

Behavioral and Serologic Survey of Men Who Have Sex with Men in Beijing, China: Implication for HIV Intervention

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Abstract

We assessed HIV prevalence and associated behaviors and risk factors among men who have sex with men (MSM) in Beijing, China. Five hundred MSM were recruited for a biological and behavioral survey using respondent-driven sampling (RDS) in 2009. Serologic specimens were tested for markers of HIV and syphilis infection. A computer-assisted personal interview (CAPI) administered questionnaire gathered information including demographic characteristics, sexual behaviors, HIV testing, and social norms concerning condom use. The adjusted HIV prevalence was 8.0%, syphilis 22.0%. HIV testing and disclosure was low; only 39.3% had HIV tested in the past 12 months, 49.7% knew their own HIV status and 22.8% knew their last male partner's HIV status. HIV infection was associated with syphilis, ever having sex with a woman, not knowing the HIV status of the most recent male partner, and never buying condoms in the past 12 months. Stronger endorsement of positive social norms around condom use strongly and predicted lower prevalence of HIV infection. Compared to surveys of similar design in the recent past, HIV continues to spread rapidly among Beijing's MSM. Our results identify points of intervention that, if addressed in time, may still alter the course of the epidemic including the promotion of HIV testing and partner disclosure, syphilis control and particularly changing social norms around condom use.

Introduction

IN CHINA, men who have sex with men (MSM) are growing as a category of HIV transmission.^{1–8} According to the latest estimation conducted jointly by Ministry of Health of China, World Health Organization, and Joint United Nations Programme on HIV/AIDS (UNAIDS) in 2009, there were approximately 740,000 people living with HIV/AIDS in China at the end of 2009, among whom male–male sexual transmission accounted for 14.7%. Of the estimated 48,000 new HIV infections that took place in 2009, homosexual transmission accounted for 32.5%—a substantial increase compared with the 2007 estimate, where 12.2% were infected through homosexual transmission.^{9,10} To date, transmission of HIV among MSM has

not been well-examined in China, and no behavioral theory-driven prevention intervention has been widely implemented among MSM in China to date. This serious problem underscores the needs for rigorous epidemiologic studies and data-driven HIV prevention interventions. Few epidemiologic and surveillance surveys use measures with enough detail to accurately characterize the specific behaviors that drive HIV transmission and can serve as the basis for the design of effective interventions in China. Moreover, few surveys use rigorous sampling methods, rather they rely primarily on convenience samples.

Since the introduction of voluntary counseling and testing (VCT) for the general population and specific testing interventions for MSM, increasing numbers of MSM have tested

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for HIV and learned their HIV status.¹¹ Emerging data from around the world point to widespread sexual harm reduction practices among MSM based on knowing their own and their partners' serostatus. "Serosorting" or "seroadaptation," for example, entails selecting partners, limiting roles in anal sex, or engaging in condom use on the basis of concordant HIV status thus reducing the risk for HIV transmission or acquisition.¹²⁻¹⁷ However, these methods to reduce HIV infection risk have not been formally evaluated for their efficacy; some may be ineffective, some may increase risk. Their very presence and applicability in the Chinese context have not been studied.

A challenge in conducting research among MSM is they are a stigmatized, hidden population in all areas of the world, difficult to access and therefore many surveys rely on convenience sampling. The respondent-driven sampling (RDS) method is a recruitment/sampling approach using long chains of referral for obtaining a more inclusive and, purportedly, more representative sample from hidden populations.^{18,19} RDS has been used successfully among MSM in China.^{22,36} For the present survey to obtain more reliable estimates of HIV and syphilis prevalence and more detailed behavioral data, we used RDS recruitment and analysis among the MSM population in Beijing, China.

Methods

Participants

A cross-sectional study was conducted among MSM from September 2009 to October 2009 in Beijing. Participants were eligible if they were male, 18 years age or older, a Beijing resident, had sex with another man in the past 12 months (sex can be defined as oral, anal, or mutual masturbation), had a valid study recruitment coupon, had not previously participated in the survey, and were able to provide written informed consent. The study was approved by the Committees for Human Research of the National Center for AIDS of the China Center for Disease Control and Prevention, Vanderbilt University and the University of California San Francisco.

Recruitment

Study participants were recruited using respondent-driven sampling (RDS). Seven MSM were selected to function as recruiter "seeds" and were diverse with respect to the types of venues that they frequented (e.g., bars, parks, bathhouse, and the Internet). Seeds were evaluated for their commitment to the goals of the study and motivation to recruit three eligible peers in their social network. Seeds were each asked to recruit up to three participants, who in turn were asked to recruit a subsequent wave of up to three participants, and so on, until our target sample size was reached and equilibrium was achieved on key variables (age, educational attainment, marital status, occupation, residence, income, anal sex role, number of male sex partners). Equilibrium is achieved when the composition of the sample reaches stability and does not change as recruitment continues to the point sample size is achieved. Equilibrium was achieved in four waves of recruitment or less for all key variables. All subsequent participants had to be a member of the recruiter's social network and meet the eligibility criteria for the study. Each participant was given three recruitment coupons/cards with study in-

formation to hand to potential recruits. To keep track of social networks, each card had a number code that connected participants back to the initial seeds. Participants were compensated 30 Yuan (CNY) for their participation in the study, as well as 20 Yuan (CNY) for each eligible participant they recruited who subsequently completed a study interview.

Measures

After providing informed consent, participants completed a CAPI administered questionnaire in a separate room of the Beijing CDC clinic. Trained health professionals conducted the interviews. Each study participant was assigned a unique and confidential identification code for the questionnaire and specimens. Questions included demographic information (e.g., age, ethnicity, education, marital status, occupation, residence, income, and health insurance status), sexual behaviors (e.g., age of the first sex with male and female partners, self-identified sexual orientation, role in anal sex, and the number and types of male and female sex partners in the past 6 months), HIV testing information, and drug using information. We also asked partner by partner sexual behavior (i.e. an assessment of sexual behavior on a partner by partner basis as opposed to an aggregate assessment across all partners), condom use, and HIV status awareness questions for up to three male partners and two female partners within the prior 6 months. A five-item condom use social norms scale was adapted to the China context from previously validated instruments from North America through development with focus group discussions, key informant interviews and pilot testing in the field.^{20,21} Items in the scale included such questions as "My friends always use condoms when having anal sex with new partners", with a 6-point Likert-like scale to record responses (social norms score ranges from 1 to 6 for answering questions of strongly disagree, somewhat disagree, slightly disagree, slight agree, somewhat agree, strongly agree, respectively). The internal reliability of the scale was tested by the Cronbach α (0.925) and assessed for its linear relationship with HIV infection. The complete CAPI administered questionnaire was also pilot tested among MSM volunteers in the real-life survey setting.

Laboratory testing

Serologic specimens collected from participants were tested for syphilis (rapid plasma reagin [RPR] test, Shanghai Rongsheng, China) with confirmation of positive tests by the *Treponema pallidum* particle assay (TPPA) test (Fujirebio inc., Japan), and HIV-1 antibody (enzyme-linked immunosorbent assay [ELISA], Vironostika HIV Uni-Form plus O, bioMerieux, Holland) with confirmation by Western blot confirmation (HIV Blot 2.2 WBTM, Genelabs Diagnostics).

Data analysis

Survey data were analyzed to produce population point estimates using RDSAT software version 5.6 (www.respondentdrivensampling.org), which adjusted for personal network size and homophily in recruitment. Homophily is a mathematical metric between -1 and 1 that represents the tendency of individuals in a group to form social bonds with others similar to them. A value of 0 means that the formation of social bonds is independent of group membership. A value

of 1 indicates that no social bonds with outsiders exist. A value of -1 means all social bonds are formed with people outside of the group. We calculated the crude and RDSAT-adjusted univariate analyses for the characteristics of MSM in the sample. Bivariate associations between selected variables and HIV were conducted using RDSAT-generated weights on the HIV infection outcome imported into in SAS version 9.1 (SAS, Cary, NC).

Variables significant at a level of $p < 0.10$ in bivariate analyses were considered candidates for multivariate models. Multivariate logistic regression models were constructed (using RDSAT-generated HIV result weights) to select independent factors for HIV infection, while controlling for potential confounding factors. Both adjusted odds ratio (AOR) and confidence interval (CI) were obtained for each explanatory variable in the final model.

Results

A total of 501 participants were recruited for the study in 2 months; 43.4% (501/1154) of the distributed coupons were actually returned and the holder interviewed. Figure 1 shows the fewest and the highest number of waves achieved was 2 and 13, respectively. One participant was referred to the VCT clinic due to ineligibility (younger than 18 years old). All 500 eligible participants completed the questionnaire and provided blood samples. Table 1 outlines the characteristics of the sample. The median age was 29 years. Most were Han (96.0%) and received a high school (35.6%) or above education (32.9%). Only 4.8% received a primary school or no education. Most men were unmarried (72.8%) and had fulltime jobs (82.5%). The majority (61.2%) of the participants reported having two or more sexual partners in the past 6 months. By self-reported sexual orientation, 61.7% identified as homosexual, 34.7% as bisexual, and only 1.7% as heterosexual. Although most of the participants had known locations for HIV test (89.0%), only 39.3% had HIV tested in the past 12 months. About half (49.7%) of participants know their own HIV status and only 22.8% knew their last male partner's HIV

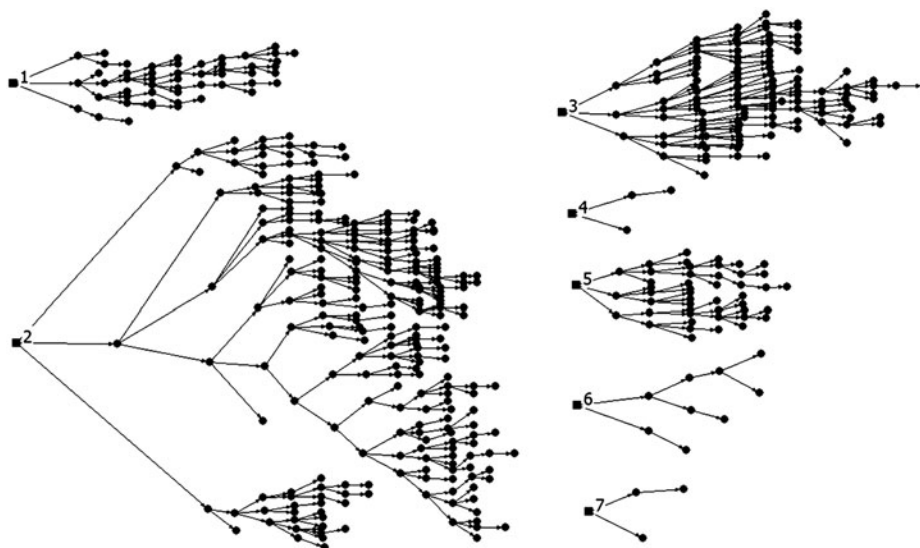
status. Very few (0.1%) acknowledged noninjection drug use; none injected drugs. The adjusted prevalence of HIV was 8.0% (95% CI 4.6–12.2%), 22.0% (95% CI 16.8–27.0%) for syphilis, and 4.2% (95% CI 1.8–7.2%) for HIV and syphilis coinfection.

Table 2 presents the crude and RDSAT-adjusted results of bivariate associations of demographic, sexual risk, and the condom use social norms scale. Significant bivariate predictors of HIV infection were age (older than 25 years), married, lived in Beijing less than 1 year, ever had sex with a woman, had more than one male sexual partner in the past 6 months and syphilis-positive. HIV infection was significantly less likely among MSM who had health insurance, had a regular male partner in the past 6 months, discussed HIV status with the last male partner, known the HIV status of the last male partner, self-reported HIV status to the last male partner and bought condoms in the past 12 months.

Table 3 presents adjusted results of multivariable logistic regression for HIV infection. In multivariable analysis, increased risk of HIV infection was associated with being syphilis-positive (AOR 4.7, 95% CI 2.3–9.8), having ever had sex with a woman (AOR 2.7, 95% CI 1.1–6.8), not knowing HIV status of the last male sexual partner (AOR 7.9, 95% CI 1.0–60.9), and not buying condoms within the past 12 months (AOR 2.2, 95% CI 1.0–4.8). Decreased risk of HIV infection was strongly and significantly associated with higher score on the condom use social norms scale (AOR 0.8 per point, 95% CI 0.7–0.9). Figure 2 illustrates the HIV prevalence with the condom use social norms scores among Beijing MSM.

Discussion

Our 2009 survey found HIV prevalence among MSM in Beijing at 8.0%, continuing a progressive increase from 0.4% in 2004 to 5.8% in 2006 determined by previous surveys in Beijing using identical RDS methods.²² HIV prevalence among MSM in Beijing is still rising. Our finding is consistent with China's current HIV prevalence trends due to increasing sexual transmission over the earlier predominant injection



Notes: Number of initial seeds 1; 2, 3 and 5; 4; 6; 7 represented different networks of bar, park, bathhouse, Internet and others, respectively.

FIG. 1. The spread from the various initial seeds.

TABLE 1. CRUDE AND ADJUSTED DEMOGRAPHIC, BEHAVIORAL, AND HIV PREVALENCE INDICATORS OF MSM IN BEIJING, 2009 (N=500)

Variable	Homophily	Equilibrium sample ^a %	Crude ^{b,c} % (n)	Adjusted % (95% CI)
Age (median 29, range 18–71)				
18–25	0.126	34.9	34.6 (173)	36.4 (29.3–43.2)
>25	0.181	65.1	65.4 (327)	63.6 (56.8–70.7)
Ethnicity				
Han	–0.024	93.7	93.6 (468)	96.0 (93.9–97.7)
Others	0.024	6.3	6.4 (32)	4.0 (2.3–6.1)
Education				
No education/elementary primary school	0.118	5.6	5.8 (29)	4.8 (2.2–8.4)
Middle school	0.096	27.0	26.8 (134)	26.7 (21.1–32.8)
High school	0.015	32.8	32.6 (163)	35.6 (29.0–42.4)
College or above	0.339	34.6	34.8 (174)	32.9 (25.7–39.8)
Current marital status				
Married	0.203	22.5	20.8 (104)	27.2 (20.4–36.2)
Unmarried	0.387	77.5	79.2 (396)	72.8 (63.8–79.6)
Occupation/work status				
Employed	0.226	85.3	85.4 (427)	82.5 (76.5–88.0)
Not employed	0.104	9.2	9.2 (46)	9.0 (5.5–12.9)
Student	0.082	5.5	5.4 (27)	8.6 (3.9–13.6)
Monthly income in the past 12 months (CNY)				
None	0.011	11.8	11.6 (58)	15.7 (10.4–21.5)
<1000	0.036	9.3	9.4 (47)	8.0 (4.7–11.7)
1000–2999	–0.018	54.2	54.2 (271)	56.8 (50.3–62.8)
3000–4999	0.006	15.9	16.0 (80)	12.4 (9.5–16.7)
≥5000	0.208	8.8	8.8 (44)	7.0 (3.6–11.5)
Beijing permanent residents	0.145	17.2	18.2 (91)	12.0 (8.5–16.1)
Have health insurance	0.121	46.1	47.2 (236)	45.6 (39.5–52.7)
Sexual orientation				
Homosexual	0.154	68.2	69.2 (346)	61.7 (55.4–68.4)
Heterosexual	–0.999	1.1	1.0 (5)	1.7 (0.2–3.4)
Bisexual	–0.259	30.1	29.4 (147)	34.7 (29.3–41.1)
Do not know	0.236	0.5	0.4 (2)	1.8 (0–4.1)
Self-reported role in anal sex with males				
Insertive	–0.162	26.7	27.1 (133)	29.6 (24.5–36.2)
Both insertive and receptive	0.145	59.7	59.4 (291)	53.7 (46.4–59.6)
Receptive	–0.367	13.6	13.5 (66)	16.7 (11.7–22.8)
Had male sexual partner in the past 6 months	0.251	97.6	97.6 (488)	96.7 (93.6–98.9)
Type of the most recent male partner in the past 6 months				
Regular partner	0.199	63.5	63.3 (309)	60.8 (53.6–67.7)
Casual partner	0.100	36.5	36.7 (179)	39.2 (32.3–46.4)
Number of male sexual partners >1 in the past 6 months	0.368	69.8	71.4 (357)	61.2 (54.5–68.5)
Unprotected insertive anal sex with the most recent male partner in the past 6 months	–0.075	36.2	36.6 (127)	34.8 (28.3–42.3)
Unprotected receptive anal sex with the most recent male partner in the past 6 months	–0.013	40.8	40.4 (115)	40.5 (31.5–48.1)
Ever had sex with female	0.051	56.8	56.6 (283)	61.2 (54.2–67.8)
Had female sexual partner in the past 6 months	–0.147	21.1	20.8 (104)	25.8 (19.4–32.2)
Unprotected sex with female sexual partner in the past 6 months	–0.099	76.2	72.1 (75)	79.6 (65.8–97.8)
Discussed HIV status with the most recent male partner	0.100	51.1	52.0 (253)	48.6 (42.4–56.5)
Self-known the HIV status	–0.004	68.4	64.7 (320)	49.7 (41.9–56.4)
Known the HIV status of the most recent male partner	0.041	25.7	26.4 (129)	22.8 (18.3–28.2)
Told the most recent male partner your HIV status	0.064	47.1	48.4 (236)	45.6 (38.7–52.3)
Known where to get HIV test	0.502	93.8	94.2 (470)	89.0 (84.2–94.0)
Ever had a HIV test	0.399	64.4	66.8 (334)	51.4 (43.3–58.6)
Had a HIV test in the past 12 months	0.283	52.6	53.2 (266)	39.3 (33.6–46.0)
Received free condoms/lubricant in the past 12 months	0.401	87.2	87.2 (436)	78.0 (72.4–84.6)
Bought condoms in the past 12 months	0.066	50.9	49.8 (249)	52.0 (44.9–58.4)
Non-injection drug use in the past 12 months	–0.991	0.9	0.8 (4)	0.1 (0–0.1)
HIV positive	0.058	7.4	7.2 (36)	8.0 (4.6–12.2)
Syphilis positive	0.023	22.1	22.0 (110)	22.0 (16.8–27.0)
Both HIV and Syphilis positive	–1.0	3.0	3.0% (15)	4.2 (1.8–7.2)

^aComposition of the sample when the sample reached stability.
^bSubgroups do not always add up to totals due to missing data.
^cComposition of the sample at the end of data collection.
MSM, men who have sex with men; CI, confidence interval.

TABLE 2. CRUDE AND ADJUSTED BIVARIATE ASSOCIATIONS BETWEEN SELECTED VARIABLES AND HIV INFECTION AMONG MSM, BEIJING, 2009 (USING RDSAT-GENERATED WEIGHTS)

Variable	Crude % (n) ^a	Adjusted % (95% CI)	p
Age			
18–25	6.4 (11)	4.1 (1.2–8.3)	0.019
>25	7.6 (25)	10.2 (5.3–15.9)	
Current marital status			
Married	11.5 (12)	13.7 (4.4–23.4)	0.005
Unmarried	6.1 (24)	5.9 (2.8–9.8)	
Lived in Beijing less than 1 year			
Yes	13.1 (11)	13.7 (5.1–24.1)	0.017
No	6.0 (25)	6.6 (3.4–10.6)	
Have health insurance			
Yes	3.8 (9)	5.5 (1.6–10.7)	0.029
No	10.2 (27)	10.2 (5.7–15.8)	
Sexual orientation			
Homosexual	7.2 (25)	8.5 (4.2–13.2)	0.595
Others	7.1 (11)	7.9 (2.9–13.8)	
Role in anal sex with males			
Insertive	6.0 (8)	6.2 (1.4–12.0)	<0.001
Equally	8.9 (26)	10.4 (5.5–17.4)	
Receptive	3.0 (2)	3.4 (0–9.3)	
Type of the most recent male partner in the past 6 months			
Regular partner	5.5 (17)	5.5 (2.4–9.8)	0.020
Casual partner	10.1 (18)	11.4 (4.7–19.3)	
Unprotected insertive anal sex with the most recent male partner in the past 6 months			
Yes	6.3 (8)	8.7 (1.3–16.0)	0.623
No	7.3 (16)	6.5 (2.7–11.6)	
Unprotected receptive anal sex with the most recent male partner in the past 6 months			
Yes	7.8 (9)	10.7 (2.4–18.6)	0.694
No	10.0 (17)	8.7 (3.2–13.8)	
Ever had sex with female			
Yes	9.2 (26)	10.8 (5.8–17.1)	0.004
No	4.6 (10)	3.4 (0.8–7.1)	
Had female sexual partner in the past 6 months			
Yes	9.6 (10)	15.0 (5.0–28.9)	0.003
No	6.6 (26)	5.8 (3.1–9.1)	
Unprotected sex with female sexual partner in the past 6 months			
Yes	3.4 (1)	34.1 (0–61.9)	0.050
No	12.0 (9)	20.2 (0–100)	
Discussed HIV status with the most recent male partner			
Yes	4.7 (12)	3.9 (1.6–7.3)	0.002
No	9.8 (23)	12.3 (6.0–19.2)	
Self-known the HIV status			
Yes	5.3 (17)	8.1 (3.8–13.4)	0.591
No	8.0 (14)	7.5 (2.8–12.8)	
Known the HIV status of the most recent male partner			
Yes	1.6 (2)	1.0 (0–2.3)	0.014
No	9.2 (33)	10.1 (5.6–15.4)	
Told the most recent male partner your HIV status			
Yes	4.2 (10)	4.0 (1.4–7.1)	0.003
No	9.9 (25)	11.5 (5.6–18.0)	
Level of HIV risk for self-perception			
Great	28.6 (18)	28.7 (15.1–43.7)	<0.001
Moderate	7.6 (7)	13.1 (4.0–24.7)	
Small	3.5 (10)	4.3 (1.1–7.2)	
None	1.7 (1)	1.5 (0–5.4)	
Ever had a HIV test			
Yes	7.5 (25)	10.3 (5.1–15.3)	0.250
No	6.6 (11)	7.2 (2.6–12.5)	
Had a HIV test in the past 12 months			
Yes	6.0 (16)	7.3 (3.2–11.0)	0.370
No	8.6 (20)	9.5 (4.6–15.4)	

(continued)

TABLE 2. (CONTINUED)

Variable	Crude % (n) ^a	Adjusted % (95% CI)	p
Received free condoms/lubricant in the past 12 months			
Yes	7.3 (32)	8.3 (4.2–10.8)	0.291
No	6.3 (4)	32.6 (6.1–49.8)	
Bought condoms in the past 12 months			
Yes	5.2 (13)	4.7 (2.1–8.5)	0.005
No	9.2 (23)	11.1 (5.8–17.4)	
Syphilis status			
Positive	13.6 (15)	19.1 (8.4–31.5)	<0.001
Negative	5.4 (21)	4.8 (2.4–7.6)	
Condoms use social norms (Cronbach α =0.925, median 18, range 5–20)	AOR (95% CI) 0.8 (0.7–0.9)	Wald χ^2 =26.409	<0.001

^aSubgroups do not always add up to totals due to missing data. MSM, men who have sex with men; CI, confidence interval; AOR, adjusted odds ratio.

related mode, with high syphilis prevalence, and with homosexual transmission increasing rapidly in many major urban areas of the country.^{2,9,46} In our survey, only about half (51.4%) of participants had ever tested for HIV. Although this was higher than previous surveys conducted in Beijing, it was still lower than in Western countries.^{23–26} Awareness of one’s HIV-positive status has been a key to preventing onward HIV transmission among MSM from the perspectives of changing behavior after testing and prevention with positives interventions.²⁷ Moreover, identifying HIV-infected MSM is a necessary first step in linking them to HIV care for the benefits to their own health and also for the potential of lowering viral loads and therefore infectivity through anti-retroviral treatment.¹⁵ We also found in our survey that only a minority (22.8%) of MSM knew the serostatus of their most recent partner and this lack of knowledge was associated with being HIV-infected. These low levels of knowing one’s own serostatus and even lower levels of knowing one’s partners’ serostatus speak to difficulty of achieving a level of “serosorting” or “seroadaptation” as measured among MSM in the West.^{12,14,28–32} Therefore, the multiple health and preventive benefits of HIV testing and serostatus disclosure have not been realized for MSM in China.

Our study is also the first to show that HIV prevalence was strongly associated with condom use social norms among Chinese MSM. Given the strong correlation we found between a preventive effect and increasing score, interventions to change social norms around condom use may affect sexual behavior among MSM when using condoms.^{33,34} Interventions of this type might utilize peer based health education and counseling.^{47,48} In addition, our finding also showed that

persons buying condoms in the past 12 months had a lower HIV prevalence compare to those who never bought condoms. Our study and the previous studies among Chinese MSM showed high proportion of unprotected sex with male and female.^{4,35,36} Therefore condom promotion and distribution may both be effective in preventing sexually acquired HIV infection in China.

Two findings bear further examination. In bivariate analysis, having female partners and being in Beijing less than 1 year were associated with higher HIV prevalence. The former finding was also held significance in the multivariate analysis. The relationship between having female partners, sexual orientation and identity, and is likely to be complex and may be rapidly changing with respect to HIV risk in China.^{37–40} Although evidence is not likely to prove that having sex with a woman would be of higher risk of acquiring HIV than with another MSM, particularly given the prevalence of HIV among other populations of women in China, there is the concern of HIV transmission to women and other sexual networks.^{41,42} In the Chinese context, due to marriage, family, parenthood and other traditional concepts, many MSM had to get married with homosexual orientation, so they may both have sex with men and with women who are their wives and often the mother of their child.^{43,44} A comprehensive HIV control strategy for MSM should also pay attention to prevent HIV transmission to women and children.

This study was subject to several limitations. First, there are limitations to RDS that have been previously noted.⁴⁵ For example, seeds for RDS recruitment are purposefully selected and do not guarantee the inclusion of all networks of MSM. Beijing is a particularly large city and RDS may not be able to

TABLE 3. ADJUSTED MULTIVARIABLE LOGISTIC REGRESSION FOR HIV INFECTION AMONG MSM, BEIJING, 2009 (USING RDSAT-GENERATED WEIGHTS)

Variable	AOR (95% CI)	Wald χ^2	p
Current syphilis positive	4.7 (2.3–9.8)	17.184	<0.001
Ever had sex with female	2.7 (1.1–6.8)	4.732	0.030
Unknown the most recent male sexual partner’s HIV status in the past 6 months	7.9 (1.0–60.9)	3.947	0.047
Condoms use social norms scores	0.8 (0.7–0.9)	17.008	<0.001
Never buy condoms in the past 12 months	2.2 (1.0–4.8)	3.918	0.048

MSM, men who have sex with men; AOR, adjusted odds ratio; CI, confidence interval.

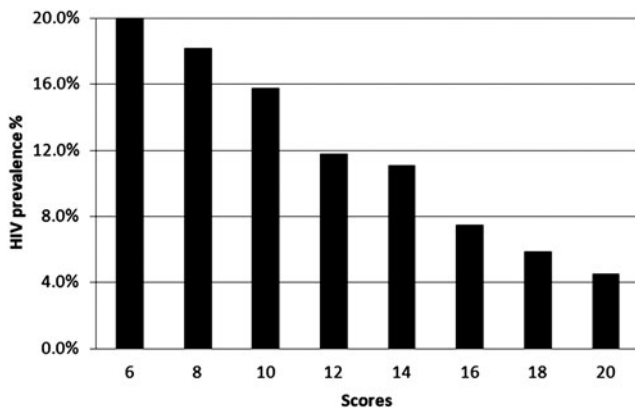


FIG. 2. HIV prevalence among men who have sex with men (MSM) with condom use social norms scores in Beijing.

reach across all geographic areas and across all networks. Second, we recognize that, although data were collected by CAPI, some high-risk behaviors and self-reported HIV status may have been underreported due to discrimination or stigma, leading to potential underestimation of prevalence and associations with these variables and HIV infection. Third, the multivariate analysis was conducted by using exported weights for the dependent variable (HIV infection). However, standardized guidelines for RDS data multivariate analysis are still under development and require validation.

Conclusions

Our study showed that HIV continues in a phase of rapid growth among MSM in Beijing, yet at 8% there is still opportunity for prevention. Meanwhile, high proportion of MSM have sex with women and are not Beijing permanent residents. Our findings reinforce the need for a multidimensional approach to prevent further spread of HIV infection both among these men and to their heterosexual partners in Beijing, and to at-risk groups in other geographic areas. One area of strong appeal is to increase resources and efforts to make HIV testing opportunities more accessible and to reduce barriers to testing so that infected persons can learn their status and obtain appropriate medical care and prevention services.

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Author Disclosure Statement

No competing financial interests exist.

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