

Original Article

Sociobehavioral Correlates of HIV Risk among Men Who Have Sex with Men in Chhattisgarh, India: Analysis of Sentinel Surveillance Data

Malay Kumar Saha^{1*}, Tanmay Mahapatra¹, Subrata Biswas¹, Piyali Ghosh¹,
Sanchita Mahapatra¹, Alope Kumar Deb¹, and Kshitiz Diwan²

¹National Institute of Cholera and Enteric Diseases, Kolkata; and

²Chhattisgarh State AIDS Control Society, Raipur, India

SUMMARY: Men who have sex with men (MSM) in India are mostly hidden due to stigma and discrimination and are at a higher risk of acquiring human immunodeficiency virus (HIV). HIV Sentinel Surveillance (HSS) reported an increased HIV burden in Chhattisgarh, an important state in central India. This state has the distinction of having the highest HIV prevalence among MSM in India; therefore, it warrants special attention; hence, we focused on the role of MSM in the HIV epidemic in this state. Cross-sectional analysis of the most recent latest (2010–2011) HSS data of 227 MSM in Chhattisgarh revealed a HIV seropositivity of 14.98%. Older age, unemployment, and receiving money for sex with a man were associated with a higher HIV risk. Participants were mostly young (mean age, approximately 26 years), school-level educated (51.98%), urban residents (99.56%), in service (46.26%), not involved in heterosexual activity (97.36%), or paid sex (68.72%). None of the participants reported injection drug use, and almost all of them (98.68%) were kothis. Some of the observed associations lacked statistical power due to sparse data obtained during this initial surveillance among MSM in Chhattisgarh. Therefore, further studies involving a larger population are needed to understand the role of MSM in the dynamics of the HIV epidemic in this state to facilitate the planning of appropriate interventions, as the epidemic is likely to be concentrated among MSM in Chhattisgarh.

INTRODUCTION

India has the highest burden of human immunodeficiency virus (HIV) in Asia and the third largest burden worldwide. There are an estimated 2.39 million HIV-infected people in India, representing a prevalence of 0.31% among the adult population in 2009 (1). HIV sentinel surveillance (HSS) provides insights into the seropositivity levels and trends in HIV among different populations (2) and helps refine and prioritize prevention strategies (2,3). The HIV seropositivity levels declined among antenatal clinic (ANC) attendees (considered as a proxy for the general adult population to estimate HIV seropositivity levels) between 2010 and 2011 in all high-prevalence states in India. However, the levels increased in some low- and moderate-HIV prevalence states, as reported for Chhattisgarh, the 16th largest state (with a population of >25.5 million) in central India (4).

Due to a diverse sexual mixing pattern, high-risk sexual behavior, and poor access to HIV prevention programs, men who have sex with men (MSM) have been identified as a high-risk group for the HIV epidemic worldwide. The HIV prevalence among MSM in Southeast Asia has been found to be 5–15 times higher

than that in the general population (3). An estimated 3.1 million MSM live in India, and this population is often a target for social discrimination or abuse (4,5). From an Indian perspective, the term MSM refers to the sexual behaviors of men, irrespective of their sexual identity, orientation, and desire (3,6). There is little acknowledgment of same-sex behavior; therefore, reaching this hidden population is a challenge in India. As a result, an accurate determination of the prevalence of HIV in this population and understanding their role in the HIV epidemic remains extremely difficult (7). The estimated percentage positivity of HIV among MSM varied from 0.4% to 17.6% across Indian states in 2007 (8,9). In addition, the HIV epidemic is becoming concentrated among MSM in some states in India (1). The estimated Indian national average for HIV seropositivity among MSM was 4.43% between 2010 and 2011. In addition, Chhattisgarh had the highest prevalence among all states, with a positivity of 14.98%, while the corresponding positivity in the adult population was 0.43% in the state (4).

Growing concern on the emerging HIV epidemic in Chhattisgarh has called for focused attention on the MSM population. Understanding the sociodemographic and behavioral correlates of HIV risk among MSM is essential to facilitate the planning of appropriate interventions to combat the spread of HIV. However, the paucity of available information is a deterrent in this regard, because little information is available. The aim of this study is to measure the potential association between HIV seropositivity and various sociodemographic and behavioral factors among MSM in Chhattisgarh by analyzing HSS 2010–2011 data.

Received April 18, 2013. Accepted June 4, 2014. J-STAGE Advance Publication November 25, 2014.

DOI: 10.7883/yoken.JJID.2013.068

*Corresponding author: Mailing address: NACO Regional Institute (East) for HIV Sentinel Surveillance, Virology Division, National Institute of Cholera and Enteric Diseases, Beliaghata, Kolkata-700010, India. Tel: +91-33-23633856, E-mail: sahamk@yahoo.com

MATERIALS AND METHODS

General setting: The HSS site is a designated targeted intervention project site (a drop-in-center where MSM meet, interact with each other, obtain advice, seek healthcare services, and collect condoms) that provides focused interventions for the prevention of HIV in the high-risk population (2,10). HSS was performed following unlinked anonymous testing strategies after receiving ethical approval from the National AIDS Control Organization, New Delhi, India.

Study design: Cross-sectional analysis of national HSS data collected during HSS 2010–2011 from a designated HSS site for MSM in Raipur, the capital city of Chhattisgarh.

Inclusion criteria and recruitment: MSM aged 15–49 years who had anal or oral sex with a male partner in the last month and who visited the sentinel site for the first time between March and June, 2011, were included after providing informed consent (2). All eligible participants were recruited consecutively to avoid selection bias, and a total of 227 eligible MSM were included in the study.

Data collection: A trained counselor explained the relevant information to eligible MSM, obtained informed consent, and administered the questionnaire to the consenting participants to collect anonymous information regarding their sociodemographic and behavioral characteristics. The quality of data collection was ensured at every step of the recruitment process using proper documentation and monitoring (2).

HIV testing: Blood specimens were collected from each eligible consenting respondent using the dried blood spot (DBS) method for anonymous HIV testing. Each sample was labeled with the sentinel site code, subsite number, sample number, and date of collection without mentioning personal identifiers to maintain anonymity (2). Samples were screened for HIV using sensitive ELISA (Microlisa HIV; J Mitra and Company Pvt Ltd., New Delhi, India), and samples that were positive on screening were retested using specific ELISA (Genedia HIV 1/2 ELISA 3.1, Green Cross Medical Science Corporation, Chungbuk, Korea). Samples that were positive in both ELISAs were considered to be HIV seropositive. All the HIV-positive samples and 20% of the negative samples were retested in the National HIV Reference Laboratory for quality assurance (2).

Data analysis: Descriptive analyses were performed to record the age, years of stay at the current place of residence, education level, the reason for attending the sentinel site, the current place of residence, occupation, self-identified MSM type, days since the last sexual act with a man, history of having sex with a female in the last 6 months, history of receiving or paying money for sex with a man in last 12 months, history of any intravenous drug use, and HIV seropositivity status of all participants. The distribution of sociodemographic and behavioral factors were determined across the strata of the HIV seropositivity status. Descriptive analysis of these factors and HIV test results across the paid sex strata was also performed. Bivariate and multivariate analyses were then performed using simple and multiple logistic regression methods to estimate the association

between sociodemographic and behavioral characteristics and HIV seropositivity. Stratified analyses were also performed to estimate how these associations varied across the strata of paid sex. All statistical analyses were conducted using SAS version 9.3.

RESULTS

The mean age of participants was approximately 26 years, and they had stayed at their current place of residence for an average of approximately 25 years (Table 1). The mean time since having sex with a man was approximately 6 days. Most subjects (51.98%) had an edu-

Table 1. Distribution of demographic, sociobehavioral characteristics, and HIV serostatus among MSM attending HIV sentinel surveillance site in Chhattisgarh state of India, 2010–2011 (*n* = 227)

| Continuous variable | | Mean | SD |
|---|--------------------------------|-------|---------|
| Age (years) | | 25.67 | 5.87 |
| Years of residing at current place | | 25.40 | 7.02 |
| Days since last sex with a man | | 6.36 | 4.19 |
| Categorical variable | Category | No. | (%) |
| Education | Illiterate | 2 | (0.88) |
| | Literate & till 5th standard | 23 | (10.13) |
| | 6th to 10th standard | 118 | (51.98) |
| | 11th to Graduation | 78 | (34.36) |
| | Post graduation | 6 | (2.64) |
| | Unknown | 0 | (0.00) |
| Reason for coming to service point | Collect condoms | 8 | (3.52) |
| | Drop-in center | 215 | (94.71) |
| | Unknown | 4 | (1.76) |
| Current place of residence | Urban | 226 | (99.56) |
| | Rural | 0 | (0.00) |
| | Unknown | 1 | (0.44) |
| Occupation | Domestic servant | 3 | (1.32) |
| | Skilled/Semi-skilled worker | 28 | (12.33) |
| | Petty business/Small shop | 10 | (4.41) |
| | Large business/Self employed | 12 | (5.29) |
| | Service (Governmental/Private) | 105 | (46.26) |
| | Student | 35 | (15.42) |
| | Local transport worker | 7 | (3.08) |
| | Hotel staff | 8 | (3.52) |
| | Unemployed | 17 | (7.49) |
| | Unknown | 2 | (0.88) |
| Type of MSM | Kothi | 224 | (98.68) |
| | Double decker | 2 | (0.88) |
| | Unknown | 1 | (0.44) |
| Had sex with female in last 6 months | No | 221 | (97.36) |
| | Yes | 4 | (1.76) |
| | Unknown | 2 | (0.88) |
| Received/paid money for having sex with man in last 12 months | No | 156 | (68.72) |
| | Only received money | 12 | (5.29) |
| | Both received and paid money | 57 | (25.11) |
| | Unknown | 2 | (0.88) |
| History of intravenous drug use | Yes | 0 | (0.00) |
| | No | 222 | (97.80) |
| | Unknown | 5 | (2.20) |
| HIV test result | Negative | 193 | (85.02) |
| | Positive | 34 | (14.98) |
| | Unknown | 0 | (0.00) |

MSM, men who have sex with men; SD, standard deviation.

cation level of the 6th to the 10th standard, followed by the 11th standard to graduation (34.36%). Most (94.71%) of the participating MSM visited the sentinel site because it was a drop-in center. All participants, except 1, were from urban areas, and most (46.26%) were in service. A total of 98.68% of subjects were kothis (anal receptive), 97.36% had not had sex with any female in the prior 6 months, 68.72% did not pay or receive money to have sex with a man in last 12 months, and none had a history of injection drug use (IDU). Among the 227 participating eligible MSM, 14.98% were sero-positive for HIV.

Analysis of the characteristics of the recruited MSM according to the HIV serostatus (Table 2) revealed that the HIV-infected group had a higher mean age (27.59 vs. 25.33 years) and mean years of stay at their current place of residence (27.35 vs. 25.05 years), although these differences were not statistically significant. HIV-infected MSM were also engaged in more frequent sexual activity, as evident from their lower mean number of days since they last had sex with a man (5.12 vs. 6.58), than HIV-negative participants. Education levels and the rea-

son for attending the site were similar among the HIV-positive and -negative groups. The proportion of unemployed MSM was higher among HIV-positive subjects (17.65% vs. 5.70%). In addition, the HIV-positive group had a higher proportion of MSM who received money to have sex with a man (8.82% vs. 4.66%) but had a lower proportion of those who both paid and received money to have sex with a man (17.65% vs. 26.42%).

Higher age was associated with an increased likelihood of being HIV seropositive (odds ratio [OR], 1.062; 95% confidence interval [CI], 1.002–1.125), whereas MSM that were in service (government or private) had a reduced risk of being HIV-positive compared with their unemployed counterparts (OR, 0.259; 95% CI, 0.082–0.820) (Table 3). Staying at current their place of residence for longer (OR, 1.051), having sex with a female partner in the last 6 months (OR, 1.969), and receiving money for sex with a man (OR, 1.747) were all associated with an increased probability of being HIV seropositive. In addition, attending the sentinel site to collect condoms (OR, 0.817), a longer period since last

Table 2. Distribution of demographic and sociobehavioral characteristics across HIV-positivity status, among MSM attending HIV sentinel surveillance site in Chhattisgarh state of India, 2010–2011 (*n* = 227)

| Continuous variable | | HIV negative | | | HIV positive | | | P value |
|---|-------------------------------|--------------|-------|----------|--------------|-------|------|---------|
| | | No. | Mean | SD | No. | Mean | SD | |
| Age (in years) | | 193 | 25.33 | 5.48 | 34 | 27.59 | 7.57 | 0.104 |
| Years of residing at current place | | 193 | 25.05 | 6.63 | 34 | 27.35 | 8.81 | 0.155 |
| Days since last sex with a man | | 192 | 6.58 | 4.32 | 34 | 5.12 | 3.15 | 0.022 |
| Categorical variable | Category | No. (%) | | | No. (%) | | | |
| Education | Illiterate | 1 (0.52) | | | 1 (2.94) | | | 0.432 |
| | Literate & till 5th standards | 20 (10.36) | | | 3 (8.82) | | | |
| | 6th to 10th standards | 102 (52.85) | | | 16 (47.06) | | | |
| | 11th to Graduation | 64 (33.16) | | | 14 (41.18) | | | |
| | Post graduation | 6 (3.11) | | | 0 (0.00) | | | |
| | Unknown | 0 (0.00) | | | 0 (0.00) | | | |
| Reason for coming to service point | Collect condoms | 183 (94.82) | | | 32 (94.12) | | | 1.000 |
| | Drop-in center | 7 (3.63) | | | 1 (2.94) | | | |
| | Unknown | 3 (1.55) | | | 1 (2.94) | | | |
| Occupation | Domestic servant | 2 (1.04) | | | 1 (2.94) | | | 0.264 |
| | Skilled/Semi-skilled worker | 24 (12.44) | | | 4 (11.76) | | | |
| | Petty business/Small shop | 9 (4.66) | | | 1 (2.94) | | | |
| | Large business/Self employed | 10 (5.18) | | | 2 (5.88) | | | |
| | Service (Government/Private) | 92 (47.67) | | | 13 (38.24) | | | |
| | Student | 30 (15.54) | | | 5 (14.71) | | | |
| | Local transport worker | 5 (2.59) | | | 2 (5.88) | | | |
| | Hotel staff | 8 (4.14) | | | 0 (0.00) | | | |
| | Unemployed | 11 (5.70) | | | 6 (17.65) | | | |
| | Unknown | 2 (1.04) | | | 0 (0.00) | | | |
| | Kothi | 190 (98.45) | | | 34 (100.00) | | | |
| Double decker | 2 (1.04) | | | 0 (0.00) | | | | |
| Unknown | 1 (0.52) | | | 0 (0.00) | | | | |
| Had sex with female in last 6 months | No | 189 (97.93) | | | 32 (94.12) | | | 0.472 |
| | Yes | 3 (1.55) | | | 1 (2.94) | | | |
| | Unknown | 1 (0.52) | | | 1 (2.94) | | | |
| Received/paid money for having sex with man in last 12 months | No | 131 (67.88) | | | 25 (73.53) | | | 0.325 |
| | Only received money | 9 (4.66) | | | 3 (8.82) | | | |
| | Both received and paid money | 51 (26.42) | | | 6 (17.65) | | | |
| | Unknown | 2 (1.04) | | | 0 (0.00) | | | |

See footnote of Table 1.

Table 3. Association of demographic and sociobehavioral characteristics with HIV-positivity among MSM attending HIV sentinel surveillance site in Chhattisgarh state of India, 2010–2011

| Demographic and socio-behavioral characteristic | | Category | Association with HIV-positivity | | | | | | | |
|---|------------------------------|----------|---|--------|-------|-----------------|-----------|--------|-------|-----------------|
| | | | Crude | | | | Adjusted | | | |
| | | | OR | 95% CL | | <i>P</i> values | OR | 95% CL | | <i>P</i> values |
| | | | | L | U | | | L | U | |
| Age (in years) | — | 1.062 | 1.002 | 1.125 | 0.042 | 1.090 | 0.960 | 1.239 | 0.183 | |
| Education | Illiterate | | Reference | | | | Reference | | | |
| | Literate & till 5th standard | 0.150 | 0.007 | 3.092 | 0.219 | 0.141 | 0.004 | 5.474 | 0.294 | |
| | 6th to 10th standard | 0.157 | 0.009 | 2.636 | 0.198 | 0.214 | 0.008 | 6.078 | 0.367 | |
| | 11th to Graduation | 0.219 | 0.013 | 3.712 | 0.293 | 0.396 | 0.013 | 12.276 | 0.597 | |
| | Post graduation | | Did not have sufficient subjects for calculating a valid OR | | | | | | | |
| Reason for coming to service point | Drop-in center | | Reference | | | | Reference | | | |
| | Collect condoms | 0.817 | 0.097 | 6.866 | 0.852 | 0.481 | 0.051 | 4.538 | 0.523 | |
| Years of residing at current place | — | 1.051 | 0.995 | 1.110 | 0.078 | 1.017 | 0.914 | 1.131 | 0.757 | |
| Occupation | Unemployed | | Reference | | | | Reference | | | |
| | Domestic servant | 0.917 | 0.068 | 12.322 | 0.948 | 1.156 | 0.030 | 44.172 | 0.938 | |
| | Skilled/Semi-skilled worker | 0.306 | 0.071 | 1.306 | 0.110 | 0.163 | 0.025 | 1.077 | 0.060 | |
| | Petty business/Small shop | 0.204 | 0.021 | 2.018 | 0.174 | 0.110 | 0.009 | 1.411 | 0.090 | |
| | Large business/Self employed | 0.367 | 0.060 | 2.252 | 0.279 | 0.132 | 0.014 | 1.254 | 0.078 | |
| | Service (Govt./Private) | 0.259 | 0.082 | 0.820 | 0.022 | 0.165 | 0.036 | 0.759 | 0.021 | |
| | Student | 0.306 | 0.077 | 1.206 | 0.091 | 0.308 | 0.058 | 1.624 | 0.165 | |
| | Local transport worker | 0.733 | 0.108 | 4.992 | 0.751 | 0.448 | 0.050 | 4.048 | 0.475 | |
| | Hotel staff | | Did not have sufficient subjects for calculating a valid OR | | | | | | | |
| Had sex with female in last 6 months | No | | Reference | | | | Reference | | | |
| | Yes | 1.969 | 0.199 | 19.519 | 0.563 | 1.620 | 0.097 | 27.094 | 0.737 | |
| Days since last sex with a man | — | 0.905 | 0.815 | 1.006 | 0.063 | 0.917 | 0.815 | 1.031 | 0.146 | |
| Received/paid money for having sex with man in last 12 months | No | | Reference | | | | Reference | | | |
| | Only received money | 1.747 | 0.442 | 6.907 | 0.427 | 1.186 | 0.234 | 6.013 | 0.837 | |
| | Both received and paid money | 0.616 | 0.239 | 1.591 | 0.317 | 0.523 | 0.172 | 1.592 | 0.254 | |

MSM, men who have sex with men; OR, odds ratio; CL, confidence limits; L, lower; U, upper; Govt., government.

having sex with a man (OR, 0.905), and having both received and paid money for sex with a man (OR, 0.616) were associated with a lower risk of being HIV-positive compared with the corresponding reference groups. However, data lacked sufficient power for statistical significance. The results were unchanged after adjusting for all other variables while putting all relevant ones in the model.

Stratified analyses (Table 4) to examine the associations across the strata of paid sex revealed that among subjects who neither received nor paid money to have sex with a man, a higher duration of stay at their current place of residence was associated with an increased likelihood of being HIV seropositive (OR, 1.076; 95% CI, 1.002–1.156); this result was statistically significant. Students who both paid and received money for sex with a man had a very high risk of being HIV-positive (OR, 8.000), but the results lacked statistical power.

DISCUSSION

The HIV seropositivity level among MSM participants in HSS 2010–11 in Chhattisgarh was 14.98%, which was 35 times higher than the estimated prevalence of 0.43% in ANC attendees in the same state (4). The corresponding Indian national average for HIV seropositivity was 4.43% among MSM, which was only

11 times higher than that of 0.40% among ANC attendees. In Japan, the HIV prevalence was 68-fold higher among MSM. This highlights the magnitude of the increased risk of HIV among the MSM population compared with that risk among the non-MSM population, even in a developed country where the prevalence of HIV among MSM subjects is much lower (0.8818%) (11). The high HIV seropositivity is consistent with studies on HIV among MSM in other states in India. Compared with non-MSM, MSM in Chennai had increased odds of being infected with HIV (12), as reported by Vivian et. al (OR, 8.57; 95% CI, 1.83–40.23). In addition, 17% of MSM attending 2 STI clinics in Mumbai were HIV seropositive (13).

The mean age (25.67 years) of all participants and the likelihood of being HIV-positive with increasing age (OR, 1.062; 95% CI, 1.002–1.125) corroborate the findings of a multitude of national and international studies, in which the mean age ranged from 23 to 28 years, and older MSM were at a higher risk of HIV (13–17). The social networks of individual MSM are likely to become wider with increasing age, and their sexual behaviors might also become more risky regarding the potential acquisition of HIV. The comparatively lower mean age of HSS participants, even among those who paid money for sex with a man, might be an indication that MSM at a higher risk of HIV are accessing fewer

Table 4. Association of demographic and sociobehavioral characteristics with HIV-positivity across the strata of paid sex, among MSM attending HIV sentinel surveillance site in Chhattisgarh state of India, 2010–2011 (*n* = 227)

| Characteristic | Category | Received/paid money for having sex with man in last 12 months | | | | | | | | | | | |
|------------------------------------|--------------------------------------|---|--------|--------|----------|---------------------|--------|-------|----------|----------------------------|--------|---------|----------|
| | | No | | | | Only received money | | | | Both received & paid money | | | |
| | | OR | 95% CL | | P values | OR | 95% CL | | P values | OR | 95% CL | | P values |
| | | | L | U | | | L | U | | | L | U | |
| Age (in year) | — | 1.068 | 0.992 | 1.150 | 0.082 | 1.230 | 0.974 | 1.554 | 0.082 | 1.013 | 0.892 | 1.150 | 0.841 |
| Education | Illiterate | Reference | | | | Reference | | | | Reference | | | |
| | Literate & till 5th standard | 0.143 | 0.006 | 3.310 | 0.225 | | | | | | | | |
| | 6th to 10th standard | 0.148 | 0.008 | 2.573 | 0.190 | | | | | | | | |
| | 11th to graduation | 0.260 | 0.015 | 4.442 | 0.352 | | | | | — | | | |
| | Post graduation | — | | | | | | | | | | | |
| Reason for coming to service point | Drop-in center/DIC | Reference | | | | Reference | | | | Reference | | | |
| | Collect condoms | 1.348 | 0.144 | 12.612 | 0.793 | | | | | — | | | |
| Years of residing at current place | — | 1.076 | 1.002 | 1.156 | 0.045 | 1.236 | 0.974 | 1.568 | 0.081 | 0.967 | 0.875 | 1.068 | 0.509 |
| Occupation | Unemployed | Reference | | | | Reference | | | | Reference | | | |
| | Domestic servant | 1.167 | 0.074 | 18.346 | 0.913 | | | | | — | | | |
| | Skilled/Semi-skilled worker | 0.467 | 0.061 | 3.565 | 0.463 | | | | | 0.615 | 0.044 | 8.703 | 0.719 |
| | Petty business/Small shop | 0.467 | 0.037 | 5.903 | 0.556 | | | | | | | | |
| | Large business/Self employed | 0.583 | 0.075 | 4.562 | 0.608 | | | | | — | | | |
| | Service (Govt./Private) | 0.401 | 0.090 | 1.790 | 0.231 | — | | | | 0.182 | 0.009 | 3.542 | 0.261 |
| | Student | 0.269 | 0.044 | 1.637 | 0.154 | | | | | 8.000 | 0.310 | 206.371 | 0.201 |
| | Local transport worker | 1.556 | 0.165 | 14.654 | 0.699 | | | | | | | | |
| | Hotel staff | — | | | | | | | | — | | | |
| | Had sex with female in last 6 months | Reference | | | | | | | | — | | | |
| | Yes | 1.778 | 0.177 | 17.817 | 0.625 | | | | | | | | |
| Days since last sex with a man | | 0.908 | 0.803 | 1.026 | 0.121 | 0.536 | 0.163 | 1.766 | 0.301 | 0.991 | 0.791 | 1.242 | 0.937 |

‘—’ refers to situations where due to insufficient number of subjects calculating a valid OR were not possible.
See footnote of Table 3.

targeted intervention services.

Most of the study participants in the current study had school-level education, whereas >70% of MSM were illiterate in a survey in Andhra Pradesh (13,18). This discrepancy suggests that MSM with a lower literacy level in Chhattisgarh might be less aware of the available services and programs; it is also likely that their participation is more affected by stigma and discrimination. This study also revealed that illiterates subjects were likely to be at a higher risk of HIV, which is consistent with previous findings (14,19–21). Therefore, these data suggest that the reach of intervention programs among MSM with a higher risk of HIV and lower or no education is probably less.

The nonparticipation of rural-dwelling MSM in the current study might be influenced by the geographical location of the site, which was in the city of Raipur. In 2005, Dandona et al. reported that only 14.5% of the total 7,275 MSM participants were from rural areas in Andhra Pradesh (18). In rural areas, the effects of stigma, discrimination, lack of awareness, and poor access to intervention programs are likely to be more pronounced; therefore, rural MSM are likely to be more vulnerable to HIV.

The duration of stay at the current place of residence for subjects who did not receive or pay money for sex was higher in the HIV-positive group. A longer duration of stay seemed to be associated with a higher HIV risk, but the results were not statistically significant. A previous study found no association between the duration of

stay at the current place of residence and HIV risk behavior in a cross-sectional study among MSM in Chennai in 2001 (12). The current study suggests that staying in the same place for a longer time might allow individual MSM to widen their network and become involved in diverse high-risk sexual behavior. This is because the MSM population is largely hidden, and therefore, time is needed to build acquaintances among individual MSM.

Compared with unemployed subjects, MSM who were in service (government or private) were at a much lower risk of being HIV seropositive. All other occupations also seemed to be at a lower risk of HIV than their unemployed counterparts, although the results lacked statistical power. Being HIV-positive or identified as an MSM might result in unemployment, which in turn might have reduced the participation of unemployed MSM in the current study (only 7.49% of all participants).

There are 3 different self-identified subgroups among MSM in India: kothi (showing femininity and generally playing the role of the receptive partner during anal or oral sex with a man), panthi (insertive partner), and double-decker (plays both the roles at different times) (10,22). Participants in the current study included no panthis, 2 double-deckers, and the remainder were kothis (except 1 subject who chose not to answer). In a cross-sectional study in 2007, most of the MSM attending a clinic in West Bengal identified themselves as kothis (74%), followed by panthis (14%), double-deck-

ers (7%), and transgender (5%) (23). These results suggest a growing need to reach more panthis and double-deckers because they seem to be more hidden than kothis.

Only 4 participants reported having sexual intercourse with a female. In a cross-sectional study of 6,661 MSM in Andhra Pradesh, 51% had sex with a female in the last 3 months, whereas 44% of MSM who attended 2 STI clinics in Mumbai admitted having sex with a female sex worker during their lifetime (13,18). More than 70% of 2,381 MSM attending STI clinics in Mumbai reported having sex with both males and females in another study (24). The discrepancies among these results suggest that bisexual and married MSM are probably being missed in Chhattisgarh. This bridge population likely plays an important role in spreading the epidemic from the high-risk population to the general population. Considering the increasing trend in HIV seropositivity among ANC attendees in Chhattisgarh, it should be ensured that this population should have access to HIV prevention programs. The possible reason for this is the likely social desirability bias, which prevents bisexual and married MSM from reporting their heterosexual activity because they are probably afraid of their identity being divulged and affecting their family.

MSM who received money for sex with a man had increased odds of being HIV-positive among all participants in the current study. This is consistent with the results of previous reports. In Bangkok, MSM who reported receiving money for sex were more likely to be infected with HIV compared with those who did not (OR, 2.16; 95% CI, 1.03–4.53) (14). MSM who exchanged money for sex had a higher likelihood of being infected with HIV compared with their counterparts in Chennai (adjusted OR, 3.93; 95% CI, 1.97–7.84) (12).

Surprisingly, none of the participants reported any history of IDU. MSM and IDU populations often overlap, and MSM who are IDUs are at a much higher risk of HIV; therefore, the nonparticipation of these individuals in HSS needs additional attention. A previous cross-sectional study in Chennai reported that males with a history of using illicit drug over the past 3 months had a higher likelihood of reporting sex with men (OR, 4.01; 95% CI, 1.92–8.41) (12). In a survey of 509 MSM in Zanzibar, Tanzania, the risk of HIV was higher among MSM who were also IDUs (14%) compared with non-IDUs (25). A multivariate analysis of MSM in Chennai suggested that MSM who reported using illicit drugs in the last 3 months had increased odds of having HIV compared with non-IDUs (adjusted OR, 4.01; 95% CI, 1.92–8.41) (12).

The current study suggested a possible association between several sociodemographic and behavioral characteristics and HIV-positivity in Chhattisgarh. However, because of sparse data, there was insufficient statistical power for many of the associations observed. Therefore, further studies involving a larger MSM population are needed to determine the generalizability of these observations, the trend in HIV seroprevalence among them, the strength of the association between potential risk factors and HIV positivity, and a better overall understanding of the role of MSM in the dynamics of the HIV epidemic in Chhattisgarh because the epidemic

probably is likely concentrated in this population. Nevertheless, quality laboratory assays, data management, and analysis plan used in this study contributed substantially toward highlighting the need for focused interventions to reach MSM who are older, illiterate, rural-dwelling, unemployed, bisexual, IDU, and those who exchange money for sex with men. Specifically, these population were associated with a higher HIV risk but were probably not using the targeted intervention services available at the drop-in center in Chhattisgarh.

Acknowledgments We acknowledge National AIDS Control Organization (NACO), New Delhi, and Chhattisgarh AIDS Control Society, Raipur, for supporting the study.

Conflict of interest None to declare.

REFERENCES

1. National AIDS Control Organization, Department of AIDS Control. Ministry of Health & Family Welfare, India. Annual Report 2010–2011, New Delhi - 110011. Available at <http://www.naco.gov.in/NACO/Quick_Links/Publication/Annual_Report/NACO_Annual_Report/NACO_Annual_Report_2011/>.
2. National AIDS Control Organization, Department of AIDS Control. Ministry of Health & Family Welfare, India. Operational Guidelines for HIV Sentinel Surveillance. New Delhi — 110011. 2012–13. Available at <http://www.naco.gov.in/NACO/National_AIDS_Control_Program/10711/>.
3. Asia Pacific Coalition on Male Sexual Health (APCOM). Report on mapping of MSM groups, organisations and networks in South Asia. 2008.
4. National AIDS Control Organization; Department of AIDS Control. Ministry of Health & Family Welfare, India. HIV sentinel surveillance 2010–11 A technical brief. New Delhi — 110011. Available at <http://www.naco.gov.in/NACO/National_AIDS_Control_Program/10711/>.
5. Thomas B, Mimiaga MJ, Kumar S, et al. HIV in Indian MSM: Reasons for a concentrated epidemic & strategies for prevention. *Indian J Med Res.* 2011;134:920–9.
6. Chakrapani V, Row-Kavi A, Ramakrishnan LR, et al. HIV prevention among men who have sex with men (MSM) in India: Review of current scenario and recommendations. Background paper prepared for SAATHII (Solidarity and Action Against the HIV Infection In India). 2002.
7. Pappas G, Khan O, Wright J, et al. Males who have sex with males (MSM) and HIV/AIDS in India: the hidden epidemic. *AIDS Publ Pol J.* 2001;16:4–17.
8. National AIDS Control Organization, Department of AIDS Control. Ministry of Health & Family Welfare, India. HIV sentinel surveillance and HIV estimation in India, 2007. A technical brief. New Delhi — 110011. Available at <http://www.naco.gov.in/NACO/Quick_Links/Publication/ME_and_Research_Surveillance/Reports_and_Surveys/HIV_Sentinel_Surveillance_and_HIV_Estimation_2007_-_A_Technical_Brief/>.
9. Nair R, Nair SS, Malhotra S, et al. Shifting trends of HIV epidemiology among most at risk groups (MARGs) in India. *Int J Med Sci Public Health.* 2012;1:18–31.
10. National AIDS Control Organization. Department of AIDS Control. Ministry of Health & Family Welfare, India. Targeted Interventions Under NACP III, OPERATIONAL GUIDELINES. New Delhi — 110011. 2007. Available at <http://www.naco.gov.in/NACO/Quick_Links/Publication/NGO_Targeted_Interventions/Operational_Technical_guidelines_and_policies/Targeted_Interventions_Under_NACP_III_-_Volume_I_CORE_HIGH_RISK_GROUPS/>.
11. Ichikawa S, Kaneko N, Koerner J, et al. Survey investigating homosexual behaviour among adult males used to estimate the prevalence of HIV and AIDS among men who have sex with men in Japan. *Sexual Health.* 2011;8:123–4.
12. Go VF, Srikrishnan AK, Sivaram S, et al. High HIV prevalence and risk behaviors in men who have sex with men in Chennai, India. *J Acquir Immune Defic Syndr.* 2004;35:314–9.

13. Setia MS, Lindan C, Jerajani HR, et al. Men who have sex with men and transgenders in Mumbai, India: An emerging risk group for STIs and HIV. *Indian J Dermatol Venereol Leprol.* 2006;72: 425-31.
14. Van Griensven F, Thanprasertsuk S, Jommaroeng R, et al. Evidence of a previously undocumented epidemic of HIV infection among men who have sex with men in Bangkok, Thailand. *AIDS.* 2005;19:521-6.
15. Lane T, Raymond HF, Dladla S, et al. High HIV prevalence among men who have sex with men in Soweto, South Africa: results from the Soweto men's study. *AIDS Behav.* 2011;15: 626-34.
16. Wade AS, Kane CT, Diallo PAN, et al. HIV infection and sexually transmitted infections among men who have sex with men in Senegal. *AIDS.* 2005;19:2133-40.
17. Koerner J, Shiono S, Ichikawa S, et al. Factors associated with unprotected anal intercourse and age among men who have sex with men who are gay bar customers in Osaka, Japan. *Sex Health.* 2012;9:328-33.
18. Dandona L, Dandona R, Gutierrez JP, et al. Sex behaviour of men who have sex with men and risk of HIV in Andhra Pradesh, India. *AIDS.* 2005;19:611-9.
19. Kumta S, Lurie M, Weitzen S, et al. Bisexuality, sexual risk taking, and HIV prevalence among men who have sex with men accessing voluntary counseling and testing services in Mumbai, India. *J Acquir Immune Defic Syndr.* 2010;53:227-33.
20. Thomas B, Mimiaga MJ, Menon S, et al. Unseen and unheard: predictors of sexual risk behavior and HIV infection among men who have sex with men in Chennai, India. *AIDS Educ Prev.* 2009;21:372-83.
21. Solomon SS, Srikrishnan AK, Sifakis F, et al. The emerging HIV epidemic among men who have sex with men in Tamil Nadu, India: geographic diffusion and bisexual concurrency. *AIDS Behav.* 2010;14:1001-10.
22. Brahnam GNV, Kodavalla V, Rajkumar H, et al. Sexual practices, HIV and sexually transmitted infections among self-identified men who have sex with men in four high HIV prevalence states of India. *AIDS.* 2008;22 Suppl 5:S45-57.
23. Deb S, Dutta S, Dasgupta A, et al. Sexual practice and perception of HIV/AIDS amongst men who have sex with men in Kolkata. *Indian J Community Med.* 2009;34:206-11.
24. Hernandez AL, Lindan CP, Mathur M, et al. Sexual behavior among men who have sex with women, men, and Hijras in Mumbai, India-multiple sexual risks. *AIDS Behav.* 2006;10 (4 Suppl): S5-16.
25. Johnston LG, Holman A, Dahoma M, et al. HIV risk and the overlap of injecting drug use and high-risk sexual behaviours among men who have sex with men in Zanzibar (Unguja), Tanzania. *Int J Drug Policy.* 2010;21:485-92.