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Risk factors for HIV and syphilis infection among male sex workers who have sex with men: a cross-sectional study in Hangzhou, China, 2011

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ABSTRACT

Objective: To investigate the prevalence and risk factors of HIV and syphilis infection among men who have sex with men (MSM) in male sex workers (MSW).

Design: Cross-sectional survey.

Setting: Hangzhou, China.

Participants: 259 MSW in MSM were recruited by respondent-driven sampling from May 2011 to December 2011.The inclusion criteria were: (1) age ≥18 years; (2) engaging in sex with men in the previous year and (3) willing to cooperate in the implementation of the study.

Outcome measures: HIV-related knowledge, high-risk behaviour and condom use.

Results: Among these MSW in MSM, 23.2% were infected with HIV and/or syphilis, 8.9% were infected only with HIV, 12.7% only with syphilis and 1.5% with HIV/syphilis co-infection; 96.6% sold sex to males, 8.9% bought sex from males and 15.4% sold sex to females; 49.0% had non-commercial sex behaviours with males and 24.3% with females. The rate of condom use while having commercial sex with clients was 86.9% and 53.3% (selling anal and oral sex to males, respectively), 95.5% (buying sex from males) and 77.5% (selling sex to females), respectively. Regarding their non-commercial sex behaviour, the rate of condom use was 77.2% (with males) and 49.2% (with females), respectively. Multivariate analysis showed that age >30 years (OR 1.055; 95% CIs 1.015 to 1.095) and having ≥10 non-commercial male sex partners (OR, 1.573; 95% CI 1.018 to 2.452) were significantly associated with HIV/syphilis infection, while heterosexuality (OR, 0.238; 95% CI 0.066 to 0.855) was significantly associated with a low HIV/syphilis infection rate.

Conclusions: The MSW in MSM population in Hangzhou has a high prevalence of HIV/syphilis infection, poor perceived risks of HIV and more engagement in unsafe sex with its clients and partners, in addition to a low rate of condom use. These risk factors may account for their relatively high infection rate of HIV/syphilis.

Strengths and limitations of this study

- Our findings are helpful in elucidating the current risk factors for HIV/syphilis infection in the male sex worker (MSW) men who have sex with men population of China.
- Our findings are useful to direct further health education and behavioural interventions.
- Selection bias may exist, due to the snowball methods sampling method and outreach site service, which might restrict the representativeness of the study.
- It is unavoidable that the participants may not provide honest responses to the sensitive questions covered in the questionnaire, though this may have been ameliorated by using self-administered questionnaires and the established good relations between data collectors and MSWs.

INTRODUCTION

AIDS has become a serious public health problem worldwide. It has been estimated that there were approximately 35.3 (95% CI 32.2 to 38.8) million people worldwide living with HIV in 2012; among them, 2.3 (1.9 to 2.7) million were new HIV infections.[1] The high prevalence and incidence burden of HIV has been globally identified in the men who have sex with men (MSM) population.[2] In developed countries of Western and East Asia, new HIV infections have continued to increase in this population, while in developing countries, HIV prevalence in MSM is also considerably high.[3–5] For example, in China, 21.4% of new HIV cases were transmitted via same-sex interactions in 2013, and the HIV epidemic in the MSM population keeps growing.[6]

With the rapid economic development in China, the migrant population moving from rural areas to urban areas is increasing. The migrants are more likely to engage in high-risk sexual behaviour, have sexually transmitted infections (STI) and transmit HIV. In this regard, the migrant subgroup of MSM, male sex workers (MSWs) known as 'money boys' (MB), who engage in same-sex sexual activities for economic survival, has become a serious concern of the society. As expected, there is a high risk of HIV and other STIs among the MSW population.[7 8] In Mainland China, the HIV/STI infection rate in MSW is high. Furthermore, MSMs have poor awareness of the epidemiological trend of AIDS/STI that makes them more vulnerable to such diseases.[9 10] Hangzhou is one of the most economically developed and socially inclusive areas in China; in addition, the MSW population represents an emerging social entity along with the so-called 'golden-10-year generation' of modern China (1998–2008). There is an especially large proportion of MSMs in the MSW population, and their current status of HIV/STI infection, risk factor persistence and variations in China are unclear.

To address this question, we investigated HIV infection, together with syphilis epidemic, as an example to indicate STIs among MSW in MSM in Hangzhou, China. Specifically, we sampled the participants in the year 2011. We believe our findings will be helpful in elucidating the current risk factors for HIV/syphilis infection in the MSW MSM population of China, which may be useful to direct further health education and behavioural interventions.

METHODS

Subjects

This study was designed as a cross-sectional survey on MSW who provided commercial sex services (including anal and oral sex) to men from May 2011 to December 2011 in Hangzhou, China. The inclusion criteria were: (1) age ≥18 years; (2) engaging in sex with men in the previous year and (3) willing to cooperate in the implementation of the study. The original protocol was required to be sampled by a respondent-driven sampling (RDS) method. Since investigators were unable to obtain large enough sample sizes using RDS, all sampling was changed to the snowball methods and outreach convenience sampling (provision of outreach service on-site, such as in bath-houses and clubs) in the early phase of the study. Overall, 87% of participants were recruited by the snowball method, 10% by the RDS method and 3% by the outreach convenience sampling method.

Signed informed consent was acquired from each participant. Participants were anonymised by assigning unique identification numbers.

Measures

The survey questionnaire was based on that used in the national sentinel surveillance programme since 1995, which included demographics, knowledge levels, HIV/STI relevant behaviours, drug consumption and HIV and syphilis infection status. Information was obtained via one-on-one interviews by qualified investigators. The Center for Disease Control and Prevention staff who conducted the survey by interview were given intensive training and a detailed protocol. Interview settings had at least one private interview/counselling room, a testing room and a waiting room.

Peripheral blood samples were collected from each participant, followed by the ELISA test for HIV-1p24antibody. The ELISA-positive participants were verified by western blotting on HIV-1 gp120. In addition, the rapid plasma regain test was used to identify the syphilis antibody in serum, and the spirochete antibody haemagglutination (*Treponema pallidum* haemagglutination) test was adopted for confirmation. Participants were assigned to the HIV/syphilis group (including HIV infection, syphilis infection and HIV/syphilis co-infection) and the control group according to their HIV and syphilis status.

Statistical analysis

The required sample size was calculated to provide estimates of the prevalence of HIV and syphilis co-infection among men MSM in MSW. On the basis of our previous pilot study, we estimated the prevalence of HIV/syphilis co-infection among men MSM in MSW in Hangzhou, China, to be approximately 30%. A minimum of 233 participants was required to obtain 80% power with a two-sided significance level of α=0.05. Data were analysed using SPSS V.15.0 (SPSS Inc, Chicago, Illinois, USA). Statistical significance was accepted when $p<0.05$. The data were presented as the mean±SD for continuous variables and as the frequency (%) for categorical variables. Logistic regression analysis was performed with HIV/syphilis infection as a dependent variable. Participants were categorised into two groups: control (non-HIV/syphilis) and cases (infected with HIV/syphilis). The selection of independent variables was primarily based on the results from the univariate analyses as shown in tables 1–4.

RESULTS

Participant characteristics

With an overall response rate of 79.3%, the final sample size reached 259 participants. Among the 259 MSW, the population age ranged from 19 to 39 years, with a mean of 21.9±3.3 years. Among them, 61.4% were educated to secondary level, 94.2% were unmarried, 54.1% were full-time MB, 43.2% were bisexual and 66.8% had been living in Hangzhou for less than 3 months (table 1). In addition, 60 (23.2%) were infected with HIV and/or syphilis. Among them, 23 (8.9%) were infected only with HIV, 33 (12.7%) only with syphilis and 4 (1.5%) with HIV and syphilis.

Table 1 Sociodemographic characteristics of participants (n=259)

Variable	HIV/syphilis group (n=60, %)	Control group (n=199, %)	Total (%)	p Value*
Age (years)				
Mean±SD	22.2±3.3	21.8±3.4	21.9±3.3	0.448
Minimum–maximum	19–34	19–39	19–39	
Age group (years)				
19	8 (13.3)	49 (24.6)	57 (22.0)	0.085
21	49 (81.7)	144 (72.4)	193 (74.5)	
>30	3 (5.0)	6 (3.0)	9 (3.5)	
Education				
Primary	1 (1.7)	8 (4.0)	9 (3.5)	0.207
Secondary	46 (76.7)	165 (82.9)	211 (81.5)	
University	13 (21.7)	26 (13.1)	39 (15.1)	
Marital status				
Married	2 (3.3)	10 (5.0)	12 (4.6)	0.498
Unmarried	58 (96.7)	186 (93.5)	244 (94.2)	
Others	0 (0)	3 (1.5)	3 (1.2)	
Resident duration in Hangzhou (months)				
<3	37 (61.7)	136 (68.3)	173 (66.8)	0.643
3–12	11 (18.3)	28 (14.1)	39 (15.1)	
≥12	12 (20.0)	35 (17.6)	47 (18.1)	
Employment status as MB				
Full time	31 (51.7)	109 (54.8)	140 (54.1)	<0.001
Part time	29 (48.3)	90 (45.2)	119 (45.9)	
Self-identified sexual orientation				
Homosexuality	30 (50.0)	60 (30.2)	90 (34.7)	0.024
Heterosexuality	3 (5.0)	25 (12.6)	28 (10.8)	
Bisexuality	20 (33.3)	92 (46.2)	112 (43.2)	
Unsure	7 (11.7)	22 (11.1)	29 (11.2)	
Occupation of part-time MB†				
Student	5 (8.8)	24 (12.1)	29 (11.2)	<0.001
Office worker	14 (23.5)	79 (39.6)	91 (35.2)	
Waiter in entertainment venues	25 (41.2)	50 (25.3)	77 (29.6)	
Others	16 (26.5)	46 (23.1)	62 (24.0)	

*χ^2 Test.
†119 Part-time MBs.
MB, money boy.

HIV/AIDS-related knowledge

Only 35.5% of participants correctly answered all of the items pertaining to HIV/AIDS relevant knowledge. More than 90% participants knew that a person could be infected by sharing needles with HIV carriers or patients with AIDS; a person could be infected by fusion blood or blood products with HIV; a person could reduce the risk of HIV transmission by using condoms correctly in every sexual behaviour; and an infected pregnant woman may transmit HIV to her child (or children). Only 56% of participants knew that mosquito bites could not spread HIV. The difference in knowledge on HIV/AIDS in the item 'Will a person be infected by sharing needles with HIV carriers or patients?' was statistically significant between the HIV/syphilis group and the control group ($p<0.05$). The proportion of correct answers to questions on HIV/AIDS knowledge, regarding needle sharing and mother-to-child transmission, was significantly higher in the control group than in the HIV/syphilis group (table 2).

HIV/AIDS-related attitudes

Among the participants, 41.3% considered that they may be at risk of getting HIV infection, and 73% acknowledge the effect of condom use in HIV prevention. There was no statistical difference in HIV/AIDS-related attitudes between the HIV/syphilis group and the control group (table 2).

Sexual behaviour

Table 3 details the participants' sexual behaviours at the first encounter and during the past 6 months. Among these participants, the mean age of the first sexual encounter was 18.7±2.5 years and the mean age of the first sexual encounter with a male was 20.4±2.7 years; of these, 40.2% revealed that their first sexual partner was male.

In the past 6 months, 96.9% of the participants sold sex to males and 70.7% of them had more than 10 male partners to whom they sold sex. In addition, 8.9% had bought sex from other MSW; 6.9% had more than two male partners from whom they bought sex; 15.4% sold

Table 2 Participants' knowledge and attitude on HIV/AIDS

	HIV/syphilis group (n=60, %)	Control group (n=199, %)	Total (%)	p Value*
Knowledge on HIV/AIDS (correct answers to questions)				
Will a person be infected by sharing needles with HIV carriers or patients?	57 (95.0)	192 (96.5)	249 (96.1)	<0.001
Will a person be infected by inputting blood or blood products with HIV?	54 (90.0)	190 (95.5)	244 (94.2)	0.191
Can a person reduce the risk of HIV transmission by using condoms correctly in every sexual behaviour?	55 (91.7)	189 (95.0)	244 (94.2)	0.568
May an infected pregnant woman transmit the AIDS virus to her child?	50 (83.3)	187 (94.0)	237 (91.5)	0.025
Can a person reduce the risk of HIV transmission by maintaining an uninfected partner?	50 (78.3)	160 (80.4)	207 (79.9)	0.862
Will a person get infected by having dinner with carriers or patients of HIV?	48 (80.0)	158 (79.4)	206 (79.5)	1.000
May a seemingly healthy person carry HIV?	42 (70.0)	141 (70.9)	183 (70.7)	1.000
Will mosquito bites spread HIV?	37 (61.7)	108 (54.3)	145 (56.0)	0.316
Proportion (%) of correct answers to questions on HIV/AIDS knowledge (mean±SD)	68.5±1.9	73.4±1.4	72.2±1.6	0.536
Attitude on HIV/AIDS				
The risk you think you get HIV infection	31 (51.7)	76 (38.2)	107 (41.3)	0.064
The effect of condom usage in HIV prevention	45 (75.0)	144 (72.4)	189 (73.0)	0.749

*χ^2 Test.

sex to females and 11.6% had more than two female partners to whom they sold sex. Meanwhile, 49% participants had conducted non-commercial anal intercourse with males and 24.3% had non-commercial sexual behaviour with at least one female partner.

Compared with the control group, the HIV/syphilis group had a significantly higher rate of having non-commercial anal intercourse with males ($p<0.05$), but there was no significant difference in other sexual behaviours between the two groups (table 3).

Condom use

Table 4 details the participants' condom use during the past 6 months. Among the 251 participants who offered commercial sex services to males, 86.9% used condoms every time when selling anal sex to males. Among the 244 participants who sold oral sex to males, only 53.8% used condoms during this practice. Among the 23 participants who bought oral sex from males, 95.5% used condoms every time; among the 127 participants who had non-commercial anal intercourse with males, 77.2% used condoms every time.

Among the 40 participants who sold sex to females, 77.5% used condoms every time. Regarding the 63 participants who had non-commercial sexual behaviour with females, only 49.2% used condoms every time. There was no significant difference in sexual behaviour with females between the HIV/syphilis group and the control group.

Multivariate logistic regression analysis of factors associated with HIV/syphilis infection

The logistic regression models with HIV/syphilis as the dependent variable demonstrated that age (>30 years; OR, 1.055; 95% CI 1.015 to 1.095) and non-commercial male sex partners (n≥10; OR, 1.573; 95% CI 1.018 to 2.452) are significantly associated with HIV/syphilis infection, while heterosexuality was significantly associated with a lower HIV/syphilis infection rate (OR, 0.238; 95% CI 0.066 to 0.855; table 5). These results have been adjusted for age, frequency of condom use for commercial sex during the past 6 months and employment status as an MB (table 5).

DISCUSSION

We demonstrated here that the MSW in MSM in Hangzhou, 2011, had high HIV and syphilis infection rates and a low condom use rate. Furthermore, older and frequent non-commercial male sex activity with different partners was associated with increased probability of contracting HIV or syphilis. In contrast, heterosexuality was associated with less risk of being infected with HIV/syphilis.

Our results on the rate of HIV and/or syphilis infection (23.2%), HIV infection (8.9%), syphilis infection (12.7%) and HIV and syphilis infection (1.5%) in MSW in MSM are comparable with studies from others on MSW only. Cuypers *et al*[11] found that 45.5% of MSW were diagnosed with at least one STI and that the HIV infection rate was 11.1% in the cohorts of the Netherlands and other Western countries. Song *et al*[12] surveyed 80 MSWs in Beijing and observed that the infection rate of HIV and syphilis was 11.3% and 16.3%, respectively. Huan *et al*[13] studied 328 MSWs and reported the prevalence of syphilis to be 13% in Jiangsu province. In this study, the HIV and syphilis infection

Table 3 Sexual behaviour of participants (n=259)

	HIV/syphilis group (n=60, %)	Control group (n=199, %)	Total (%)	p Value*
First time sexual behaviour				
Age of the first sexual behaviour (years)				
Mean±SD	19.2±3.3	18.6±2.2	18.7±2.5	0.091
Minimum–maximum	13–32	10–26	10–32	
Age of the first sexual behaviour with a man (years)				
Mean±SD	20.7±3.5	20.4±2.5	20.4±2.7	0.548
Minimum–maximum	14–32	10–26	10–32	
Gender of the first sexual partner				
Male	26 (43.3)	78 (39.2)	104 (40.2)	0.652
Female	34 (56.7)	121 (60.8)	155 (59.9)	
S*exual behaviour in the past 6 months*				
Selling sex to males				
Yes	60 (100)	191 (96.0)	251 (96.9)	0.204
Number of selling-sex male partners				
0	0	8 (4.0)	8 (3.1)	0.181
1	2 (3.3)	10 (5.0)	12 (4.6)	
2–9	15 (25.0)	41 (20.6)	56 (21.6)	
≥10	43 (71.7)	140 (70.4)	183 (70.7)	
Buying sex from males				
Yes	3 (5.0)	20 (10.1)	23 (8.9)	0.778
Number of buying-sex male partners				
0	57 (95.0)	179 (89.9)	236 (91.1)	0.148
1	0	5 (2.5)	5 (1.9)	
≥2	3 (5.0)	15 (7.5)	18 (6.9)	
Selling sex to females				
Yes	9 (15.0)	31 (15.6)	40 (15.4)	1.000
Number of selling-sex female partners				
0	51 (85.0)	168 (84.4)	219 (84.6)	0.861
1	3 (5.0)	7 (3.5)	10 (3.9)	
≥2	6 (10.0)	24 (12.1)	30 (11.6)	
Non-commercial anal intercourse behaviour with males				
Yes	36 (60.0)	91 (45.7)	127 (49.0)	<0.001
Number of non-commercial male sex partners				
0	24 (40.0)	108 (54.3)	132 (51.0)	0.087
1	11 (18.3)	17 (8.5)	28 (10.8)	
2–9	11 (18.3)	42 (21.1)	53 (20.5)	
≥10	14 (23.3)	32 (16.1)	46 (17.8)	
Non-commercial sexual behaviour with females				
Yes	10 (16.7)	53 (26.6)	63 (24.3)	1.000
Number of non-commercial female sex partners				
0	50 (83.3)	146 (73.4)	196 (75.7)	0.233
1	6 (10.0)	32 (16.1)	38 (14.7)	
≥2	4 (6.7)	21 (10.6)	25 (9.7)	

*χ^2 Test.

rates were higher than the overall prevalence (HIV 4.9%, syphilis 11.8%) among MSM in a large national survey across 61 cities[14] and similar to the prevalence among MSM in Chengdu, China (HIV 13.3%, syphilis 15.9%)[15] and reports from South and South east Asia (range: 14–18%).[16] The Ministry of Health of the People's Republic of China estimated that HIV prevalence among China's MSM population was approximately 6.3% in 2011, which suggests that the HIV epidemic is still expanding in this population.[17–19] Our findings emphasise that MSM in MSW are more vulnerable to HIV/syphilis infection compared with the general MSM population. The results in our survey showed that the participants were generally young, educated to a higher level, unmarried and highly migratory. Most part-time MBs were office workers and waiters in entertainment venues. These data are in-line with the findings of other studies.[11 14]

Regarding the basic knowledge of HIV/AIDS, more than 90% of MSW in MSM maintained accurate knowledge on some aspects of HIV transmission, but there were some false beliefs, such as that of HIV/AIDS being transmitted by mosquito bites or when people dine together. This corroborates similar findings of other

Table 4 Usage of condoms on sexual service in the past 6 months

	HIV/syphilis group (%)	Control group (%)	Total (%)	p Value*
With males				
Consistent condom use when selling anal sex (n=251)				
Yes	50 (83.3)	168 (88.0)	218 (86.9)	0.355
No	10 (16.7)	23 (12.0)	33 (13.1)	
Consistent condom use when selling oral sex (n=244)				
Yes	29 (50.0)	106 (57.0)	135 (55.3)	0.350
No	29 (50.9)	80 (43.0)	109 (44.7)	
Consistent condom use when buying oral sex (n=23)				
Yes	3 (100.0)	18 (94.7)	21 (95.5)	1.000
No	0	1 (5.3)	1 (4.5)	
Consistent condom use in non-commercial anal sex (n=127)				
Yes	29 (80.6)	69 (75.8)	98 (77.2)	0.567
No	7 (19.4)	22 (24.2)	29 (22.8)	
With females				
Consistent condom use in commercial sex (n=40)				
Yes	9 (81.8)	22 (75.9)	31 (77.5)	1.000
No	2 (18.2)	7 (24.1)	9 (22.5)	
Consistent condom use in non-commercial sex (n=63)				
Yes	7 (58.3)	24 (47.1)	31 (49.2)	0.482
No	5 (41.7)	27 (52.9)	32 (50.8)	

*χ^2 Test.

studies in China, and warrants further educational interventions.[20] We found that up to 94.2% of the 259 MSW knew that using condoms correctly in every sexual behaviour could reduce the risk of HIV transmission; however, only 53.8% used them every time when having oral sex during the past 6 months. Meanwhile, there were also low condom use rates when having commercial or non-commercial sex with females. In fact, the lowest rate of consistent condom use in this study was in the context of MSW in MSM having sex with female partners and selling oral sex. In addition, only 41.6% of the participants in this study revealed that they consider themselves at high risk of HIV infection. These results highlight the poorly perceived risks of HIV and suggest that when MSW encounter different types of sexual partners, their consideration of the risk of non-protective sexual behaviour was different. Specifically, they may consider that casual sexual partners with mutually friendly emotions between each other are safer, which leads to reduced disease prevention and less condom use frequency.

Table 5 Multivariable logistic regression of explanatory variables against HIV/syphilis

	OR	95% CI	p Value
Age group			
<20	1.000		
20–30	1.038	0.503 to 2.140	0.920
>30	1.055	1.015 to 1.095	0.006
Employment status as money boy			
Full time	1.000		
Part time	1.033	0.564 to 1.891	0.916
Sex orientation			
Homosexuality	1.000		
Heterosexuality	0.238	0.066 to 0.855	0.028
Bisexuality	0.647	0.245 to 1.710	0.379
Unsure	0.638	0.245 to 1.666	0.359
Non-commercial anal intercourse behaviour with males			
No	1.000		
Yes	1.576	0.704 to 3.527	0.269
Number of non-commercial male sexual partners			
0	1.000		
1	1.378	0.490 to 3.877	0.543
2–9	0.611	0.234 to 1.590	0.312
≥10	1.573	1.018 to 2.452	0.046

The mean age of the first sexual behaviour among the MSW in MSM was relatively young, and generally they had multiple sexual partners. The risk factors identified for having HIV and syphilis infections are not unexpected and the results are consistent with other reports.[14 15] These results indicate that the HIV/syphilis group was more likely to have non-commercial anal intercourse behaviour with males. Therefore, the necessity of education and behavioural intervention to target more MSW, especially MSW in MSM, in the AIDS voluntary consultation is an important issue so that risky sexual behaviour can be reduced through 'peer education'.

In this study, only 34.7% of MSW in MSM self-identified as gay; most of them (54%) were either bisexual or heterosexual men engaging in sex with men and women concurrently, and had complicated sexual relationships with their partners. These observations on the bisexual or heterosexual proportion are consistent with the findings of other studies in China[9 21 22] but higher

than those reported in other countries.[23] A higher HIV/syphilis infection rate was found in those who self-identified as homosexual or bisexual, compared with those who self-identified as heterosexual; indeed, heterosexual participants were associated with a 4.17-fold decrease in the risk for HIV/syphilis infection. This finding is consistent with the conclusion from China[14] and other countries.[16] In fact, bisexual MSW have a higher rate of engagement in commercial sex and a lower rate of condom use, and have the least HIV knowledge. The low rate of consistent condom use found in this study was in the context of MSW having sex with female partners.[24] It has been a long-existing concern that HIV/syphilis infection could be spread through risky man-to-man sex into heterosexual networks.[25] In this regard, MSW should be the target of specific preventive activities, given their particular vulnerability and because infections are likely to disseminate into the general population given the high proportion of bisexual activity and marriage.

We also noted some possible limitations in the study. First, selection bias may exist, due to the RDS sampling method and outreach site service, which might restrict the representativeness of the study. Second, it is unavoidable that the participants may not provide honest responses to the sensitive questions covered in the questionnaire, though this may have been ameliorated by using self-administered questionnaires and the established good relations between data collectors and MSWs.

CONCLUSIONS

This study showed that the MSW in MSM population in Hangzhou in 2011 had a high prevalence of HIV/syphilis infection, relatively good knowledge on HIV/AIDS, poor perceived risks of HIV and more engagement in unsafe sex with their clients and partners, along with a low rate of condom use. These factors may account for the relatively high infection rate of HIV/syphilis in this subgroup. Specific and comprehensive prevention and treatment engagements require to be implemented urgently.

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