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Uptake of provider-initiated HIV and syphilis testing among heterosexual STD clinic patients in Guangdong, China: results from a cross-sectional study

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ABSTRACT

Objectives Underscreening of HIV and syphilis in clinical settings is pervasive in resource-constrained settings. Heavy patient loads and competing health priorities in these settings inhibit provider's ability to meet screening coverage targets. The objective of this study was to examine determinants of provider-initiated HIV and syphilis testing uptake at sexually transmitted disease (STD) clinics in China.

Design A cross-sectional study was performed between July 2016 and December 2016.

Setting Seven STD clinics in Guangdong Province, China.

Participants Heterosexual STD clinic patients met the inclusion criteria, regardless of their interest in receiving HIV or syphilis testing.

Outcome measures The syphilis and HIV testing uptake determined by patient receipt of results.

Results A total of 1943 individuals were recruited in this study. Among those participants, 60.6% (1177/1943) and 74.3% (1443/1943) conducted HIV testing and syphilis testing during the study, respectively, of whom, 2.2% (26/1177) and 21.5% (310/1443) were found to be HIV-positive and syphilis-positive, respectively. The most common reason for rejecting HIV and syphilis testing was a low self-perceived risk of HIV and syphilis infection. After adjusting for covariates, condom use in the last sexual act, consistent condom use in the last 6 months, having paid sex in the last 6 months and having received any kind of HIV/STD-related knowledge during the last 12 years were positively associated with both HIV and syphilis testing uptake.

Conclusions The low-level of HIV and syphilis testing uptake, alongside with the high-level of engagement in risky sexual behaviours among heterosexual STD clinic patients, warranted a more targeted and intensive behavioural interventions to promote HIV and syphilis testing in this population.

INTRODUCTION

Sexually transmitted HIV infections have become a public health concern globally. An estimated 85% of HIV infections are

Strengths and limitations of this study

► This is one of the very limited studies analysing determinants of provider-initiated HIV/syphilis test uptake among 1943 heterosexual sexually transmitted diseaseclinic patients in China.

► The number of syphilis and HIV testing uptake was determined by patient receipt of results, making the outcome more reliable.

► All the data were collected through self-report, which may be prone to information bias.

► The cross-sectional nature of the study design makes it difficult to determine causal interference.

transmitted through heterosexual intercourse worldwide.[1] In China, heterosexual transmission has been reported to account for 69.9% of HIV infections.[2] Integration of HIV services into the clinical care of routine sexually transmitted diseases (STD) has been proven useful for expanding HIV testing and treatment among populations at risk of both infections in many low-income and middle-income countries.[3–5]

In 2014, considering the heavy burden of HIV–syphilis coinfection and syphilis epidemic, the Chinese centres for disease control and prevention issued provider-initiated HIV/syphilis testing and counselling (PITC) guideline to increase provider-initiated HIV/syphilis testing in China.[6] However, promoting active HIV and syphilis testing provided by physicians to all patients presenting for STD medical care is no small task due to the high workload of clinicians in China.[7] To address this challenge, several studies suggested strategies of pay-for-performance, strengthened training and propaganda among physicians to encourage provider HIV/syphilis testing.[6 8] Although a

marked increase in HIV/syphilis testing rate among STD clinic patients was observed with the application of these strategies, the rates of HIV testing[6] (56.7%) and syphilis testing[6] (68.6%) were still much lower than the target that 90% of people with HIV and 90% of people with syphilis should be aware of their infection status by the year 2020.[9 10] To date, limited studies have been conducted to analyse the factors associated with the uptake of HIV/syphilis testing from STD clinic patients' perspective in the context of PITC programme.[11–13]

In light of the high proportions (99.1%) of heterosexual population among STD clinic patients,[13] this study focused on heterosexual STD clinic patients to analyse determinants of provider-initiated HIV/syphilis test uptake from patients' perspective in China.

METHODS
Project setting
We conducted a cross-sectional study in Guangdong Province in Southern China between July 2016 and December 2016. Guangdong Province was chosen for this study because of a high burden of sexually transmitted HIV infection and syphilis.[14] In 2018, the average burden of syphilis in China was 35.6 cases per 100 000 population with Guangdong Province reporting 50.3 cases per 100 000 population.[15] Guangdong has consistently ranked first by the number of newly reported syphilis cases in China during the last decade.[16] The Pearl River Delta is the population-dense, urbanised central region of Guangdong Province that includes 7 of the province's 21 municipalities. The Pearl River Delta region of Guangdong has a disproportionate burden of sexually transmitted HIV infection and syphilis.[17]

Study participants
Two cities (Dongguan city and Zhongshan city) in the Pearl River Delta were selected to implement this research based on laboratory capacity, availability of trained research assistants and space to conduct the interview. Three public STD clinics in Dongguan city and four public STD clinics in Zhongshan city were chosen using a probability proportional-to-size sampling method. The number of public STD patients per day at each site was estimated with administrative data.

Sample size
The primary outcome of this study was test uptake defined by the receipt of test results. A previous study reported 70% of syphilis testing uptake among STD clinics attendees in China.[8] We applied two-sided CIs for one proportion method to estimate a sample size of 1513 for this study to produce a two-sided 95% CI with a width equal to 0.050. According to the number of public STD patients per day at each site, the total number of study participants at each site ranged from 200 to 300 over the course of 6 months study.

Study procedure
The survey items were created based on discussions with HIV/STD experts, STD physicians and policymakers. We also piloted the survey with 20 volunteer STD patients. The purpose of this formative research was to test survey items and examine local syphilis/HIV testing capacity, referral patterns and the availability of treatment and care services. These pilot data were not included in the final analysis.

From July 2016 to December 2016, potential study subjects were identified by physicians and research assistants at selected STD clinics. Patients were eligible for participation if they met the following inclusion criteria, regardless of their interest in receiving HIV or syphilis testing: self-identified heterosexual, engaged in vaginal or anal sex with an opposite-sex partner in the past 12 months, at least 18 years of age, and willing to provide written informed consent. For all eligible patients, physicians actively recommended them to conduct HIV and syphilis testing and invited them to fill out a questionnaire no matter whether or not they accepted the testing. Participation in this survey was voluntary and no incentives were given to patients to participate in the study. All surveys were self-administered and checked by a research assistant for completeness.

For participants who accepted HIV or syphilis testing, the results of the syphilis and HIV test were available to all participants within 2 hours, and the results were collected by research assistants at the end of the survey. Venous samples were tested for HIV by enzyme-linked immunoassay (Lizhu Biotech, Zhuhai, China) and syphilis by the rapid plasma regains test (Lizhu Biotech, Zhuhai, China) and Treponema pallidum particle agglutination test (Rongsheng Biotech, Shanghai, China). Both the syphilis and HIV test kits were approved by the China's State Food and Drug Administration. Confidentiality of testing results was ensured when the participants were informed of their results. Post-test counselling and appropriate medical care for STD/HIV was implemented according to standard STD clinic procedures.

Measures
Sociodemographic and behavioural variables
Sociodemographic information included age, gender, marital status, education and monthly income. Behavioural variables included condom use in the last sexual act, frequency of condom use in the last 6 months and ever engaged in paid sex in the last 6 months.

HIV and syphilis testing and related medical service variables
HIV and syphilis testing and related medical services included acceptance of HIV and syphilis testing uptake during this visiting, reasons for not conducting HIV and syphilis testing, STD infection history, received education on HIV and STD-related knowledge, whether the participants returned for results and the results of the testing.

Statistical analysis

All data were double-entered with logic checks using EpiData V.3.0. Descriptive analysis was performed to describe sociodemographics, sexual behaviours and HIV/syphilis testing. A series of univariate and multivariable logistic regressions were conducted to explore factors associated with HIV testing uptake, syphilis testing uptake, HIV infection and syphilis infection, respectively. In the multivariable model, we adjusted for age (continuous), gender, marital status, educational attainment and monthly income. All data were analysed using SAS V.9.4 (SAS Cary, North Carolina, USA).

Patient and public involvement

The participants and general public were not involved in the development of the research question, outcome measures, design, recruitment and conduct of this study.

RESULTS

A total of 1943 participants were recruited in this study and filled out the questionnaire. Of those participants, a total of 428 (22.0%) participants refused both tests, 1177 (60.6%) conducted HIV test, 1443 (74.3%) conducted syphilis test, 1105 (56.9%) conducted both tests. Among those who tested for either HIV or syphilis, 2.2% (26/1177) and 21.5% (310/1443) had a reactive result for HIV test and syphilis test, respectively (table 1).

The majority of participants was between 25 and 35 years old (40.1%), was men (50.6%), was married (79.6%), had a junior high school degree (40.1%) and had an annual income between US$5001 and US$9000 (39.8%). Around one-tenth (12.9%) had paid sex during the last 6 months, of whom 50.4% did not use condoms in the last paid sexual act. Most participants (83.1%) used condoms inconsistently when engaged in sexual intercourse in the last 6 months (table 1).

Among those who refused either HIV testing or syphilis testing, the most common reason was that they think it is not necessary to do the testing (71.5% for HIV testing and 67.6% for syphilis testing), followed by having ever received a testing before (14.6% for HIV testing and 17.2% for syphilis testing) and worrying about confidentiality (6.1% for HIV testing and 8.2% for syphilis testing). In addition, among those who refused HIV testing, most participants (98.0%) reported not ever having HIV testing in the last 12 months, and 46.3% (19/41) of this population reported not using condoms in the last paid sex. The same situation was also found in the participants who refused syphilis testing (table 2).

Factors associated with HIV and syphilis testing uptake

In terms of HIV testing uptake, after adjusted for age, gender, ethnic, education level, marital status and monthly income, multivariable logistic regression analysis indicated that condom use in the last sexual encounter (adjusted OR (aOR): 3.25, 95% CI 2.61 to 4.05), having paid sex in the last 6 months (aOR: 3.19, 95% CI 2.24 to 4.56), consistently condom use in the last 6 months (aOR: 1.96, 95% CI 1.44 to 2.67), received any kind of HIV/STD-related knowledge in the last 12 months (aOR: 1.94, 95% CI 1.58 to 2.40) were positively associated with HIV testing uptake (table 3).

For syphilis testing uptake, the participants who ever had a diagnosis of STD (aOR=1.78, 95% CI 1.29 to 2.44), condom use in the last sexual encounter (aOR=2.23, 95% CI 1.76 to 2.84), consistent condom use in the last 6 months (aOR: 2.37, 95% CI 1.79 to 3.15), had paid sex in the last 6 months (aOR=1.84, 95% CI 1.27 to 2.67) and received any kind of HIV/STD-related knowledge in the last 12 months (aOR=2.91, 95% CI 2.25 to 3.77) were more likely to be tested for syphilis (table 3).

Factors associated with HIV and syphilis infection

For HIV infection, after adjusted for age, gender, ethnicity, education level, marital status and monthly income, multivariable logistic regression analysis indicated that participants who engaged in paid sex in the last 6 months (aOR=2.00, 95% CI 1.24 to 3.12) were more likely to be infected with HIV (table 4).

For syphilis infection, the participants who ever had a diagnosis of STD (aOR=5.31, 95% CI 3.93 to 7.18) and not used condom in the last sexual encounter (aOR=1.75, 95% CI 1.29 to 2.39) were positively correlated with syphilis infection (table 4).

DISCUSSION

HIV and syphilis testing uptake remain low among STD clinic patients in China, although provider-initiated HIV and PITC guideline have been initiated since 2007.[18] This study extended the existing literature by focusing on heterosexual STD clinic patients and analysing determinants to provider-initiated HIV and syphilis testing uptake. Data suggested that many barriers still exist preventing patients from accepting HIV and syphilis testing in China. Findings from this study inform improvement of HIV and syphilis testing promotion strategies among STD clinic patients in the context of PITC programme.

We found a low HIV and syphilis testing uptake among heterosexual STD clinic patients in China. This rate is much lower than previously reported in Zambia,[19] Botswana[20] and South Africa,[21] whereas other studies showed that social stigma against HIV and STD,[22] fear of testing[23] and lack of testing information[24] are main contributors of limiting HIV and syphilis testing, our study found that the most common barrier in this sample of Chinese heterosexual STD clinic patients was a perceived low risk of HIV and syphilis infection. This highlights the importance of improving knowledge and awareness related to HIV and syphilis infection among heterosexual STD clinic patients. Internet-based interventions, such as through mobile communication apps, have been well developed and widely implemented on increasing health sexual knowledge and behaviours globally.[25] Given the high internet accessibility in China, future strategies explored

Table 1 Sociodemographic and sexual behavioural characteristics of participants among heterosexual STD clinic patients, a cross-sectional survey in China, 2016 (N=1943)

Variables	HIV testing n (%, 95% CI)		Syphilis testing n (%, 95% CI)		Total n (%, 95% CI)
	Yes (n=1177)	No (n=766)	Yes (n=1443)	No (n=500)	
Age (years)					
<25	247 (21.0,18.7~23.3)	164 (21.4,18.5~24.3)	288 (20.0,17.9~22.0)	123 (24.6,20.8~28.4)	411 (21.2,19.3~23.0)
25–35	456 (38.7,36.0~41.5)	324 (42.3,38.8~45.8)	550 (38.1,35.6~40.6)	230 (46.0,41.6~50.4)	780 (40.1,38.0~42.3)
35–45	280 (23.8,21.4~26.2)	179 (23.4,20.4~26.4)	363 (25.2,22.9~27.4)	96 (19.2,15.7~22.7)	459 (23.6,21.7~25.5)
45 above	194 (16.5,14.4~18.6)	99 (12.9,10.5~15.3)	242 (16.8,14.8~18.7)	51 (10.2,7.5~12.9)	293 (15.1,13.5~16.7)
Gender					
Male	652 (55.4,52.6~58.2)	331 (43.2,39.7~46.7)	748 (51.8,49.3~54.4)	235 (47.0,42.6~51.4)	983 (50.6,48.4~52.8)
Female	525 (44.6,41.8~47.4)	435 (56.8,53.3~60.3)	695 (48.2,45.6~50.7)	265 (53.0,48.6~57.4)	960 (49.4,47.2~51.6)
Marital status					
Married	945 (80.3,78.0~82.6)	601 (78.5,75.5~81.4)	1155 (80.0,78.0~82.1)	391 (78.2,74.6~81.8)	1546 (79.6,77.8~81.4)
Unmarried	232 (19.7,17.4~22.0)	165 (21.5,18.6~24.5)	288 (20.0,17.9~22.0)	109 (21.8,18.2~25.4)	397 (20.4,18.6~22.2)
Education					
Elementary school or below	334 (28.4,25.8~31.0)	225 (29.4,26.1~32.6)	456 (31.6,29.2~34)	103 (20.6,17.1~24.1)	559 (28.8,26.8~30.8)
Junior high school	481 (40.8,38.1~43.7)	299 (39.0,35.6~42.5)	591 (41.0,38.4~43.5)	189 (37.8,33.5~42.1)	780 (40.1,38.0~42.3)
Senior high school and above	362 (30.8,28.1~33.4)	242 (31.6, 28.3~34.9)	396 (27.4,25.1~29.7)	208 (41.6,37.3~45.9)	604 (31.1,29.0~33.1)
Annual income (USD)					
≤$1500	46 (3.9,2.8~5.0)	29 (3.8,2.4~5.1)	60 (4.2,3.1~5.2)	15 (3.0,1.5~4.5)	75 (3.9,3.0~4.7)
$1501–$5000	345 (29.3,26.7~31.9)	248 (32.4,29.1~35.7)	473 (32.8,30.4~35.2)	120 (24.0,20.3~27.7)	593 (30.5,28.5~32.6)
$5001–$9000	493 (41.9,39.1~44.7)	281 (36.7,33.3~40.1)	583 (40.4,37.9~42.9)	191 (38.2,33.9~42.5)	774 (39.8,37.7~42)
≥$9001	293 (24.9,22.4~27.4)	208 (27.2,24.0~30.3)	327 (22.7,20.5~24.8)	174 (34.8,30.6~39)	501 (25.8,23.8~27.7)
Ever diagnosed with STD					
Yes	179 (15.2,13.2~17.3)	134 (17.5,14.8~20.2)	260 (18.0,16.0~20.0)	53 (10.6,7.9~13.3)	313 (16.1,14.5~17.7)
No	998 (84.8,82.7~86.8)	632 (82.5,79.8~85.2)	1183 (82.0,80.0~84.0)	447 (89.4,86.7~92.1)	1630 (83.9,82.3~85.5)
Condom use in the last sexual act					
Yes	527 (44.8,41.9~47.6)	158 (20.6,17.8~23.5)	559 (38.7,36.2~41.3)	126 (25.2,21.4~29)	685 (35.3,33.1~37.4)
No	650 (55.2,52.4~58.1)	608 (79.4,76.5~82.2)	884 (61.3,58.7~63.8)	374 (74.8,71.0~78.6)	1258 (64.7,62.6~66.9)
Consistently used condom in the last 6 months					
Yes	246 (20.9,18.6~23.2)	83 (10.8,8.6~13.0)	264 (18.3,16.3~20.3)	65 (13.0,10.1~15.9)	329 (16.9,15.3~18.6)
No	931 (79.1,76.8~81.4)	683 (89.2,87.0~91.4)	1179 (81.7,79.7~83.7)	435 (87.0,84.1~89.9)	1614 (83.1,81.4~84.7)
Ever had paid sex in the last 6 months					

Continued

Table 1 Continued

Variables	HIV testing n (%, 95% CI)		Syphilis testing n (%, 95% CI)		Total n (%, 95% CI)
	Yes (n=1177)	No (n=766)	Yes (n=1443)	No (n=500)	
Yes	209 (17.8,15.6~19.9)	41 (5.4,3.8~6.9)	212 (14.7,12.9~16.5)	38 (7.6,5.3~9.9)	250 (12.9,11.4~14.4)
No	968 (82.2,80.1~84.4)	725 (94.6,93.1~96.2)	1231 (85.3,83.5~87.1)	462 (92.4,90.1~94.7)	1693 (87.1,85.6~88.6)
Condom use in the last paid sexual act*					
Yes	102 (48.8,42.0~55.6)	22 (53.7,38.4~68.9)	106 (50.0,43.3~56.7)	18 (47.4, 31.5~63.2)	124 (49.6,43.4~55.8)
No	107 (51.2,44.4~58.0)	19 (46.3,31.1~61.6)	106 (50.0,43.3~56.7)	20 (52.6, 36.8~68.5)	126 (50.4,44.2~56.6)
Received any kind of HIV/STD-related knowledge in the last 12 months					
Yes	442 (37.6,34.8~40.3)	183 (23.9,20.9~26.9)	534 (37.0,34.5~39.5)	91 (18.2, 14.8~21.6)	625 (32.2,30.1~34.2)
No	735 (62.4,59.7~65.2)	583 (76.1,73.1~79.1)	909 (63.0,60.5~65.5)	409 (81.8, 78.4~85.2)	1318 (67.8,65.8~69.9)
Ever had HIV testing in the last 12 months					
Yes	52 (4.4,3.2~5.6)	15 (2.0,1.0~2.9)	60 (4.2,3.1~5.2)	7 (1.4, 0.4~2.4)	67 (3.5,2.6~4.3)
No	1125 (95.6,94.4~96.8)	751 (98.0,97.1~99)	1383 (95.8,94.8~96.9)	493 (98.6, 97.6~99.6)	1876 (96.5,95.7~97.4)
Ever had syphilis testing in the last 12 months					
Yes	76 (6.5,5.1~7.9)	69 (9.0,7.0~11.0)	120 (8.3,6.9~9.7)	25 (5.0, 3.1~6.9)	145 (7.5,6.3~8.6)
No	1101 (93.5,92.1~94.9)	697 (91.0, 89.0~93.0)	1323 (91.7,90.3~93.1)	475 (95.0, 93.1~96.9)	1798 (92.5,91.4~93.7)
HIV infection					
Positive	26 (2.2,1.4~3.0)	–	–	–	26 (2.2,1.4~3.0)
Negative	1151 (97.8,97.0~98.6)	–	–	–	1151 (97.8,97.0~98.6)
Syphilis infection					
Positive	–	–	310 (21.5, 19.4~23.6)	–	310 (21.5, 19.4~23.6)
Negative	–	–	1133 (78.5,76.4~80.6)	–	1133 (78.5,76.4~80.6)

*This analysis was restricted to participants who had ever paid sex in the last 6 months.
STD, sexually transmitted diseases.

Table 2 Reasons for not conducting HIV or syphilis testing

Reasons	HIV testing (n=766, %)	Syphilis testing (n=500, %)
High cost for test	8 (1.0, 0.3~1.8)	6 (1.2, 0.2~2.2)
Worried about confidentiality	47 (6.1,4.4~7.8)	41 (8.2, 5.8~10.6)
Not necessary for test	548 (71.5, 68.3~74.7)	338 (67.6, 63.5~71.7)
Worried about discrimination	11 (1.4, 0.6~2.3)	2 (0.4, 0.0~1.0)
Ever received a test	112 (14.6, 12.1~17.1)	86 (17.2,13.9~20.5)
Worried about positive results	15 (2.0, 1.0~2.9)	14 (2.8,1.4~4.2)
Others	25 (3.3, 2.0~4.5)	13 (2.6,1.2~4.0)

on improving acceptability of HIV and syphilis testing uptake through internet are warranted.

Our study showed a high proportion of both HIV and syphilis infection among individuals who conducted HIV and syphilis testing. This proportion is higher than previously reported in other studies in China,[13] South Africa,[26] Vietnam.[27] Additionally, among those testers, we found that around one-tenth of participants had ever engaged in paid sex in the last 6 months, but only half of those used condoms in the last paid sex, which is similar to another study in China.[13] These indicate that heterosexual STD clinic patients bear a high burden of HIV and syphilis infection, warranting the necessity of improving HIV and syphilis test uptake among this population.

Our data found that condom use was positively associated with both HIV and syphilis testing. This finding was consistent

Table 3 Factors associated with HIV and syphilis testing among heterosexual STD clinic patients, a cross-sectional survey in China, 2016 (n=1943)

Variables	HIV testing* Crude model OR (95% CI)	P	Adjusted model OR (95% CI)	P	Syphilis testing* Crude model OR (95% CI)	P	Adjusted model OR (95% CI)	P
Ever diagnosed with STD								
Yes	1.17 (0.92~1.49)	0.198	1.19 (0.93~1.53)	0.173	1.88 (1.37~2.56)†	<0.001	1.78 (1.29~2.44)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Condom use in the last sexual encounter								
Yes	3.06 (2.48~3.77)†	<0.001	3.25 (2.61~4.05)†	<0.001	3.06 (2.48~3.77)†	<0.001	2.23 (1.76~2.84)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Consistently used condom in the last 6 months								
Yes	1.51 (1.12~2.02)†	<0.001	1.96 (1.44–2.67)†	<0.001	2.22 (1.69~2.90)†	<0.001	2.37 (1.79~3.15)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Ever had paid sex in the last 6 months								
Yes	3.80 (2.70~5.36)†	<0.001	3.19 (2.24~4.56)†	<0.001	2.08 (1.46~2.97)†	<0.001	1.84 (1.27~2.67)†	0.001
No	Ref.		Ref.		Ref.		Ref.	
Condom use in the last paid sexual act								
Yes	0.82 (0.42~1.61)	0.571	0.93 (0.41~2.12)	0.867	0.78 (0.42~1.46)	0.436	1.21 (0.58~2.52)	0.621
No	Ref.		Ref.		Ref.		Ref.	
Received any kind of HIV/STD-related knowledge in the last 12 months								
Yes	1.85 (1.51~2.26)†	<0.001	1.94 (1.58~2.40)†	<0.001	2.53 (1.97~3.24)†	<0.001	2.91 (2.25~3.77)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Ever had HIV testing in the last 12 months								
Yes	2.32 (1.30~4.15)†	0.005	2.11 (1.20~3.69)†	0.009	3.06 (1.39~6.74)†	0.006	3.09 (1.39~6.86)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Ever had syphilis testing in the last 12 months								
Yes	0.70 (0.50~0.98)†	0.048	0.75 (0.53~1.06)	0.101	1.73 (1.11~2.69)†	0.016	1.87 (1.19~2.94)†	0.007
No	Ref.		Ref.		Ref.		Ref.	

*Adjusted model was adjusted for age (continuous), gender, ethnic, education, marital status and monthly income.
†p<0.05.
STD, sexually transmitted diseases.

Table 4 Factors associated with HIV and syphilis infection among heterosexual STD clinic patients, a cross-sectional survey in China 2016

	HIV infection* (n=1177)				HIV infection* (n=1177)			
	Crude model		Adjusted model		Crude model		Adjusted model	
Variables	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P	OR (95% CI)	P
Ever diagnosed with STD								
Yes	2.04 (0.84~4.92)	0.862	1.74 (0.66~4.61)	0.945	5.36 (4.02~7.13)†	<0.001	5.31 (3.93~7.18)†	<0.001
No	Ref.		Ref.		Ref.		Ref.	
Condom use in the last sexual encounter								
No	1.63 (0.65~4.06)	0.609	1.28 (0.47~3.51)	0.983	2.30 (1.73~3.07)†	<0.001	1.75 (1.29~2.39)†	<0.001
Yes	Ref.		Ref.		Ref.		Ref.	
Inconsistently used condom in the last 6 months								
Yes	1.01 (0.29~3.49)	0.993	0.89 (0.24~3.39)	0.875	1.59 (1.10~2.30)†	0.014	1.04 (0.71~1.54)	0.827
No	Ref.		Ref.		Ref.		Ref.	
Ever had paid sex in the last 6 months								
Yes	3.47 (1.57~7.67)†	<0.001	2.00 (1.24~3.12)†	<0.001	0.99 (0.70~1.41)	0.782	1.12 (0.76~1.64)	0.748
No	Ref.		Ref.		Ref.		Ref.	
Condom use in the last paid sexual act								
No	2.02 (0.49~8.25)	0.329	1.16 (0.20~6.83)	0.873	3.05 (1.48~6.29)†	0.002	2.44 (0.98~5.99)	0.053
Yes	Ref.		Ref.		Ref.		Ref.	
Received any kind of HIV/STD-related knowledge in the last 12 months								
Yes	0.90 (0.40~2.04)	0.883	1.04 (0.43~2.53)	0.788	0.77 (0.59~1.01)	0.521	0.98 (0.74~1.30)	0.446
No	Ref.		Ref.		Ref.		Ref.	

*Adjusted model was adjusted for age (continuous), gender, ethnic, education, marital status and monthly income.
†p<0.05.
STD, sexually transmitted diseases.

with the previous studies.[12 28–30] The potential reason is that participants who used condoms may have strong self-protection awareness as well as a better understand of their potential risk of developing AIDS or other STDs and in turn have strong awareness of healthcare seeking.[31] Although the effect of condom use on preventing the sexual transmission of HIV/syphilis has been clearly demonstrated,[32] we found only around one-third of participants used condom in the last sexual intercourse and one-tenth used condom consistently, which highlights the importance of condom promotion among heterosexual STD clinic patients. Additionally, our study showed that participants who had ever paid sex were more likely to have both testing uptake. This may be partly attributable to higher risk perception of HIV/syphilis infection.[33] Findings suggest that HIV and syphilis testing services that target heterosexual STD clinic attendees at high risk for HIV and syphilis infection may be strengthened by increasing the high perception of HIV/STD risk.

This study has several limitations. First, all the data were collected through self-report, which may be prone to information bias. Second, the participants were not randomly selected in this study. This may limit the external validity of our findings. Third, this study was cross-sectional, so relations should be interpreted as associations that might or might not be casual. Finally, this study could not account for many factors that likely influence the frequency of testing—policy environment, purpose of the patient's visit, clinic factors and local norms.

CONCLUSIONS

Our findings showed a low-level of HIV and syphilis testing uptake in STD clinic-based context in China, alongside with a high level of engagement in risky sexual behaviours, which indicates a high risk of HIV and syphilis infection among STD clinic patients. Future intervention programmes on promoting HIV and syphilis testing uptake among this population must be designed scientifically and take sexual behaviours, improvement of knowledge and awareness of HIV and syphilis infection into account.

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