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Advances and challenges in sexually transmitted infections prevention among men who have sex with men in Asia

Wei Ma, Zhixian Chen and Shuyue Niu

Purpose of review
This review summarizes recently published research on sexually transmitted infections (STIs) and sexually transmitted diseases (STDs) among men who have sex with men (MSM) in Asia, covering four main areas: prevalence and consequences of STIs/STDs, factors associated with STI risk, strategies and measures of STI prevention, challenges in the prevention of SITs.

Recent findings
Studies show that STIs among Asian MSM are still prevalent, with the prevalence of STIs varying slightly from country to country. In addition to the number of sexual partners, frequency of condom use, high-risk sexual behaviors, the influence of Confucianism, law, and COVID-19 are also related to STI risk. Social stigma, weak health systems, lack of funding and policy support are the current challenges for STIs prevention.

Summary
In the future, new media technologies are encouraged to be used to enhance education and reduce stigma and discrimination against MSM and STIs. Expanding STI screening, strengthening STI knowledge propaganda and education among MSM population, and providing necessary counseling and medical services are main strategies in STI prevention. It is also important to strengthen STI awareness and policy support at the national level.

Keywords
Asia, men who have sex with men, sexually transmitted infections

INTRODUCTION

Nowadays, there are over 30 known pathogens (i.e., bacteria, viruses, or parasites), which are exclusively or predominantly transmitted through sexual contact or transmissible during sexual contact [1]. According to the World Health Organization (WHO) [2], >1 million sexually transmitted infections (STIs) are acquired every day worldwide, the majority of which are asymptomatic. Each year, there are an estimated 374 million new infections with one of four STIs: chlamydia, gonorrhea, syphilis, and trichomoniasis [2].

Men who have sex with men (MSM) is a population with high risk of SITs. For example, WHO reported that syphilis is highly prevalent among MSM worldwide [3]. Recently, studies have also shown that the MSM is the high-risk group attracted by STIs. For example, a study in England showed that the most common route of STI transmission in England changed from heterosexual men (40.4%) in 2014 to MSM (36.7%) in 2019, with a 76% increase during this period among MSM [4]. Another research reported that the prevalence of syphilis was higher among people with HIV (7.1% among MSM with HIV and 3.4% without HIV) [5]. Other major STIs were prevalent among MSM as well. In a study conducted in West Africa [6], of all participants (816 MSM), 24.3% had at least one STI symptom during the 4 follow-up years, and the overall STI

Department of Epidemiology, School of Public Health, Cheeloo College of Medicine, Shandong University, Jinan, Shandong, PR China

Correspondence to Wei Ma, PhD, Department of Epidemiology, School of Public Health, Cheeloo College of Medicine, Shandong University, 44 West Wenhua Road, Jinan, Shandong 250012, PR China.
Tel: +86 531 8838 2141; e-mail: weima@sdu.edu.cn

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KEY POINTS

- The prevalence of sexually transmitted infections (STIs) among men who have sex with men (MSM) in Asia is still high, which varied from country to country.
- Sexual behavior and psychologic stress have a negatively impact on diagnosis, treatment, and reduction of transmission of STI in the Asian MSM population.
- Effective and innovative measures are called on to prevent and control SITs among MSM.

symptoms incidence was 20.4 per 100 person-years (95% confidence interval [CI] 18.4–22.6). Between 2010 and 2017, overall diagnoses with gonorrhea/chlamydia increased by 76% across 46 European countries, and the increases were more pronounced for asymptomatic (142%) compared to symptomatic (31%) infections [7].

Currently, a comprehensive review of the epidemic of STIs among MSM in Asia is lacking. Additionally, there is little information about prevention of STI across the Asian region. We conducted a systematic review across 8 databases (PubMed, Web of Science, BioMed Central, Scopus, CNKI, SionMed, VIP database and Wanfang database) from January 2021 to June 2022 for advances and challenges in STI prevention in MSM populations of Asia. Two review authors screened literatures by terms: ''STI''/''STD'', ''MSM'', ''Epidemic'', ''Prevention'', ''Challenges'' and ''Asia'' firstly, and then we selected more relevant studies conducted in some Asian countries such as China, Thailand, India and Japan etc. Besides, we also searched ''low-and middle-income countries'', ''Central Asia'', ''South Asia'', ''Southeast Asia'' and other keywords to acquire more research. Finally, by looking through the full text of the literatures, we ascertained 43 references in our review.

TEXT OF REVIEW

Prevalence and consequences of sexually transmitted infections

From global perspective, the age-standardized incidence rates (ASRs) of HIV, chlamydia, trichomoniasis and genital herpes were 1.70%, 0.29%, 0.27%, and 0.40% per year from 2010 to 2019, respectively. Specifically, East Asia had the greatest increase in ASR for trichomoniasis and genital herpes [8▪]. In Central Asia and the Caucasus, prevalence of HIV, HCV, and HBV remains exceedingly high among MSM, with 6.6% and 13.2% HIV prevalence reported in two Kyrgyz studies [9▪▪]. In the Association of Southern Asian Nations (ASEAN) region, a decrease in HIV prevalence was detected among MSM in Bangkok, but it was stable or increasing in the other cities [10▪]. In Asia, which consists of many middle-low incomes countries, the prevalent trends of STIs have not been controlled well yet. For example, the prevalence of HIV among adolescent and young MSM in Urban Indonesia reached an alarming level, with 30% of them were HIV antibody positive in 2018–2019 [11▪]. Likewise, Israel reported that 34.3% of HIV-1 was transmitted through homosexual contacts [12]. In a study conducted in Thailand, 5.6% and 2.6% of participants were HIV positive in stand-alone and mobile voluntary counseling and testing (VCT) facilities respectively, and the number of HIV positive MSM was more than transgender women (TGW) in all areas [13]. Both HIV and syphilis among MSM were also observed with an upward trend in Vietnam, with the prevalence increased from 8.1% to 16.0% and 3.5% to 9.5%, respectively in 2014–2018. Co-infection with HIV and syphilis also rose from 1.1% in 2014 to 3.7% in 2018 [14]. A cross-sectional study in India reported that 71.2% of the respondents had at least one sexual health problem(s) such as pain in defecation/bleeding per anus/rectal prolapse, anal injury, or perianal warts during the past 1 year [15]. In China, a meta-analysis showed that the pooled incidence of new HIV infection was 4.93 (95% CI: 4.15–5.72) per 100 person-years among MSM populations from 2010 to 2021 [16▪▪], and another study found that HIV prevalence among the male sex workers (MSWs) was 17.8% (95% CI: 13.2–23.4) whereas 6.5% (95% CI: 5.8–7.2) among MSM in Tianjin in 2011–2018 [17]. Similarly, STIs and HIV were seen in around 22% 0.9% of MSM in Chennai according to 600 MSM who attended the STI clinics from January 2018 to December 2020 [18]. Over half of participants tested positive for HIV or another STI (HSV-2, syphilis, gonorrhea, orchlamydia) in a cross-sectional community-based study of MSM in Hanoi, Vietnam, and the prevalence of HIV, HSV-2, syphilis, gonorrhea, and chlamydia was 10%, 4%, 13%, 34%, and 19%, respectively [19]. Overall HPV infection prevalence among MSM and TGW was 66.4% in Pakistan, and the substantial risk of them to develop anal cancer was high, particularly for those with a concurrent HIV infection [20]. In Japan, the overall prevalence of high-risk human papillomavirus positivity was 59.7%, with HIV-infected MSM (68.9%) having a significantly higher rate than HIV-uninfected MSM (40.6%) [21].

STIs have remained a major public health threat, disproportionately affecting men who have sex with

men. Specifically, HIV can adversely impact the mental health [22▪▪]. In a review including 26 literatures, the authors found MSM infected with chlamydia, gonorrhea, and syphilis had twice or greater risk of HIV acquisition [23▪▪]. In Shenyang, China, 59.3% had a single infection, 19.2% had dual infections, and 4.5% had multiple (i.e., more than two) infections among the 177 MSM [24▪]. Additionally, the majority ($n = 17/20$) participants reported experiencing significant psychological distress either in the past or in the present, approximately one-third also reported a history of suicidal ideation or self-harm, and more depressive-anxious symptoms in a Vietnamese qualitative study [25]. Operario *et al.* [26▪▪] showed that repeated exposure to anti-MSM stigma can produce emotional distress, pressure to conceal one's identity, social isolation, maladaptive coping, and physiological reactivity.

Factors associated with sexually transmitted infection risk

Given the high prevalence of STIs and the vulnerability of MSM in Asia, next we reviewed and explored the factors associated with STI risk, hoping to provide the suggestions for future intervention.

Based on national HIV sentinel surveillance of MSM aged 16 years or older in Vietnam, factors associated with HIV infection included place of residence, early sexual debut, consistent condom use and not engaging in anal sex during the past month, not knowing one's HIV test results, having ever injected drugs, and having active syphilis [14]. In another study, it was reported that factors associated with STI incidence were self-reported >2 sex partners in the past month (unadjusted rate ratio [uRR] 4.6, 95% CI 1.0, 20.6), and moderate preexposure prophylaxis (PrEP) adherence ([uRR] 7.3, 95% CI 1.6, 32.6) in young Thai MSM [27]. A retrospective study in Shenzhen, China found that ever had sex with female, gender of the first sexual partner, marital status, age group, education, monthly income (RMB), frequency of condom use in anal sex with men in the past 6 months, and history of STIs were significantly associated with herpes simplex virus type 2 (HSV-2 infection). This study also indicated that MSM who used a condom every time in anal sex with a man in the past 6 months were less likely to be infected with HSV-2 than MSM who never used a condom [28]. A systematic review and meta-analysis reported that higher HPV prevalence was observed among MSM with less education and HIV-positive status in China [29]. The prevalence of trichomonas vaginalis in Turkey varies depending on the socioeconomic structure of the region, the lifestyle of the person, the method used in the study, the size of the population, and the clinical condition of patients [30]. In addition to the factors above, another study showed that Confucianism was probably associated with increased risk of HIV infection among MSM and MSW in China [17]. Because homosexuality is not legal and there is considerable social stigma associated with homosexuality [18], it also suggested the MSM were willing to conceal the STI infection and then resulted in more prevalence in Chennai, India.

The influences of coronavirus disease 2019 (COVID-19) on STIs in the past a few years were also explored. A study in China showed that the incidence of HIV infection, syphilis and gonorrhea dramatically declined by 13.1%, 13.8%, and 11.4% in 2020 compared with that in 2019, respectively [31], although further data related to MSM were not available. Schumacher *et al.* [32] conducted a study among 231 MSM in US comparing the periods of during vs. prepandemic and found that reports of more than three sex partners and substance use decreased, human immunodeficiency virus/PrEP care engagement increased, STI testing decreased and then rebounded, neither Chlamydia nor gonorrhea positivity significantly changed. In addition, the findings in Amsterdam showed that incidence rates of chlamydia, gonorrhea and syphilis were significantly lower during 15 March 2020 to 15 June 2020, but nonsignificantly higher during 16 June 2020 to 15 September 2020 and during 16 September 2020 to 1 April 2021 of restrictions than in 2019 [33]. Thus, the influences caused by COVID-19 differentially existed between China and the remainder of the world. Given the current lack of published research, further studies on the impact of COVID19 on STI, specifically in the MSM population is needed in both Asia and worldwide.

A summary of details about studies on the factors associated with STI risk are shown in Table 1.

Strategies and measures of sexually transmitted infection prevention

In addition to the promotion of condom use, institutional testing and other routine preventive measures [22▪▪], different countries and regions have taken active measures to prevent STIs and STDs. The use of new media and other means (Internet, TV, mobile apps) to raise awareness of sexually transmitted diseases and health education is the most common measure.

In a randomized controlled trial in Singapore, the group that received the online television intervention had significantly increased willingness to test for HIV and other STIs [34]. A social media-based behavioral intervention in Shenzhen, China, significantly reduced the incidence of STI symptoms in

Table 1. Studies about sexually transmitted infection from January 2021 to June 2022 with a focus on men who have sex with men in Asia

Country/city	Prevalence of STIs					Influencing factors	Note	Reference
	HIV	Syphilis	Gonorrhea	Other STI 1	Other STI 2			
Worldwide		ASR: 1.70% (95% CI: 1.62–1.78%)		ASR of chlamydia: 0.29% (95% CI: 0.04–0.54%), ASR of trichomoniasis: 0.27% (95% CI: 0.03–0.52%) ASR of genital herpes: 0.40% (95% CI: 0.36–0.44%)		Geographical regions and age groups (younger or older)	ASR: age-standardized incidence rates	[8▪]
Worldwide	25 times greater among MSM than among heterosexual men							[26▪▪]
Worldwide	MSM infected with TP, NG, or CT have twice or greater risk of HIV acquisition						TP: *Treponema pallidum*, NG: *Neisseria gonorrhoeae*, CT: *Chlamydia trachomatis*	[23▪▪]
Central Asia and the Caucasus	Kazakhstan: 6.6% Kyrgyzstan: 13.2%			Kyrgyzstan (HCV): 2.2% and 7.3%				[9▪▪]
Association of Southeast Asian Nations	Bangkok: decrease prevalence, other cities: stable or increasing					Pervasive societal stigma and discrimination of MSM		[10▪]
Urban Indonesia	30%					Being 20–24 years old, having a steady partner and preferring the receptive position during sex.		[11▪]
Shenzhen, China	Fell significantly from 15.9% in 2012 to 8.7% in 2018	From 20.4% in 2012 to 14.8% in 2018			HSV-2 seropositive: No significant change (16.7% in 2012 to 14.0% in 2018)	Ever had sex with female, Gender of first sexual partner, marital status, age group, education, monthly income (RMB), frequency of condom use in anal sex with men in the past 6 months, history of STIs were significantly associated with HSV-2 infection.		[28]
Shenyang, China		*Treponema pallidum* (TP): 9.6%	*Neisseria gonorrhoeae* (NG): 10.2%	Human papillomavirus (HPV): 76.3%	Chlamydia trachomatis (CT) CT 15.3%	Higher educational level (aOR, 0.46; 95% CI: 0.24–0.85) and the history of STIs (aOR, 2.53; 95% CI,)	83.1% were infected with one STI	[24▪]
Chiang Mai, Thailand	More than 80% (HIV VCT data) 5.6% (stand-alone facility)					Individuals tested at the stand-alone centers, were 20–24 or >24 years old, sex workers, or sexually transmitted infection positive		[13]
China	MSWs:17.8% (95% CI: 13.2% ~ 23.4%)	MSM: 6.5% (95% CI: 5.8–7.2)				Engaging in male sex industry		[17]

Table 1 (*Continued*)

Country/city	Prevalence of STIs					Influencing factors	Note	Reference
	HIV	Syphilis	Gonorrhea	Other STI 1	Other STI 2			
China	increase incidence	Increase incidence	Fluctuant			COVID-19, lockdown, home-staying, keeping social distance, Less high-risk sexual behavior		[31]
China					HPV: 85.1% (HIV-positive), 53.6% (HIV-negative), and 59.2% (unknown HIV status)	Higher HPV prevalence was associated with less education and HIV-positive status		[29]
China	Pooled incidence of new HIV infection: 4.93 (95% CI: 4.15 to 5.72) per 100 person-years					Risk factors: Syphilis infection, unprotected anal sex, multiple sexual partners, seeking sex partners in bars, public baths and parks Protective factors: age of > 25 years, Han Ethnicity, awareness of AIDS-related knowledge and provision of HIV preventive services		[16▪▪]
Thailand	Overall incidence rate of STIs was 25.2/100PY	8.6/100 PY for syphilis.		19.0/100 PY for CT (chlamydia)		Self-reported >2 sex partners in the past month (unadjusted rate ratio [uRR] 4.6, 95% CI 1.0, 20.6), and moderate PrEP adherence (uRR 7.3, 95% CI 1.6, 32.6).		[27]
Vietnam						Sexual stigma Financial security		[25]
Hanoi, Vietnam	55% tested positive for HIV or another STI	HIV (10%), syphilis (13%)	Gonorrhea (34%)	Chlamydia (19%)	HSV-2 (4%)		Another STI: HSV-2, syphilis, gonorrhea, or chlamydia	[19]
Vietnam	Varied from 8.1% (95% CI: 6.0–10.6) to 16.0% (95% CI: 13.2–19.2) from 2014 to 2018					Place of residence, early sexual debut, consistent condom use and not engaging in anal sex during the past month, not knowing one's HIV test results, having ever injected drugs, and having active syphilis.		[14]
India				71.2% had at least one sexual health problem		Sexual orientation, sexual roles and the number of sexual partners	Health problem: anal and peri-anal conditions, perianal warts, genital/oral vesicles, burning during micturition and genital ulcers	[15]

Table 1 (*Continued*)

Country/city	Prevalence of STIs					Influencing factors	Note	Reference
	HIV	Syphilis	Gonorrhea	Other STI 1	Other STI 2			
Karachi, Pakistan					Overall HPV infection prevalence: 66.4% (180/271)	Risk factors: living with HIV, more unprotected anal intercourse and receptive anal sex preference		[20]
Chennai, India	STIs: 22% HIV positive: 0.9%		Gonococcal infection: 10%	Herpes genitalis: 12%	Urethral discharge and genital ulcer: 16%			[18]
Turkey				Mean prevalence of trichomonas vaginalis: 5.94%, 2.87% in men, and 6.17% in women.		Socioeconomic structure of the region, the lifestyle of the person, the method used in the study, the size of the population, and the clinical condition of patients.		[30]
Israel	34.3% of HIV-1 was transmitted through MSM							[12]

aOR, adjusted odds ratio; CI, confidence interval; MSM, men who have sex with men; STI, sexually transmitted infection.

condom-using youth MSM when compared with VCT services [35▪]. The results of a meta-analysis in China showed that network intervention for HIV/AIDS prevention in MSM population had a better effect, and the network intervention could make the population have a clearer understanding of the source of HIV infection, and know how to protect themselves and others in high-risk behaviors [36].

Testing methods and facilities also have an impact on STIs. A study in Chiang Mai, Thailand, showed that mobile HIV voluntary counseling and testing facilities made it easier to reach hard-to-reach populations such as MSM, making testing available to more at-risk groups [13]. A point-of-care dual testing (POCTs) method for simultaneous detection of HIV and syphilis antibodies has been developed in multiple countries, expanding the opportunities for HIV and syphilis detection in MSM population [37▪▪]. Nucleic acid amplification is the international gold standard for detection and diagnosis of *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (NG) infections, but cost and operational limitations make it available only in high-level healthcare Settings. In China, diagnosis and treatment guidelines have recommended the use of nucleic acid testing techniques such as PCR for rapid and effective diagnosis of CT and NG infections [38].

Vaccines are also essential for preventing STIs. Currently, vaccines for CT and NG are still in development or clinical trials. HPV-related vaccines have been developed and deployed. Countries such as the United States, France, Germany, and Australia have reduced the burden of HPV disease through universal male vaccination [39▪]. A study in Japan showed that high-risk HPV genotypes preventable by 9-valent HPV vaccine are prevalent in Japanese MSM. It is recommended that both infected and uninfected Japanese MSM should consider vaccination against HPV, but no plans have been implemented at the national level [21]. A Chinese study suggests young men who have sex with men get the HPV vaccine before they have sex for the best protection [29]. No other Asian countries was found to include HPV vaccination for MSM in their national STI prevention guidelines, this is likely an area of opportunity to improve sexual healthcare in MSM for those countries.

PrEP and post exposure prophylaxis (PEP) are effective measures to prevent HIV and the efficacy of PrEP has been verified in several clinical trials at home and abroad [40]. According to a global systematic review, awareness of PrEP and willingness to use PrEP were 50.0% and 58.6%, respectively among MSM [41]. MSM in India who scored higher

on the perceived benefit of PrEP reported higher rates of willingness to take PrEP [42]. Unfortunately, acceptance of PrEP is suboptimal in India, and so far, no demonstration projects are underway in MSM population [43]. In China, MSM's willingness to use PrEP is at a moderate level, such as 48.3–58.2% of men who have sex with men in Shenyang, and about 60% of men in Beijing, Sichuan, and Chongqing. Barriers to PrEP programs included cost, fear of adverse reactions, adherence, and social discrimination [44▪▪]. In 2020, China approved tenofovir fumarate and emtricitabine for HIV prevention [45]. PEP, as an effective prevention strategy for AIDS, has a relative higher level of awareness among the high-risk population of AIDS in China [46]. A study carried out in 11 cities in China showed that 67.3% of subjects are willing to use PEP in case of HIV exposure in the future, among which MSM has the highest proportion (82.6%) willing to use PEP [46].

Challenges of sexually transmitted infection prevention

STI prevention among MSM still faces many challenges in Asia. The first challenge is the stigma of sexually transmitted diseases among men who have sex with men. Because of the culture and religion, the stigma in Asia might be more impactful than elsewhere in the world. In Vietnam, perceived social stigma in the medical setting was negatively associated with prior testing for HIV or STIs [19]. Also in India, stigmatization and discrimination against homosexuals affect MSM's health seeking behavior. A study showed that only 70.3% of MSM were willing to seek medical help for sexual health problems, and 79.4% of respondents were not willing to disclose their sexual behavior when seeking medical attention [15]. A study in Vietnam found similar results, with sexual stigma contributing to MSM's reluctance to actively access health services [25]. The second challenge is weak health systems. In low- and middle-income countries, weaknesses in health systems, such as inadequate infrastructure, inadequate documentation, heavy workloads, inadequate funding and quality assurance, are main barriers to the development of POCTs [47▪]. The third challenge is financial and policy support. Due to the limited economic level of some low- and middle-income countries in Asia, governments and societies do not have sufficient funds to support more STI prevention measures. In the same way, the lack of policy support also affects the implementation effect of preventive measures. In addition, the COVID-19 isolation and lockdown policy has limited STI testing and treatment behavior of MSM population to some extent [31].

CONCLUSION

Sexually transmitted infections have seriously increased the burden of global public health. This study reviewed the progress and challenges in the prevention of STIs among Asian MSM, described the prevalence, factors associated with STI risk in Asia, and provided some suggestions for future interventions. It is urgent and necessary to take active and effective measures to prevent and control STIs. In the future, social publicity to reduce discrimination and stigma against MSM should be strengthened. New media and other innovative technology are encouraged to be used to strengthen STI knowledge propaganda and education and reduce the risk of sexual activity. Further, expanding the screening of STIs in MSM, improving the screening coverage and screening rate, early detection and management of infected patients, standardized diagnosis and treatment services are also essential. Considering the characteristics of MSM, self-testing, confidential spaces in medical facilities, online medical treatment, remote consultation and medical support are encouraged to assure better effects.

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Conflicts of interest

There are no conflicts of interest.

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- ▪ of special interest
- ▪▪ of outstanding interest

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This review analyzed trends and differences in STIs by geographical regions and age groups from 1990 to 2019. Then, it reported annual number of new infections and age-standardized incidence rates (ASRs) of syphilis, chlamydia, gonorrhea, trichomoniasis, and genital herpes in different regions such as American, southern sub-Saharan Africa, East Asia, North Africa and Middle East, respectively.

9. ▪▪ Davlidova S, Haley-Johnson Z, Nyhan K, *et al.* Prevalence of HIV, HCV and HBV in Central Asia and the Caucasus: a systematic review. Int J Infect Dis 2021; 104:510–525.

This review reported the prevalence of HIV, HCV and HBV among high-risk populations (people who inject drugs (PWID), female sex workers (FSW), men who have sex with men (MSM), prisoners, and migrants) in Central Asia and the Caucasus, and it found exceedingly high prevalence among PWID and MSM.

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This study identified a need for health behavior theory and showed that research on STI prevention behaviour has extended from a focus on abstinence, partner reduction and condom use, to also include novel preventive behaviours, notably treatment-as-prevention, preexposure prophylaxis (i.e., the preventive use of medicines by uninfected people), and vaccination for some STIs.

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