

Facilitators and Barriers for Chlamydia and Gonorrhoea Testing in Female Sex Workers: A Scoping Review

Wenqian Xu,^{1,2,3,4} Peng Liang,^{1,2,3,4} and Cheng Wang^{1,2,3}

¹Dermatology Hospital of Southern Medical University, Guangzhou, China, ²Southern Medical University Institute for Global Health, Guangzhou, China, ³Guangdong Provincial Center for Skin Diseases and STIs Control, Guangzhou, China, and ⁴School of Public Health, Southern Medical University, Guangzhou, China

We conducted a scoping review to examine the barriers and facilitators accessing *Chlamydia trachomatis* and *Neisseria gonorrhoeae* testing among female sex workers. A literature search was conducted in Embase, Medline, and Web of Science for studies published from the date of creation of database to 17 March 2023, without restrictions for publication date. We used thematic synthesis to identify common affecting factors across included studies and then linked them into categories of the socioecological framework. Among the 14 articles included, 3 utilized qualitative methods, 7 utilized quantitative surveys, 2 were mixed methods, and 2 were randomized controlled trials. Several important affecting factors stood out during this review, including stigma and discrimination, as well as social support at the societal level, and financial costs at the service level. This review suggested that interventions on addressing societal- and service-level determinants are needed, which includes reducing stigma and discrimination toward sex work and cost for facility testing, as well as increasing social support and community engagement.

Keywords. chlamydia; female sex workers; gonorrhoea; screening; testing.

Chlamydia trachomatis (CT) and *Neisseria gonorrhoeae* (NG) are the most common bacterial sexually transmitted infections (STIs) worldwide, with a global incident cases of 127.2 million and 86.9 million, respectively, in 2016 [1]. Both types of infection can lead to severe reproductive complications, as well as potentially increase acquisition of human immunodeficiency virus (HIV) [2, 3]. According to the most recent estimation of the World Health Organization, approximately 128 million new cases of CT and 82 million cases of NG occurred globally in 2020 [4]. Female sex workers (FSWs) are at particularly high risk for CT and NG infection due to frequent sexual contact with multiple sex partners, and barriers to the negotiation of condom use [5, 6]. Moreover, social marginalization, violence, and abuse, as well as unregulated work environments, may further exacerbate FSWs' vulnerabilities and risk of CT and NG infections [7–9]. The prevalence of CT and NG infections in FSWs were 4.0%–32.0% and 0.8%–29.3% [10–14], respectively, much higher than that in the general population 15–49 years old (3.2% for CT and 0.7% for NG) [4].

Most CT and NG infections are asymptomatic; thus, timely access to testing and treatment services is crucial for reducing further transmission and preventing potential sequelae from the infections [7]. Nevertheless, few FSWs receive CT and NG testing services. For example, a cross-sectional study conducted in China found that only 1 in 10 FSWs had CT and NG testing in the past year [15]; another study in Hongkong showed that only 4.7% of participants had pharyngeal NG and CT screening in the preceding year [16]. A large number of undiagnosed infections could lead to therapy delays and further transmission of CT and NG infections among FSWs, their clients, and the wider population [17]. Interventions to improve CT and NG testing uptakes for FSWs are warranted, which should be developed based on the understanding of affecting factors for CT and NG testing from the perspective of FSWs. However, no review literature to date has systematically reported factors that facilitate or undermine the uptake of CT and NG testing in FSWs.

The objective of this review is to examine the barriers and facilitators accessing CT and NG testing among FSWs, which is essential to orient public health policies and action toward undiagnosed persons and mitigate the health impact of CT and NG infections in FSWs.

METHODS

This scoping review was conducted by using the socioecological framework [18]. According to this conceptual framework, we conceptualized the uptake of CT and NG test as the result of many interrelated factors that operate concurrently at the “individual,” “service,” and “societal” levels, and thereby provided

Received 18 May 2023; accepted 18 July 2023; published online 25 July 2023

Correspondence: Cheng Wang, PhD, Dermatology Hospital of Southern Medical University, Number 2 Lujing Road, Guangzhou, China, 510095 (wangcheng090705@gmail.com).

Open Forum Infectious Diseases®

© The Author(s) 2023. Published by Oxford University Press on behalf of Infectious Diseases Society of America. This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs licence (<https://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial reproduction and distribution of the work, in any medium, provided the original work is not altered or transformed in any way, and that the work is properly cited. For commercial re-use, please contact journals.permissions@oup.com

<https://doi.org/10.1093/ofid/ofad397>

a comprehensive understanding of the multilevel factors influencing CT and NG testing behaviors among FSWs. The individual level included sociodemographic and sexual behavioral characteristics, the perceived risk of CT and NG infections, the knowledge about CT and NG infections, and the preference of sampling types. The service level included facility-service delivery time, financial cost, and interacting with healthcare providers. The societal level included factors such as social stigma and discrimination, social support, and community engagement.

We conducted a literature search for studies published from the date of creation of each database to 17 March 2023, without restrictions for publication date. We searched Embase, Medline, and Web of Science using the search terms “chlamydia” or “chlamydia trachomatis” or “CT” and “neisseria gonorrhoeae” or “gonorrhoea” or “NG” and “screen” or “test” and “barriers” or “facilitators.” Searches were supplemented by hand searches of the reference lists of eligible studies.

Studies were included if they were published in English, focused on FSWs or key populations involving FSWs, and focused on the factor affecting CT or NG testing. The population of interest was limited to FSWs, defined as individuals assigned female sex at birth who exchange sex for money or other gifts and commodities. The phenomenon of interest is access and utilization of any screening approach for CT and/or NG along with any other STIs. The outcomes of interest are those perceived barriers and facilitators to CT and/or NG screening for FSWs from their perspective. This review aims to analyze studies using primary data, so we excluded articles published as systematic reviews and editorial comments.

The results from our database searches were downloaded into an Endnote library (version 20), and duplicates were removed. Two researchers independently screened the titles and abstracts of articles to assess eligibility, and then reviewed the full text. Any discrepancies about the included studies were resolved through discussion. In addition, the reference lists of included studies were manually searched for relevant publications.

RESULTS

The initial search resulted in 376 potentially relevant articles. Titles and abstracts were screened from 361 unique records and 14 records were finally included. [Figure 1](#) summarizes different phases of the study selection process.

Of 14 studies, 3 utilized in-depth interviews and focus group discussions, 7 utilized quantitative surveys, 2 were mixed methods, and 2 were randomized controlled trials (RCTs) ([Table 1](#)).

Individual-Level Factors

Sociodemographic and Sexual Behavioral Characteristics

Two studies discussed individual sociodemographic characteristics [[19](#), [20](#)]. A study conducted in a rural county in Guangxi

province, China, which used the surveys of 411 FSWs, found that younger participants were more likely to test for CT and NG infections [[19](#)]. However, analysis of questionnaire surveys from 425 FSWs in Nepal found higher testing uptake among women aged ≥ 25 years [[20](#)]; this study also reported that married women were more likely to test.

Two articles found the association between sex work venues and CT and NG testing uptake [[15](#), [21](#)]. In Vietnam, FSWs who conducted sex work in commercial venues were more likely to go for testing than those who solicited clients on streets. This is due to the fact that employees at some karaoke bars and massage parlors were required by owners to undergo routine health screenings. Conversely, street-based FSWs usually sought care only when they experienced severe symptoms that forced them to exit sex work [[21](#)]. Similar results were also noted among the study in Guangdong province in China, which used anonymous questionnaires to explore the testing behaviors of 1207 FSWs, and found that women working at low-tier locations (ie, streets and other public outdoor places) were more likely to have recently tested for CT than those working at middle-tier locations (ie, hair salons, barber shops, massage parlors, and roadside shops) [[15](#)].

Two studies identified that the number of clients or sexual partners was associated with the uptake of CT and NG testing among FSWs. In China [[15](#)] and Switzerland [[22](#)], those with more clients or sexual partners were more likely to test.

Knowledge About CT and NG Infections

Four articles examined CT- and NG-related knowledge [[23–26](#)]. A cross-sectional survey that recruited 417 FSWs in India found that knowledge of CT and NG influenced testing behaviors among FSWs. In this study, peer educators were used to improve awareness of CT and NG infection and healthcare service availability, which improved the uptake of testing [[24](#)]. Additionally, a community randomized trial and a cross-sectional study both conducted in Peru found that FSWs who had received prevention messages in HIV/STI health education or counseling sessions in outreach programs were more likely to seek health services including CT and NG testing [[25](#), [26](#)]. A study in the Netherlands explored the determinants of reluctance to seek CT and NG testing and found that one-third of FSWs were unaware of the possibility of getting a free and anonymous test at local STI clinics [[23](#)].

Perceived Risk of CT and NG Infection

We reviewed 3 articles that discussed individual perceptions toward CT and NG infection risks [[15](#), [19](#), [21](#)]. A study conducted in Vietnam used focus groups, in-depth interviews, and participant observation with FSWs to explore health-seeking behavior for STI and HIV testing. It found that the women exhibited high-risk perceptions of HIV whereas their concerns of NG and CT infections were limited, which hampered their decision to

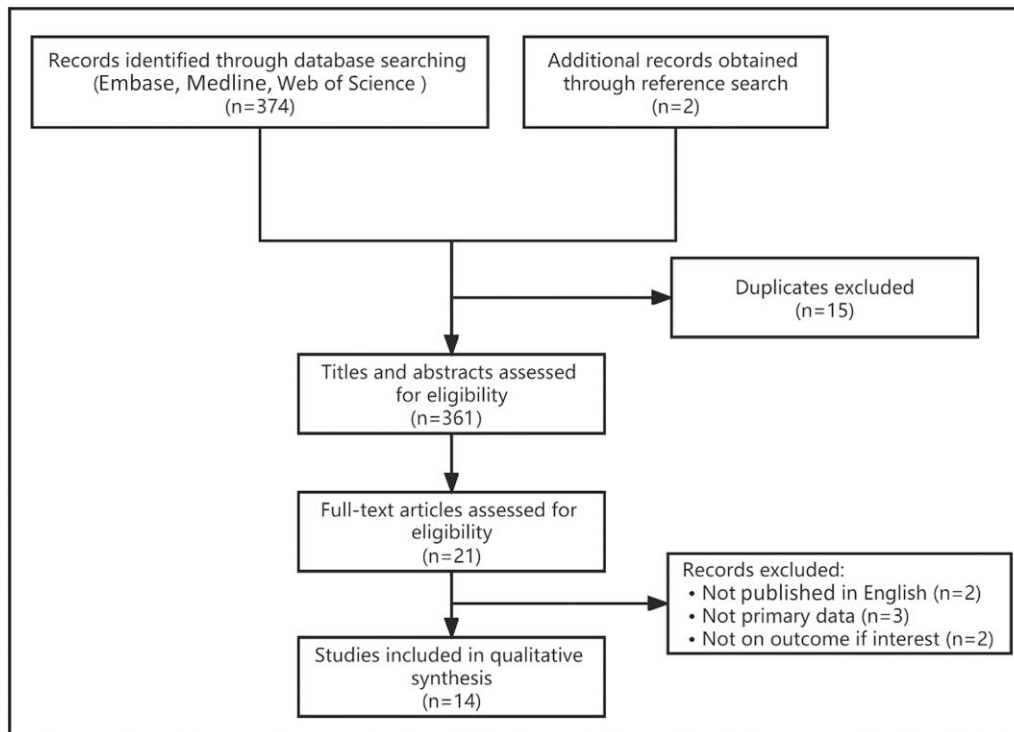


Figure 1. Flow diagram of article selection.

seek testing [21]. In Guangxi province in China, the lack of perception of risk for STIs and the lack of awareness of STI symptoms (including asymptomatic STIs) largely result in a low CT and NG testing rate in FSWs [19]. Similar findings were also noted in another study in southern China [15].

Preference of Sampling Types

One study conducted in Switzerland used surveys of 96 FSWs to explore the preferences for the types of sampling, such as oral, blood, urine, and rectal. It found that the majority preferred oropharyngeal and vaginal swabs, with anal sampling being the least accepted method [22].

Service-Level Factors

Facility-Service Delivery Time

Time restraints impeded facility testing for CT and NG among FSWs in Russia [27] and Nepal [20]. Participants in both studies expressed dissatisfaction with time restraints and long waiting lists at healthcare facilities, which caused scheduling conflicts and resulted in financial and time loss.

Financial Costs

Five studies identified that financial hardship is a major problem faced by FSWs and contributes to delays in testing [21, 22, 27–29]. The study conducted in the Switzerland found that three-quarters of participants were uninsured, and the vast

majority (91%) would want the screening to be totally free of charge, while 4% would spend up to US\$300 or more for CT and NG testing [22]. Another study in Russia found that in most cases, FSWs could not afford to utilize CT and NG testing and other services because of the high cost [27]. Studies conducted in Vietnam also noted a similar theme [21, 28].

The last RCT, conducted in China, randomized 480 FSWs to either free CT and NG testing donated by the community or testing as usual. Compared to standard of care, the intervention increased the testing frequency in FSWs by nearly 20 times, and 50.3% of women who received community-supported testing chose to donate money to support testing for peers. This study suggests that free testing integrated with community engagement (ie, community donations and support) strongly motivates testing behavior change [29].

Characteristics of Testing Provider

Four articles reported that characteristics of the testing provider was an important consideration, particularly the provider's attitude [20, 21, 27, 30]. A study conducted in Vietnam used a series of focus group discussions with 94 FSWs to explore the views and experiences of accessing CT and NG testing services among FSWs. Some women in this study noted that they were highly sensitive to how they felt the testing services providers perceived them, and the judgmental attitudes of providers reinforce their reluctance to use these services [21]. In

Table 1. Characteristics of Selected Articles

Study [Reference]	Country	Study Population	Study Aim	Study Design	Socioecological Framework Determinant		
					Individual Level	Service Level	Societal Level
Hong et al (2010) [19]	China	FSWs	To examine the occurrence of underreporting of STIs and assess the factors that contribute to underreporting in FSWs	Cross-sectional study, questionnaire survey plus STI testing (n = 411); purposive sampling	<ul style="list-style-type: none"> • Age • Lack of risk perception for STIs and lack of awareness of STI symptoms	...	...
Ngo et al (2007) [21]	Vietnam	FSWs	To explore health-seeking behavior for STI and HIV testing among FSWs	Qualitative research, in-depth interviews (n = 30) plus focus groups (n = 94); snowball sampling approach	<ul style="list-style-type: none"> • Sex work venues • Number of clients or sexual partners • Perceived risk of CT and NG infection 	<ul style="list-style-type: none"> • Financial costs • Judgmental attitudes of testing provider • Stigma 	<ul style="list-style-type: none"> • Fear of losing clients
Zhao et al (2021) [15]	China	FSWs	To assess the uptake and determinants of CT and NG testing among FSWs	Venue-based cross-sectional study (n = 1207); convenience sampling	<ul style="list-style-type: none"> • Sex work venues • Lack of risk perception for STIs and lack of awareness of STI symptoms 	<ul style="list-style-type: none"> • Testing subsidy 	<ul style="list-style-type: none"> • Stigma and discrimination • Social support from intimate partners
Vu et al (2020) [22]	Switzerland	FSWs	To evaluate the prevalence of 6 STIs among FSWs	Cross-sectional study, questionnaire survey plus STI testing (n = 96); convenience sample	<ul style="list-style-type: none"> • Number of clients or sexual partners • Preferences for the sampling types 	<ul style="list-style-type: none"> • Financial costs 	<ul style="list-style-type: none"> • Support of social workers
Kampman et al (2022) [23]	Netherlands	FSWs and MSWs	To establish sexual risk behavior and STI testing behavior among female and male self-employed sex workers	Cross-sectional study, internet questionnaire survey (n = 76); participants recruited through online or outreach programs	<ul style="list-style-type: none"> • Number of clients or sexual partners • Unaware of the possibility of getting a free and anonymous test at local STI clinics	...	...
Das et al (2011) [24]	India	FSWs	To determine the prevalence of STIs and assess the current strategies for STI management among FSWs	Cross-sectional study, questionnaire survey plus STI testing (n = 417); sampling: attendees at 3 dedicated FSW clinics	<ul style="list-style-type: none"> • Knowledge about CT and NG infections	...	...
Kohler et al (2016) [25]	Peru	FSWs	To evaluate condom use, STI screening, and knowledge of STI symptoms among FSWs associated with sex work venue and a community randomized trial of STI control	Community randomized trial (n = 4156); participants recruited through targeted street outreach	<ul style="list-style-type: none"> • Received prevention messages in HIV/STI health education or counseling sessions	...	...
Campos et al (2013) [26]	Peru	FSWs	To assess the impact of community-based prevention and STI counseling and testing approaches in reaching FSWs with prevention messaging and treatment options	Cross-sectional study, questionnaire survey (n = 24 814); participants recruited through mobile street outreach	<ul style="list-style-type: none"> • Received prevention messages in HIV/STI health education or counseling sessions 	...	<ul style="list-style-type: none"> • Support of peers
King et al (2013) [27]	Russia	FSWs	To provide a better understanding of the facilitators of and barriers to accessing healthcare services for FSWs	Qualitative research, in-depth interviews (n = 29); purposive sampling strategy	...	<ul style="list-style-type: none"> • Time restraints and long waiting lists at healthcare facilities • Financial costs • Attitudes of testing providers 	<ul style="list-style-type: none"> • Fear of lectures and scolding from healthcare providers • Financial and emotional support from family

Table 1. Continued

Study [Reference]	Country	Study Population	Study Aim	Study Design	Socioecological Framework Determinant		
					Individual Level	Service Level	Societal Level
Ghimire et al (2011) [20]	Nepal	FSWs	To explore FSWs' use of sexual health services and the factors associated with their use and nonuse of services	Mixed-methods study; questionnaire survey (n = 425) followed by in-depth interviews (n = 15); snowball sampling	<ul style="list-style-type: none"> • Age • Marital status 	<ul style="list-style-type: none"> • Time restraints and long waiting lists at healthcare facilities • Sexual harassment by male doctors, and prejudice and lack of sensitivity from providers 	<ul style="list-style-type: none"> • Stigma and discrimination
Wi et al (1998) [30]	Philippines	FSWs	To evaluate the factors influencing the CT and NG testing among FSWs	Cross-sectional study; registration and periodic examinations (n = 537); purposive sampling strategy	...	<ul style="list-style-type: none"> • Training of clinicians 	...
Ngo et al (2007) [28]	Vietnam	FSWs	To describe psychosocial factors associated with the intention to seek STI services among FSWs	Qualitative study, in-depth interviews and focus groups (n = 69); snowball sampling	...	<ul style="list-style-type: none"> • Financial cost 	<ul style="list-style-type: none"> • Stigma and discrimination
Tang et al (2023) [29]	China	FSWs	To examine the effectiveness and cost of the pay-it-forward strategy in increasing access to CT and NG testing among FSWs	Cluster randomized controlled trial (n = 480); participant recruited through outreach programs	...	<ul style="list-style-type: none"> • Financial cost 	<ul style="list-style-type: none"> • Social support from intimate partners
Rosenheck et al (2010) [31]	Tanzania	FSWs	To investigate why some FSWs who experience symptoms of STIs actively seek diagnosis and treatment while others do not	Cohort study, questionnaire survey (n = 459); in-depth interviews and focus group discussion (n = 42); snowball sampling	...	...	<ul style="list-style-type: none"> • Stigma and discrimination

Abbreviations: CT, *Chlamydia trachomatis*; FSWs, female sex workers; HIV, human immunodeficiency virus; MSW, male sex worker; NG, *Neisseria gonorrhoeae*; STI, sexually transmitted infection.

Nepal, some FSWs reported that the experiences of sexual harassment by male doctors, as well as the prejudice and lack of sensibility from providers, hindered their access to and use of available STI services, including CT and NG testing [20]. Another study conducted in Russia also noted the influence of the attitudes of testing providers. FSWs in this study were fearful of disrespectful attitudes and embarrassment by service providers [27]. In addition, a study conducted in 2 cities in the Philippines found that experience and training of clinicians can influence the uptake of CT and NG testing services [30].

Societal-Level Factors

Stigma and Discrimination

Six articles highlighted that stigma associated with CT and NG infections, as well as sex work, reinforced the fear of undertaking testing services among FSWs [15, 20, 21, 27, 28, 31]. In Russia, FSWs feared healthcare providers lecturing and scolding them publicly if they identified themselves as sex workers [27]. In Vietnam, some FSWs did not want to undertake CT and NG testing because they feared losing clients if they were

known or suspected to have a CT or NG infection [21]. Thus, most FSWs do not seek diagnosis or treatment even when symptoms are present. In Nepal, to avoid social stigma and fear of exposure to the public, women preferred to visit distant hospital or private clinics [20].

Social Support and Community Engagement

Five studies suggested the importance of social support and community engagement [15, 22, 26, 27, 29]. Analysis of surveys from FSWs in Switzerland found that nearly half of participants required the support of social workers in the form of translation and social support, which facilitate access to testing for CT and NG infections [22]. Some FSWs in Russia stated that financial and emotional support from family were important conditions for accessing CT and NG testing services [27]. The other study in China, which used online questionnaires to explore the testing behaviors of 1207 FSWs, identified that FSWs who have regular partners were more likely to have CT and NG testing, and increasing social support from intimate partners can promote testing among this population [15].

A community randomized trial conducted in Peru shows that the use of trained FSW peers in creating demand for CT and NG testing services can increase the uptake of these services [26]. Additionally, the RCT in China found that, providing free testing from community donations and encouraging participation in community donations could generate strong community ownership and trust, which might increase FSWs' willingness to undergo CT and NG testing [29].

Criminalization of Sex Work

Four articles reported the impact of criminalization laws of sex work on access to CT- and NG-related care services among FSWs [23, 25, 27, 28]. In the Netherlands, the legalization of sex work was accompanied by strict controls imposed on the sex industry and its workers, such as prohibitions on working from home and requirement for registration with the authorities. These regulations forced FSWs to work in illegal conditions, which impeded their access to screening services for STIs like CT and NG [23]. Sex work is illegal in Vietnam and Russia; thus, FSWs faced constant threat of arrest and tend to avoid seeking care services at facilities [27, 28]. In Peru, sex work is quasi-legal and sex workers here could receive free STI screening and treatment at public health facilities. FSWs in such settings, therefore, were more likely seeking CT and NG screening services [25].

DISCUSSION

Promoting testing is an effective strategy for reducing the burden of both CT and NG infections among FSWs. Our scoping review highlighting factors that impede or facilitate the uptake of CT and NG testing among FSWs. Several important affecting factors stood out during this review, including stigma and discrimination, and social support at the societal level, as well as financial costs at the service level. This review contributes to the literature by using a socioecological framework to provide an overview of the relevant factors of CT and NG testing uptake among FSWs. Findings in this study are crucial in optimizing current testing options for this population.

Based on this review, societal-level determinants are especially important for FSWs; stigma and discrimination consistently emerged as a barrier to accessing to CT and NG testing. Individual and societal opprobrium and exclusion toward FSWs are very prevalent in the majority of settings, which is driven and reinforced by criminalization, as well as social and cultural perspectives of sex work as contravening norms [32]. In our review, FSWs hesitated to seek CT and NG screening services because of the fear of arrest, rights violation, and verbal abuse if identified as a sex worker [27]. In many countries of the world, various restricting policies and criminal laws exist in relation to sex work, which reinforce sex workers' marginalization and vulnerability [33]. Additional efforts are needed to

improve the rights and dignity of FSWs and their access to care. Modernization of criminalization laws with more support and restorative practices might be a promising approach.

Additionally, some FSWs were concerned that the stigma associated with positive results may prevent them from soliciting clients [21], and they felt it was better to remain without knowing their infection status to remain employed. Structural interventions to mitigate social stigma and to empower sex workers should be considered to improve the uptake of CT and NG testing—for example, fostering welcoming and nonjudgmental healthcare environments for FSWs by strengthening the cultural competence training of healthcare providers, while building trauma-informed care principles into daily clinical processes to avoid triggering or exacerbating trauma caused by interpersonal violence or discrimination, and providing needed services [34–36]. Decentralized testing at their preferred venues (eg, mobile testing vans, online postal self-sampling, anonymous testing, and home self-tests) also afford significant opportunities to confront structural barriers that prevent sex workers from accessing to testing.

Societal-level factors, such as social support, also plays a key role in improving the CT and NG testing uptake among FSWs. In this review, positive support from family or partners can improve self-efficacy and promote CT and NG testing uptake in FSWs [15, 27]. Interventions to strengthen those positive social support could improve health behavioral outcomes for this high-risk population. Measures of social support (eg, community-led outreach and peer educators) have already been used to increase CT and NG testing uptake in a number of settings, such as Peru [26]. In addition, community engagement, as a key structural component of the community empowerment approach, can effectively expand access to NG and CT testing among FSWs; notable examples include the pay-it-forward model in China [29].

Our review has also shown that financial cost is a salient barrier deterring FSWs from seeking CT and NG testing services. International funding for sex work STI prevention services has increased recently, but mostly focuses on HIV and syphilis prevention, particularly in low- and middle-income countries where CT and NG rates are high [21, 28, 37]. Even in countries with national healthcare systems such as Russia and China, FSWs are commonly excluded from publicly subsidized healthcare because of cost-sharing barriers, disparities in coverage, and quality of public health services [27, 29]. Thus, FSWs may not be afford the payments required to access CT and NG testing services from health facilities and other hidden costs (eg, transport cost and time spent to travel to the facilities). FSW-targeted facilitating payment plans and programs aimed at alleviating perceived financial barriers to testing are needed. These may include providing fee subsidies, reduction of fees, and other types of innovative support such as

the pay-it-forward approach, which provides an alternative to using limited public funding, and strong community engagement (ie, voluntary donations) to maintain or expand testing [29].

This review has some limitations. First, we restricted our search to studies reported in English, and potential bias could thus be introduced in this review. Second, we did not review gray literature and non-peer-reviewed journals. Third, we potentially missed some important articles due to narrow search strings and no further contact with authors for full text. Finally, findings are based on the topics presented by the selected studies, so they are restricted by the reported information.

CONCLUSIONS

Testing is the first step in the CT and NG treatment cascade. With synthesizing multilevel facilitators and barriers for uptake of CT and NG testing among FSWs, our review has found that it is important to address societal- and service-level determinants in order to make CT and NG testing more accessible and encourage regular screening. This includes reducing the stigma and discrimination toward sex work and cost for facility testing services, as well as increasing social support and community engagement. We hope that findings from this study can shed insights on the development of interventions and programs aimed at promoting CT and NG testing among FSWs.

Notes

Author contributions. C. W. conceived and designed the review. W. X. and P. L. performed the search, screened, and charted information for eligible studies. W. X. wrote the first draft of the manuscript. All authors were involved in the drafting and reviewing of the manuscript and approved the final version.

Patient consent. The design of the study does not include factors necessitating patient consent.

Potential conflicts of interest. All authors: no reported conflicts of interest.

References

- Rowley J, Vander Hoorn S, Korenromp E, et al. Chlamydia, gonorrhoea, trichomoniasis and syphilis: global prevalence and incidence estimates, 2016. *Bull World Health Organ* **2019**; 97:548–562P.
- Peterman TA, Newman DR, Maddox L, Schmitt K, Shiver S. Risk for HIV following a diagnosis of syphilis, gonorrhoea or chlamydia: 328,456 women in Florida, 2000–2011. *Int J STD AIDS* **2015**; 26:113–9.
- Heumann CL, Quilter LA, Eastment MC, Heffron R, Hawes SE. Adverse birth outcomes and maternal *Neisseria gonorrhoeae* infection: a population-based cohort study in Washington state. *Sex Transm Dis* **2017**; 44:266–71.
- World Health Organization. Global progress report on HIV, viral hepatitis and sexually transmitted infections, 2021. Accountability for the global health sector strategies 2016–2021: actions for impact. Geneva, Switzerland: WHO; **2021**.
- Diabaté S, Chamberland A, Geraldo N, Tremblay C, Alary M. Gonorrhoea, chlamydia and HIV incidence among female sex workers in Cotonou, Benin: a longitudinal study. *PLoS One* **2018**; 13:e0197251.
- Tounkara FK, Tégoué I, Guédou FA, Keita B, Alary M. Prevalence and factors associated with HIV and sexually transmitted infections among female sex workers in Bamako, Mali. *Sex Transm Dis* **2020**; 47:679–85.
- Wang Y, Dooley K, Wang C, Smith K. Biomedical contraceptives and their association with condom use consistency among female sex workers in China: results from a national cross-sectional study. *Ann Epidemiol* **2022**; 74: 104–10.
- Glick JL, Jivapong B, Russo R, et al. Cultivating PEARL (Promoting Empowerment and Risk Reduction): formative research for a PrEP intervention among female sex workers in Baltimore, Maryland. *AIDS Behav* **2022**; 26:2664–75.
- West BS, Agah N, Roth A, et al. Sex work venue disorder and HIV/STI risk among female sex workers in two México-US border cities: a latent class analysis. *AIDS Behav* **2023**; 27:82–95.
- Hoek A VD, Yuliang F, Dukers NH, et al. High prevalence of syphilis and other sexually transmitted diseases among sex workers in China: potential for fast spread of HIV. *AIDS* **2001**; 15:753–9.
- Whelan J, Abbing-Karahagopian V, Serino L, Unemo M. Gonorrhoea: a systematic review of prevalence reporting globally. *BMC Infect Dis* **2021**; 21: 1152.
- Platt L, Grenfell P, Bonell C, et al. Risk of sexually transmitted infections and violence among indoor-working female sex workers in London: the effect of migration from Eastern Europe. *Sex Transm Infect* **2011**; 87:377–84.
- Znazen A, Frikha-Gargouri O, Berrajah L, et al. Sexually transmitted infections among female sex workers in Tunisia: high prevalence of *Chlamydia trachomatis*. *Sex Transm Infect* **2010**; 86:500–5.
- Decker MR, Wirtz AL, Baral SD, et al. Injection drug use, sexual risk, violence and STI/HIV among Moscow female sex workers. *Sex Transm Infect* **2012**; 88: 278–83.
- Zhao PZ, Wang YJ, Cheng HH, et al. Uptake and correlates of chlamydia and gonorrhoea testing among female sex workers in southern China: a cross-sectional study. *BMC Public Health* **2021**; 21:1477.
- Wong HT, Lee KC, Chan DP. Community-based sexually transmitted infection screening and increased detection of pharyngeal and urogenital *Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections in female sex workers in Hong Kong. *Sex Transm Dis* **2015**; 42:185–91.
- Cwikel JG, Lazer T, Press F, Lazer S. Sexually transmissible infections among female sex workers: an international review with an emphasis on hard-to-access populations. *Sex Health* **2008**; 5:9–16.
- Tiesajaparoen W, Zhang Y, Fairley CK, et al. Improving access to oral pre-exposure prophylaxis for HIV among international migrant populations [manuscript published online ahead of print 5 July 2023]. *Lancet Public Health* **2023**. doi:10.1016/S2468-2667(23)00105-6
- Hong Y, Fang X, Zhou Y, Zhao R, Li X. Factors associated with sexually transmitted infection underreporting among female sex workers in China. *J Womens Health* **2010**; 20:129–36.
- Ghimire L, Smith WC, van Teijlingen ER. Utilisation of sexual health services by female sex workers in Nepal. *BMC Health Serv Res* **2011**; 11:79.
- Ngo AD, Ratliff EA, McCurdy SA, Ross MW, Markham C, Pham HTB. Health-seeking behaviour for sexually transmitted infections and HIV testing among female sex workers in Vietnam. *AIDS Care* **2007**; 19:878–87.
- Vu F, Cavassini M, D'Acremont V, et al. Epidemiology of sexually transmitted infections among female sex workers in Switzerland: a local, exploratory, cross-sectional study. *Swiss Med Wkly* **2020**; 150:w20357.
- Kampman CJG, Peters CMM, Koedijk FDH, Berkenbosch TS, Hautvast JLA, Hoebe CJP. Sexual risk and STI testing behaviour among Dutch female and male self-employed sex workers; a cross-sectional study using an internet based survey. *BMC Public Health* **2022**; 22:1155.
- Das A, Prabhakar P, Narayanan P, et al. Prevalence and assessment of clinical management of sexually transmitted infections among female sex workers in two cities of India. *Infect Dis Obstet Gynecol* **2011**; 2011:494769.
- Kohler PK, Campos PE, Garcia PJ, et al. Sexually transmitted infection screening uptake and knowledge of sexually transmitted infection symptoms among female sex workers participating in a community randomised trial in Peru. *Int J STD AIDS* **2016**; 27:402–10.
- Campos PE, Buffardi AL, Cárcamo CP, et al. Reaching the unreachable: providing STI control services to female sex workers via mobile team outreach. *PLoS One* **2013**; 8:e81041.
- King EJ, Maman S. Structural barriers to receiving health care services for female sex workers in Russia. *Qual Health Res* **2013**; 23:1079–88.
- Ngo AD, McCurdy SA, Ross MW, Markham C, Ratliff EA, Pham HTB. The lives of female sex workers in Vietnam: findings from a qualitative study. *Cult Health Sex* **2007**; 9:555–70.
- Tang W, Xie Y, Xiong M, et al. A pay-it-forward approach to improve chlamydia and gonorrhoea testing uptake among female sex workers in China: venue-based superiority cluster randomized controlled trial. *JMIR Public Health Surveill* **2023**; 9:e43772.

30. Wi T, Mesola V, Manalastas R, et al. Syndromic approach to detection of gonococcal and chlamydial infections among female sex workers in two Philippine cities. *Sex Transm Infect* **1998**; 74(Suppl 1):S118–122.
31. Rosenheck R, Ngilangwa D, Manongi R, Kapiga S. Treatment-seeking behavior for sexually transmitted infections in a high-risk population. *AIDS Care* **2010**; 22:1350–8.
32. Baral S, Holland CE, Shannon K, et al. Enhancing benefits or increasing harms: community responses for HIV among men who have sex with men, transgender women, female sex workers, and people who inject drugs. *J Acquir Immune Defic Syndr* **2014**; 66:S319–28.
33. Kempadoo K, Doezema J. *Global sex workers: rights, resistance, and redefinition*. New York: Routledge, **2018**.
34. Lazarus L, Deering KN, Nabess R, Gibson K, Tyndall MW, Shannon K. Occupational stigma as a primary barrier to health care for street-based sex workers in Canada. *Cult Health Sex* **2012**; 14:139–50.
35. Dourado I, Guimarães MDC, Damacena GN, Magno L, de Souza Júnior PRB, Szwarcwald CL. Sex work stigma and non-disclosure to health care providers: data from a large RDS study among FSW in Brazil. *BMC Int Health Hum Rights* **2019**; 19:1–8.
36. Gorfinkel I, Perlow E, Macdonald S. The trauma-informed genital and gynecologic examination. *CMAJ* **2021**; 193:E1090.
37. Joint United Nations Programme on HIV/AIDS. UNAIDS report on the global AIDS epidemic. Available at: https://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120_UNAIDS_Global_Report_2012_with_annexes_en.pdf. Accessed 18 March 2023.