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ASSESSING BURDEN OF HIV AND INTEGRATING HEALTH BELIEF MODEL (HBM) INFLUENCING PREVENTIVE BEHAVIOR AMONG FEMALE SEX WORKERS OF BAHAWALPUR, PAKISTAN

IQRA HAMID KHAN[1,2*], DR. JAYASREE S KANATHASAN[3], DR. SREEMOY KANTI DAS[4], DR. SALSBEEL KHAN[5], SHAHZAIB ARSHAD[6], SAJIA JABEEN[7], DR. AWAIS GOHAR[8,9], ANSAR ALI FARAZ[10]

[1] PH.D. SCHOLAR, LINCOLN COLLEGE UNIVERSITY, SELANGOR, MALAYSIA, EMAIL: ihkhan.phdscholar@lincoln.edu.my
[2] ASSISTANT PROFESSOR, UNIVERSITY INSTITUTE OF PUBLIC HEALTH, UNIVERSITY OF LAHORE, LAHORE, PAKISTAN
[3] LECTURER, LINCOLN COLLEGE UNIVERSITY, SELANGOR, MALAYSIA, EMAIL: k.jayasree@lincoln.edu.my
[4] ASSOCIATE PROFESSOR, LINCOLN COLLEGE UNIVERSITY, SELANGOR, MALAYSIA, sreemoy@lincoln.edu.my
[5] ASSISTANT PROFESSOR, GREEN INTERNATIONAL UNIVERSITY, LAHORE, PAKISTAN EMAIL: salsbeel.khan@giu.edu.pk
[6] MEDICAL LABORATORY TECHNOLOGIST, UNIVERSITY INSTITUTE OF MEDICAL LABORATORY TECHNOLOGY, THE UNIVERSITY OF LAHORE, EMAIL: shahzaib.shahzaiblahore@gmail.com
[7] CLINICAL PSYCHOLOGIST, GOVERNMENT COLLEGE UNIVERSITY, LAHORE, PAKISTAN (sajia.jabeen.sj@gmail.com)
[8] ASSOCIATE PROFESSOR, UNIVERSITY INSTITUTE OF PUBLIC HEALTH, UNIVERSITY OF LAHORE, LAHORE, PAKISTAN (awais.gohar@pht.uol.edu.pk)
[9] PUNJAB AIDS CONTROL PROGRAM, LAHORE, PAKISTAN
[10] DEPARTMENT OF REHABILITATION SCIENCES, FACULTY OF ALLIED HEALTH SCIENCES, THE UNIVERSITY OF LAHORE, LAHORE PAKISTAN 54000, EMAIL: ansar.ali@drs.uol.edu.pk

ABSTRACT

Purpose: Female sex workers (FSWs) remain a key population sustaining HIV epidemics. This study assessed the burden of HIV among FSWs in Bahawalpur, Pakistan, and evaluated Health Belief Model (HBM) constructs to determine which most strongly predict HIV preventive behaviors.

Methods: An analytical cross-sectional study was conducted (January–August 2024) among 183 FSWs recruited via respondent-driven sampling. Data about demographics, sexual practices, and six HBM domains was collected using validated Likert-scale (Cronbach's α 0.72–0.83). HIV infection was confirmed by a three-step national testing algorithm. Logistic regression estimated adjusted odds ratios (aOR) with 95% CI for predictors of preventive behavior. Pearson's correlation coefficients was used to determine the inter-domain relationships.

Results: HIV prevalence was 3.3% (6/183), among female sex workers of Bahawalpur, Pakistan. Early sex-work initiation (<20 years) showed a borderline association with HIV positivity (OR 5.07; 95% CI 1.06–44.32). Condom use was high (82.5%), but only 49.2% had tested for HIV recently. Perceived benefits (aOR 1.92; 95% CI 1.28–2.87) and self-efficacy (aOR 2.21; 95% CI 1.46–3.35) were the strongest predictors of prevention, while barriers reduced protective behaviour (aOR 0.56; 95% CI 0.36–0.87). Correlation analysis showed weak inter-domain associations, with benefits linked positively to prevention (r = 0.14) and negatively correlated with cues to action (r = –0.13).

Conclusion: Despite high condom use, testing and injection safety gaps persist. Specific measures that enhance self-efficacy and reduce structural barriers are critical to interrupt HIV transmission among FSWs in Pakistan.

Keywords: HIV, Burden, Female Sex Workers, Health Belief Model, Self-efficacy, Prevention, Pakistan

INTRODUCTION

Female sex workers (FSWs) remain a key population for HIV and other sexually transmitted infections (STIs), facing layered structural risks including criminalization, mobility, and stigma that impede prevention and care.(Salje, 2021). Persistent discrepancies in healthcare are highlighted by recent global reviews that despite overall worldwide success, WHO's consolidated key-population guidelines emphasize individualized preventive measures for sex workers, and there are significant gaps in access and protection (Organization, 2022a). The social stigma surrounding sex work further marginalizes this population, creating profound barriers to healthcare access

and limiting uptake of essential prevention strategies including routine screening, testing, and treatment for HIV and other sexually transmitted diseases (Reynish et al., 2021)

As part of the sustainable development goal (SDG), the international community planned to reduce the number of new HIV infections and AIDS-related deaths to less than 370,000 and 250,000 respectively by 2025 (Tang et al., 2025). Sex workers can substantially reduce the risk of HIV transmission from clients and to clients through consistent and correct condom use, testing for HIV, and not sharing injecting equipment with others (Organization, 2022b).

It has been focused that HIV amongst a range of populations within the country, Pakistan varies upon demographics to establish the relationship between sex workers and geographical HIV distribution. Female sex workers prevalence varies from 0.2% to 2.6% in Asia and the number is increasing.(Vandepitte et al., n.d.)

The Health Belief Model (HBM) is one of the most widely used frameworks for explaining and changing health behaviours. HBM constructs are usually linked with the protective actions, even though effect sizes and the importance of vulnerability and severity differ depending on the situation and behavior, particularly perceived benefits, barriers, and self-efficacy—are commonly linked (Taflinger et al., n.d.). The usefulness of HBM and the necessity of taking setting specific factors into consideration were both highlighted by recent research work that applied HBM to HIV prevention among FSWs in sex-work contexts. The study found that self-efficacy and perceived barriers were the constructs most significantly connected to preventative behavior.

Therefore, this study identifies the burden of HIV among Female sex workers (FSWs) in Bahawalpur, Pakistan and integrate the Health Belief Model (HBM) with behavioral prediction.

METHODOLOGY

Study design and setting

An analytical cross-sectional study was conducted from March 2024 to January 2025 in Bahawalpur, Pakistan, across two designated zones (Area A and Area B). The study adhered to the STROBE guidelines for observational epidemiological research.

Participants and Sampling

We recruited Female sex workers (FSWs) via Respondent-Driven Sampling (RDS), a peer-referral method optimized for such groups. Initial "seeds" was selected, and seed received three recruitment coupons to invite peers from their social network under confidentiality assurances, including referral through pimps where relevant. Recruitment continued in successive waves until the target sample of Bahawalpur was achieved and there was repetition. Therefore, 183 female sex workers were enrolled.

Eligibility criteria included females aged ≥10 years who had engaged in commercial sex for ≥6 months. Women who did not provide informed consent or did not meet these criteria were excluded.

Data collection

Trained female interviewers from PACP collected data of blood samples and questionnaire in private settings to ensure confidentiality.

Blood samples

Blood samples for laboratory testing were obtained to measure HIV infection. It was a three-step screening algorithm was used (Alere Determine™ HIV-1/2 Combo, Uni-Gold™, and Bio-Line™), following national guidelines of AIDS Control Programme in their respective Laboratory.

Questionnaire

Moreover, a structured questionnaire captured Sociodemographic characteristics including age, education, marital status, duration in sex work, residency. Sexual behaviors including condom use, client load, history of sexually transmitted infections. Health Belief Model (HBM) which mainly had six HBM constructs including Perceived susceptibility (5 items), Perceived severity (6 items), Perceived benefits (7 items), Perceived barriers (7 items), Self-efficacy (7 items) and Cues to action (4 items). Items had options on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Construct scores were calculated as the mean of item responses. Reliability of HBM Construct: Internal consistency reliability was acceptable across all six HBM domains, with Cronbach's α ranging from 0.723 (cues to action) to 0.830 (self-efficacy); perceived susceptibility (0.785), severity (0.813), benefits (0.796), and barriers (0.796) all exceeded the 0.70 threshold, and the overall mean α across constructs was within the acceptable range. The primary outcome was HIV prevention behavior defined as consistent condom use in the last 6 months (Yes/No). Secondary outcomes were (i) HIV testing in the last 3 months (Yes/No) and (ii) non-sharing of injecting equipment in the last 6 months (Yes/No). A composite sensitivity analysis classified participants as "high prevention" if all three behaviours were met.

Data were entered and analyzed using SPSS version 26.0. Participant characteristics were summarized as n (%) or mean ± SD. Crude proportions was calculated and in addition to that HIV prevalence was estimated using a modified respondent-driven sampling (RDS-MOD) technique. Weighted prevalence and 95% confidence intervals were derived. Associations with HIV prevention behaviour were assessed with multivariable logistic regression, reporting adjusted odds ratios (aOR) with 95% CI. Reliability of HBM subscales was evaluated with Cronbach's α using the full sample. Pearson's correlation coefficients summarized construct inter-relations.

RESULTS

Participants characteristics

This study enrolled 183 female sex workers (FSWs), achieving a 100% response rate through provision of free health screening and referral services. The mean age was 34.3 years (SD 1.14; range 10–85). Most participants were married 110 (60.1%), with 21 (11.5%) separated or divorced and 52 (28.4%) single. Over half resided in home settings (106 (57.9%) rather than brothels or apartments (77; 42.1%).

A small minority reported medical risk exposures, 6 (3.3%) had ever received a blood transfusion and 20 (10.9%) had undergone tooth extraction. Substance use was frequent, with 50 (27.3%) reporting injection or illicit drug use. Approximately 90 (49.2%) initiated sex work before age 20, and the majority (119; 65.0%) reported ≥5 clients per day. Consistent condom use was high overall (151; 82.5%), though 32 (17.5%) reported inconsistent use.

Burden of HIV

Among 183 FSWs, six (3.3%, 6/183) were HIV positive. No significant differences were observed by marital status, residency, blood transfusion, or tooth extraction. Early initiation of sex work (<20 years) showed a borderline association with HIV positivity (OR = 5.07, 95% CI 1.06–44.32), while having fewer than five daily clients was significantly associated with infection (OR = 10.0, 95% CI 1.14–87.55, p = 0.02). Condom use suggested a protective trend but did not reach significance.

Given the relatively small sample size (n = 183), we also applied a modified respondent-driven sampling (RDS-MOD) adjustment, which incorporates recruitment chains (who-recruited-whom) and stratification across venue (apartment vs brothel) and age to correct for unequal recruitment. Crude prevalence was 3.3%, 95% CI 1.2–7.0 (6/183, using exact binomial method) and RDS-MOD weighted 2.8% HIV among FSWs, 95% CI 1.3–6.1, weighted prevalence at 95% CI was derived using bootstrap resample at 10,000 resamples, taken at 1st and 99th percentile. Both estimates are reported for transparency.

Table 1: Characteristics of Female Sex Workers enrolled in study (n=183)

Characteristic	**n (%) / Mean ± SD**
Age (years)	34.6 ± 15.4 (range 10–85)
Marital status	
Married	110 (60.1)
Separated/Divorced	21 (11.5)
Single	52 (28.4)
Residency	
Brothel/Apartment	77 (42.1)
Home	106 (57.9)
Ever had blood transfusion	6 (3.3)
Ever had tooth extraction	20 (10.9)
Drug use (IDU/illicit)	50 (27.3)
Non-drug users	133 (72.7)
Age at sex-work initiation	
<20 years	90 (49.2)
≥20 years	93 (50.8)
Clients per day	
<5	64 (35.0)
≥5	119 (65.0)
Always use condoms	151 (82.5)
Do not always use condoms	32 (17.5)

Health Belief Model constructs and HIV prevention behaviour

Responses to the Health Belief Model (HBM) construct are summarized in Table 2, while summary distributions of high versus low construct scores are shown in Table 3.

First domain of HBM construct is perceived susceptibility, among all FSWs most acknowledged the occupational risk of HIV. Specifically, 111 (60.7%) agreed and 47 (25.7%) strongly agreed that their work put them at risk of HIV, while only 2 (1.1%) strongly disagreed. Similarly, 100 (54.6%) agreed and 59 (32.2%) strongly agreed that inconsistent condom use could lead to infection. At the domain level, 118 (64.5%) were classified as having high susceptibility (mean 4.05 ± 0.65), compared with 65 (35.5%) with low susceptibility. Whereas perceived severity was also strongly endorsed. A total of 86 (47.0%) strongly agreed and 78 (42.6%) agreed that untreated HIV can lead to death. In summary, 133 (72.7%) fell into the high severity group (mean 4.28 ± 0.58).

Regarding perceived benefits, FSWs widely recognized the value of preventive behaviors. For example, 111 (60.7%) agreed and 47 (25.7%) strongly agreed that condom use reduces HIV risk, while 100 (54.6%) agreed and 59 (32.2%) strongly agreed that regular HIV testing protects them and their partners. Domain scores showed 128 (69.9%) with high benefits (mean 4.21 ± 0.62). In light of perceived barriers, it revealed that 103 (56.3%) agreed

and 59 (32.2%) strongly agreed that pimps sometimes restrict access to clinics, and 86 (47.0%) strongly agreed condoms are not always available. Overall, 101 (55.2%) were categorized as high barriers, while 82 (44.8%) reported low barriers (mean 3.91 ± 0.71). This highlights that nearly half of participants still faced constraints such as condom unavailability, client pressure, stigma, or economic incentives against safe practices.

Self-efficacy, many FSWs expressed confidence in negotiating and practicing prevention. A total of 83 (45.4%) agreed and 67 (36.6%) strongly agreed they could insist on condom use, while 84 (45.9%) agreed and 71 (38.8%) strongly agreed they could use condoms correctly every time. Still, only 57 (31.1%) strongly agreed they could always access condoms. At the domain level, 119 (65.0%) were classified as high self-efficacy (mean 4.08 ± 0.67), suggesting confidence among the majority in negotiating condom use, refusing unsafe sex, and seeking HIV testing. Cues to action is another domain of HBM construct that was less consistent as only 52 (28.4%) strongly agreed and 62 (33.9%) agreed that clinic reminders encouraged regular testing respectively whereas, 58 (31.7%) strongly agreed that knowing someone with HIV motivated preventive behaviour. Domain-level results showed that 100 (54.6%) had high cues to action, while 83 (45.4%) scored low (mean 3.89 ± 0.74), indicating high motivation from external prompts (peer educators, media, reminders, or knowing someone with HIV.

Finally, HIV prevention behaviours revealed mixed adherence. Of the 183 participants, 151 (82.5%) reported consistent condom use in the last six months, while 32 (17.5%) did not. Ten (5.5%) admitted to sharing injecting equipment, and only 90 (49.2%) had tested for HIV in the preceding three months, indicating substantial gaps remain in structural barriers and external motivators, which directly shape their preventive behaviours.

Table 2: Distribution of responses across Health Belief Model (HBM) domains and HIV prevention behaviours among female sex workers in Bahawalpur (n = 183)

Items	SD	D	N	A	SA
Perceived Susceptibility					
I am at risk of getting HIV because of my work.	2 (1.1%)	11 (6.0%)	12 (6.6%)	111 (60.7%)	47 (25.7%)
If I don't use condoms every time, I could get HIV.	2 (1.1%)	8 (4.4%)	14 (7.7%)	100 (54.6%)	59 (32.2%)
Some of my clients could be living with HIV.	6 (3.3%)	6 (3.3%)	16 (8.7%)	88 (48.1%)	67 (36.6%)
Without regular HIV testing, I might have HIV and not know it.	6 (3.3%)	7 (3.8%)	21 (11.5%)	82 (44.8%)	67 (36.6%)
My current sexual practices increase my chance of HIV infection.	3 (1.6%)	8 (4.4%)	18 (9.8%)	93 (50.8%)	61 (33.3%)
Perceived Severity					
HIV would seriously affect my health and daily life.	1 (0.5%)	7 (3.8%)	12 (6.6%)	92 (50.3%)	71 (38.8%)
If I had HIV, my relationships would suffer.	4 (2.2%)	7 (3.8%)	16 (8.7%)	92 (50.3%)	64 (35.0%)
HIV would make it hard to support myself or my family.	1 (0.5%)	6 (3.3%)	24 (13.1%)	82 (44.8%)	70 (38.3%)
Untreated HIV can lead to death.	5 (2.7%)	3 (1.6%)	11 (6.0%)	78 (42.6%)	86 (47.0%)
Living with HIV brings social problems (stigma, discrimination).	5 (2.7%)	3 (1.6%)	20 (10.9%)	85 (46.4%)	70 (38.3%)
HIV treatment is lifelong and difficult to manage.	0 (0.0%)	3 (1.6%)	19 (10.4%)	83 (45.4%)	78 (42.6%)
Perceived Benefits					
Using condoms every time greatly reduces my risk of HIV.	2 (1.1%)	11 (6.0%)	12 (6.6%)	111 (60.7%)	47 (25.7%)
Regular HIV testing helps protect me and my partners.	2 (1.1%)	8 (4.4%)	14 (7.7%)	100 (54.6%)	59 (32.2%)
Not sharing any injecting equipment prevents HIV.	6 (3.3%)	6 (3.3%)	16 (8.7%)	88 (48.1%)	67 (36.6%)
Carrying condoms makes it easier to protect myself.	6 (3.3%)	7 (3.8%)	21 (11.5%)	82 (44.8%)	67 (36.6%)
Refusing sex without a condom keeps me safe.	3 (1.6%)	8 (4.4%)	18 (9.8%)	93 (50.8%)	61 (33.3%)

Advice from peer educators helps me prevent HIV.	1 (0.5%)	7 (3.8%)	12 (6.6%)	92 (50.3%)	71 (38.8%)
Visiting clinics for counseling/testing helps me avoid HIV.	4 (2.2%)	7 (3.8%)	16 (8.7%)	92 (50.3%)	64 (35.0%)
Perceived Barriers					
Clients often offer more money for sex without a condom.	1 (0.5%)	6 (3.3%)	24 (13.1%)	82 (44.8%)	70 (38.3%)
Condoms are sometimes not available when I need them.	5 (2.7%)	3 (1.6%)	11 (6.0%)	78 (42.6%)	86 (47.0%)
Some clients complain condoms are uncomfortable.	5 (2.7%)	3 (1.6%)	20 (10.9%)	85 (46.4%)	70 (38.3%)
I'm worried I'll be judged or treated badly when I seek HIV services.	0 (0.0%)	3 (1.6%)	19 (10.4%)	83 (45.4%)	78 (42.6%)
My manager/pimp sometimes doesn't allow me to go to clinics.	6 (3.3%)	7 (3.8%)	8 (4.4%)	103 (56.3%)	59 (32.2%)
Condoms cost too much for me to use every time.	1 (0.5%)	10 (5.5%)	12 (6.6%)	98 (53.6%)	62 (33.9%)
Buying or carrying condoms can be difficult for me.	0 (0.0%)	8 (4.4%)	16 (8.7%)	89 (48.6%)	70 (38.3%)
Self-Efficacy					
I can insist on a condom even if a client refuses.	2 (1.1%)	10 (5.5%)	21 (11.5%)	83 (45.4%)	67 (36.6%)
I can refuse sex if a client won't use a condom.	6 (3.3%)	7 (3.8%)	34 (18.6%)	72 (39.3%)	64 (35.0%)
I can use a condom correctly every time.	5 (2.7%)	8 (4.4%)	15 (8.2%)	84 (45.9%)	71 (38.8%)
I can get condoms whenever I need them.	2 (1.1%)	13 (7.1%)	41 (22.4%)	70 (38.3%)	57 (31.1%)
I can go to a clinic to get an HIV test when I need to.	7 (3.8%)	9 (4.9%)	27 (14.8%)	72 (39.3%)	68 (37.2%)
I can discuss HIV testing with my partners/clients.	6 (3.3%)	7 (3.8%)	42 (23.0%)	70 (38.3%)	58 (31.7%)
I can avoid sharing any injecting equipment.	3 (1.6%)	9 (4.9%)	10 (5.5%)	88 (48.1%)	73 (39.9%)
Cues to Action					
Peer educators/outreach workers encourage me to use condoms and test for HIV.	7 (3.8%)	9 (4.9%)	23 (12.6%)	77 (42.1%)	67 (36.6%)
Information from media or social media motivates me to protect myself.	4 (2.2%)	6 (3.3%)	34 (18.6%)	77 (42.1%)	62 (33.9%)
Knowing someone who got HIV motivates me to take precautions.	3 (1.6%)	11 (6.0%)	41 (22.4%)	70 (38.3%)	58 (31.7%)
Clinic reminders help me get tested regularly.	6 (3.3%)	5 (2.7%)	58 (31.7%)	62 (33.9%)	52 (28.4%)
HIV Prevention Behavior					
	Yes		**No**		
Consistent condom use (last 6 months)	151 (82.5%)		32 (17.5%)		
Shared injecting equipment (last 6 months)	10 (5.5%)		173 (94.5%)		
Tested for HIV (last 3 months)	90 (49.18%)		93 (50.8%)		

SD = Strongly Disagree; D = Disagree; N = Neutral; A = Agree; SA = Strongly Agree. Whereas, HIV prevention behavior items were measured as Yes/No responses. All domains demonstrated acceptable internal consistency (Cronbach's α 0.723–0.830; pilot tested in 10% of the sample.

Table 3: Distribution of Health Belief Model (HBM) domain scores categorized as low (< mean) and high (≥ mean) among female sex workers in Bahawalpur (n = 183).

Domains	Group	n (%)	Mean ± SD
Susceptibility	**Low**	65 (35.5%)	4.05 ± 0.65
	High	118 (64.5%)	
Severity	**Low**	50 (27.3%)	4.28 ± 0.58
	High	133 (72.7%)	
Benefits	**Low**	55 (30.1%)	4.21 ± 0.62
	High	128 (69.9%)	
Barriers	**Low**	82 (44.8%)	3.91 ± 0.71
	High	101 (55.2%)	
Self-Efficacy	**Low**	64 (35.0%)	4.08 ± 0.67
	High	119 (65.0%)	
Cues to Action	**Low**	83 (45.4%)	3.89 ± 0.74
	High	100 (54.6%)	

For each HBM mean construct scores were dichotomized using the sample mean as the cut-off, classifying participants into "Low" (< mean) and "High" (≥ mean).

A multivariate logistic regression model was applied to estimate adjusted odds ratio (aOR) with 95% confidence intervals for predictors of HIV preventive behavior. Among behavioural and demographic factors, injection drug use was negatively associated with prevention (aOR 0.39; 95% CI 0.17–0.88; p = 0.023), while having ≥5 clients per day showed a borderline negative association (aOR 0.48; 95% CI 0.22–1.03; p = 0.056). Early initiation of sex work (<20 years), place of residence, and marital status were not significantly associated. Among all constructs of HBM, perceived benefits were strongly associated with preventive behaviour (aOR 1.92; 95% CI 1.28–2.87; p = 0.002), indicating that women who recognized the protective value of consistent condom use and testing were nearly twice as likely to practice prevention. Self-efficacy showed the strongest effect (aOR 2.21; 95% CI 1.46–3.35; p < 0.001), suggesting that confidence in negotiating condom use, refusing unsafe sex, and accessing services substantially increased the odds of prevention. Conversely, perceived barriers significantly reduced prevention (aOR 0.56; 95% CI 0.36–0.87; p = 0.01), reflecting the impact of client pressure, cost, and restricted clinic access. Other HBM domains (susceptibility, severity, cues to action) trended in the expected direction but did not reach statistical significance as illustrated in Figure 1.

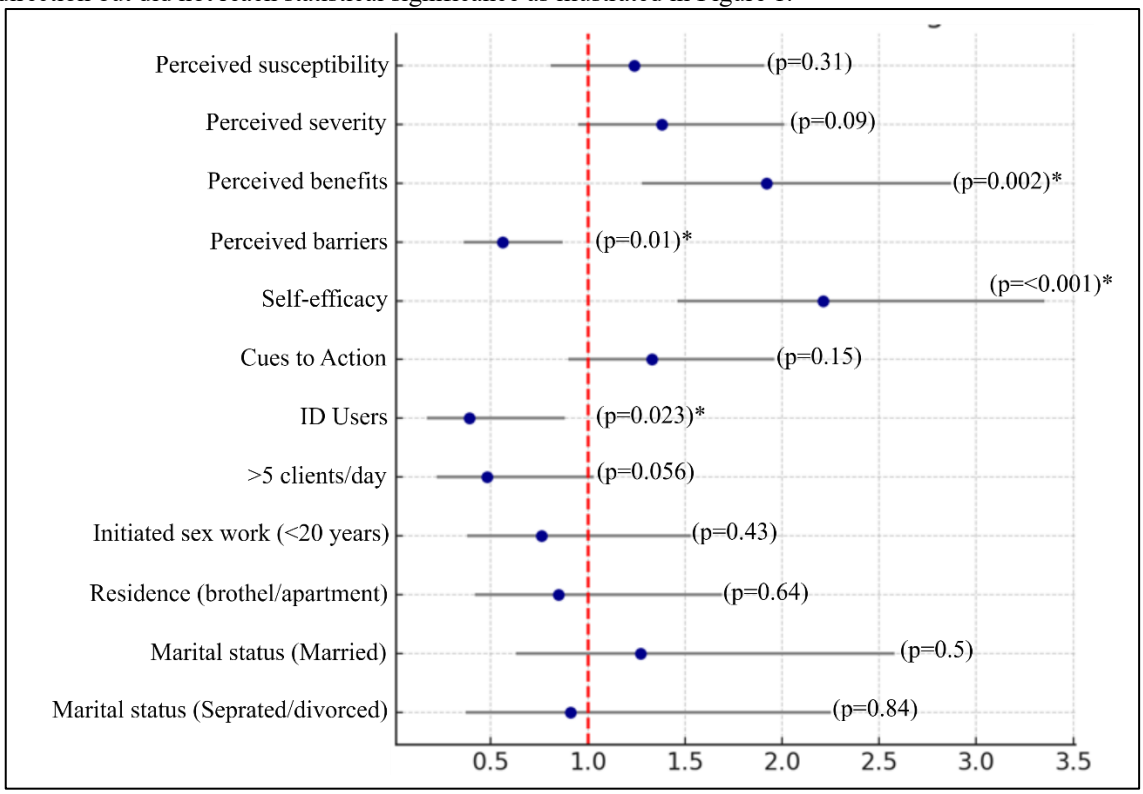

Figure 1: Forest plot of adjusted odds ratios (aOR) with 95% confidence intervals for Health Belief Model (HBM) constructs and selected sociodemographic factors associated with HIV prevention behaviour among female sex workers.

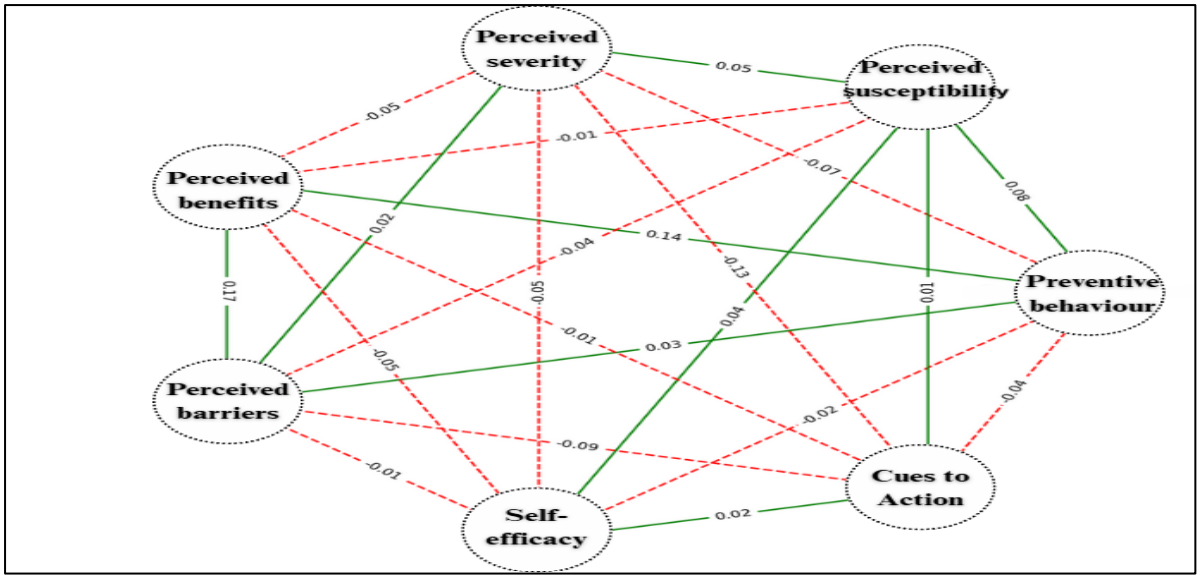

Figure 2: Network visualization of correlations among Health Belief Model (HBM) constructs and HIV prevention behaviour among female sex workers. Green solid lines represent positive correlations, red dashed lines represent negative correlations, and line thickness reflects the magnitude of Pearson's correlation coefficients (–0.13 to +0.17).

In figure 2, the network visualization highlights mostly weak associations among HBM domains and HIV prevention behaviour. The strongest positive edges linked perceived benefits with prevention behaviour (r = 0.14) and barriers with benefits (r = 0.17), while the strongest negative edge connected perceived severity with cues to action (r = –0.13). The overall sparse and weakly weighted structure suggests that each construct operates relatively independently in shaping HIV preventive behaviours among FSWs.

DISCUSSION:

This study discusses the HIV burden among FSWs of Bahawalpur and their behavioural determinants by applying the Health Belief Model (HBM). The observed HIV prevalence of 3.3% (6/183), while lower than some sub-Saharan African estimates, remains considerably higher than general female prevalence in Pakistan, which is estimated below 0.1% (Garcia-Calleja et al., n.d.), whereas, in another study of Pakistan 2.2% HIV is reported among FSWs (Ebasone et al., 2023)(Raza et al., n.d.). This disproportion underscores the continued role of FSWs as a key population in sustaining HIV transmission. Demographically, the mean age of participants was 34.3 years, and nearly 49.2% had initiated sex work before the age of 20, reflecting early entry and prolonged exposure. Early initiation showed a borderline association with HIV positivity (OR 5.07; 95% CI 1.06–44.32), reported that women aged ≥25 years were almost twice as likely to engage in HIV prevention behaviours compared to those aged 16–19 years (adjusted odds ratio = 1.91, 95% CI: 1.10–3.32), indicating that younger FSWs are significantly less likely to practice prevention (Asefa et al., 2022b).

Although consistent condom use was reported by 82.5% of participants, only 49.2% had tested for HIV in the preceding three months and 5.5% admitted to sharing injecting equipment. The discrepancy highlights a critical prevention gap, whereby protective sexual practices are not consistently translated into testing or injection safety. Comparable patterns have been observed among Indonesian FSWs, where condom uptake exceeded 80% yet recent HIV testing remained below 50%, reflecting systemic disparities common to low- and middle-income countries with fragile peripheral health systems (I. Putra et al., n.d.).

Perceived susceptibility and severity were widely acknowledged as 47.0% strongly agreed that untreated HIV can lead to death, and 38.8% strongly agreed that it would would be seriously harm health and daily life. However, neither construct was significantly associated with preventive behaviour in multivariate analysis. This is consistent with meta-analytic evidence showing that susceptibility and severity typically explain only a modest share almost 20–40% of variance in health behaviours, whereas perceived benefits and self-efficacy more reliably predict preventive action (Alyafei et al., n.d.).

Perceived benefits demonstrated a strong association with prevention. Women who endorsed the protective value of condom use and testing were nearly twice as likely to practice prevention (aOR 1.92; 95% CI: 1.28–2.87). At the descriptive level, 111 (60.7%) agreed and 47 (25.7%) strongly agreed that consistent condom use reduces HIV risk. This finding is consistent with Ethiopian evidence showing that recognition of HIV prevention benefits significantly predicted condom use and testing among FSWs discussed and with Iranian research where perceived benefits were an independent predictor of safe-sex behavior among high-risk women (Alizade et al., n.d.-a). Similarly, Indonesian FSWs who endorsed prevention benefits reported greater adoption of consistent condom use (Syarifah et al., 2018a)

Perceived barriers, in contrast, were a significant negative predictor (aOR 0.56; 95% CI 0.36–0.87). Nearly half (86; 47.0%) strongly agreed that condoms are not always available, and over one-third (59; 32.2%) strongly agreed that pimps restricted clinic access. Such barriers reduce prevention likelihood, even in the presence of awareness and motivation, an HBM-based study of indirect FSWs in Bali found that higher self-efficacy and perceived benefits predicted protection (I. G. N. E. Putra et al., 2020).

In Surakarta, Indonesia, HBM components increased benefits, reduced barriers were tied to STI-preventive behaviours among FSWs, reinforcing your pattern that benefits/self-efficacy push behavior while barriers pull it back (Syarifah et al., 2018a). A provincial Indonesian study focused specifically on HBM and condom use among FSWs showed six HBM components most notably perceived barriers and cues to action were significantly associated with condom behavior, again highlighting barriers impact on prevention even where awareness is high.(Masyarakat & 2017, n.d.) More recently, work on FSWs "health belief" around condom use HBM constructs reported that sociodemographic constraints like education, income, marital status interact with HBM constructs, women with lower resources report higher perceived barriers and lower self-efficacy, which mediates weaker uptake of preventive acts despite recognizing benefits (Hajimiri et al., n.d.)(Zeng et al., 2020).

Across HBM applications in FSW populations, stronger perceived benefits consistently predict higher prevention, while stronger barriers suppress protective practices. These disparities like inconsistent condom supply, clinic inaccessibility, or pimp/client control highlights the need for structural interventions, including free condom distribution and venue-level engagement (Apuulison et al., 2025).

In this study, self-efficacy emerged as the most powerful predictor (aOR 2.21; 95% CI 1.46–3.35), with women confident in negotiating condom use, refusing unsafe sex, and seeking services being more than twice as likely to practice prevention. Similar associations have been reported in Ethiopia (Asefa et al., 2022d) Indonesia (Syarifah et al., 2018b) and Iran (Alizade et al., n.d.-b) that reinforce belief in an individual's ability to act outweighs mere recognition of risk. Collectively, this evidence underscores that strengthening self-efficacy, through empowerment and negotiation skills—is pivotal to sustaining prevention among FSWs.

Moreover, 67 (36.6%) of FSWs strongly agreed they could insist on condom use and 71 (38.8%) strongly agreed they could use condoms correctly, illustrating the pivotal role of self-efficacy. Comparable evidence from China and Vietnam shows that higher condom self-efficacy scores among FSWs are strongly associated with consistent condom use and uptake of HIV testing, reinforcing the predictive strength of this HBM construct (Assessment & 2016, n.d.)(Zhao et al., 2008a)

Cues to action is weak as 52 (28.4%) strongly agreed that clinic reminders can help testing, although 67 (36.6%) strongly agreed that peer educators encouraged condom use. Weak cue endorsement may partly explain why strong risk awareness doesn't consistently translate into testing or safe behaviors. For instance, in Uganda, a quasi-experimental by Muhindo, bi-monthly SMS reminders combined with weekly peer education significantly increased 3-monthly HIV and syphilis testing uptake among FSWs, suggesting that when both interpersonal and system-level prompts are activated, behavioral adherence improves markedly. (Muhindo et al., 2020)

Correlation analysis showed that inter-domain relationships were generally weak. The strongest positive correlation was between perceived benefits and prevention behaviour (r = 0.14), consistent with evidence from China where condom self-efficacy and benefits most strongly predicted safe-sex practices among FSWs (Zhao et al., 2008b). In contrast, perceived severity had a negative correlation with cues to action (r= -0.13), reflecting findings from Indonesia that severity frequently has a limited or inconsistent impact on actual preventive behavior (Syarifah et al., 2018c). Therefore, community-driven programs to demonstrate the effectiveness of integrating empowerment, peer mobilization, and service accessibility, resulting in measurable reductions in HIV incidence.

These findings align with Pakistan's National AIDS Control Program (NACP) priorities, which emphasize on the prevention among high-risk populations, but highlight persistent implementation gaps. Despite WHO's recommendation for FSW-specific services, Pakistan's programmatic data show HIV prevalence under 1% in the general population yet disproportionately higher among FSWs. Integrating peer-led condom distribution, stigma-free testing, and structural enablers into NACP's framework could accelerate progress towards the UNAIDS 95-95-95 targets.

CONCLUSION

HIV prevalence among FSWs in Bahawalpur was 3.3%, markedly higher than in the general female population. Perceived benefits and self-efficacy were strong predictors of prevention, while barriers significantly undermined protective behaviours. Weak cues to action highlight gaps between awareness and consistent practice, highlighting the necessity of motivational and structural approaches.

Recommendations

Specific measures including digital or interpersonal reminders or availability of protections should be prioritized for strengthening condom self-efficacy through engaging trainings or harm-reduction programs and peer empowerment. Moreover, integration of routine testing and safe practices must be encouraged.

Limitations

This cross-sectional design doesn't include causal inference. Reliance on self-reported behaviours may introduce social desirability bias despite non-disclosure concerns.

Ethical Approval:
This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Ethics Committee of University of Lahore (7-12-2023/ UIPH/UOL/744/2024).

Consent to participate:
Informed consent was obtained from all individual participants included in the study. To promote recruitment and support participants, free medical examinations were offered in collaboration with the Punjab AIDS Control Program (PACP).

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REFERENCES:

1. Alizade, M., Farshbaf-Khalili, A., … J. M.-J. of education, & 2021, undefined. (n.d.-a). Predictors of preventive behaviors of AIDS/HIV based on Health Belief Model constructs in women with high-risk sexual behaviors: A cross-sectional survey. Journals.Lww.ComM Alizade, A Farshbaf-Khalili, J Malakouti, M MirghafourvandJournal of Education and Health Promotion, 2021•journals.Lww.Com. Retrieved September 8, 2025, from https://journals.lww.com/jehp/fulltext/2021/10000/predictors_of_preventive_behaviors_of_aids_hiv.349.aspx
2. Alizade, M., Farshbaf-Khalili, A., … J. M.-J. of education, & 2021, undefined. (n.d.-b). Predictors of preventive behaviors of AIDS/HIV based on Health Belief Model constructs in women with high-risk sexual behaviors: A cross-sectional survey. Journals.Lww.ComM Alizade, A Farshbaf-Khalili, J Malakouti, M MirghafourvandJournal of Education and Health Promotion, 2021•journals.Lww.Com. Retrieved September 10, 2025, from https://journals.lww.com/jehp/fulltext/2021/10000/predictors_of_preventive_behaviors_of_aids_hiv.349.aspx
3. Alyafei, A., StatPearls, R. E.-C.-, & 2024, undefined. (n.d.). The health belief model of behavior change. Statpearls.Com. Retrieved September 8, 2025, from https://www.statpearls.com/point-of-care/161679
4. Apuulison, D. F., Nabawanuka, B., Muhoozi, M., Aryampa, J., Irumba, P., Katsomyo, E., Asiimwe, M., Epuitai, J., Akugizibwe, P., George, W., & Rubaihayo, J. (2025). Enablers of and barriers to ART adherence among female sex workers in mid-western Uganda: a qualitative study. Springer, 22(1), 4. https://doi.org/10.1186/S12981-025-00698-9
5. Asefa, A., Midaksa, G., Qanche, Q., Wondimu, W., Nigussie, T., Bogale, B., Birhanu, F., Asaye, Z., Mohammed, N., & Yosef, T. (2022a). Does the perception of HIV risk among Female sex workers affect HIV prevention behavior? application of the Health Belief Model (HBM). SpringerA Asefa, G Midaksa, Q Qanche, W Wondimu, T Nigussie, B Bogale, F Birhanu, Z AsayeBMC Public Health, 2022•Springer, 22(1), 1646. https://doi.org/10.1186/S12889-022-14046-3
6. Asefa, A., Midaksa, G., Qanche, Q., Wondimu, W., Nigussie, T., Bogale, B., Birhanu, F., Asaye, Z., Mohammed, N., & Yosef, T. (2022b). Does the perception of HIV risk among Female sex workers affect HIV prevention behavior? application of the Health Belief Model (HBM). SpringerA Asefa, G Midaksa, Q Qanche, W Wondimu, T Nigussie, B Bogale, F Birhanu, Z AsayeBMC Public Health, 2022•Springer, 22(1), 1646. https://doi.org/10.1186/S12889-022-14046-3
7. Assessment, M. U.-, & 2016, undefined. (n.d.). TEXILA INTERNATIONAL JOURNAL OF PUBLIC HEALTH. Texilajournal.Com. Retrieved September 10, 2025, from https://www.texilajournal.com/public-health/edition/32-specialedition
8. Ebasone, P. V., Peer, N., Dzudie, A., & Kengne, A. P. (2023). Prevalence of selected cardiometabolic risk factors in the global ART-naïve HIV infected population: A protocol for a systematic review and meta-analysis. Journals.Plos.Org, 18(6 June). https://doi.org/10.1371/JOURNAL.PONE.0286789
9. Garcia-Calleja, J., Gouws, E., infections, P. G.-S. transmitted, & 2006, undefined. (n.d.). National population based HIV prevalence surveys in sub-Saharan Africa: results and implications for HIV and AIDS estimates. Sti.Bmj.Com. Retrieved September 5, 2025, from https://sti.bmj.com/content/82/suppl_3/iii64.short
10. Hajimiri, K., Shakibazadeh, E., … A. M.-J. of E., & 2018, undefined. (n.d.). The role of perceived barrier in the postpartum women's health promoting lifestyle: A partial mediator between self-efficacy and health promoting lifestyle. Journals.Lww.Com. Retrieved September 8, 2025, from https://journals.lww.com/jehp/fulltext/2018/07000/The_role_of_perceived_barrier_in_the_postpartum.38.aspx
11. Masyarakat, D. B.-J. M. K., & 2017, undefined. (n.d.). Hubungan komponen health belief model (HBM) dengan penggunaan kondom pada pekerja seks komersil (PSK) di wilayah kerja Puskesmas Bandar Baru tahun. E-Journal.Sari-Mutiara.Ac.Id. Retrieved September 8, 2025, from
12. https://e-journal.sari-mutiara.ac.id/index.php/JMKM/article/view/119
13. Muhindo, R., Mujugira, A., Castelnuovo, B., Sewankambo, N. K., Parkes-Ratanshi, R., Kiguli,
14. J., Tumwesigye, N. M., & Nakku-Joloba, E. (2020). HIV and syphilis testing behaviors among heterosexual male and female sex workers in Uganda. Springer, 17(1), 48. https://doi.org/10.1186/S12981-020-00306-Y
15. Organization, W. H. (2022a). Consolidated guidelines on HIV, viral hepatitis and STI prevention, diagnosis, treatment and care for key populations.
16. https://books.google.com/books?hl=en&lr=&id=Lri0EAAAQBAJ&oi=fnd&pg=PR6&dq=WHO%27s+consolidated+key-

population+guidelines+emphasize+individualized+preventive+packages+for+sex+workers&ots=jvI9pvKrTL&sig=Edk0pUCCIOdy50bZgB92KdlA2nw
17. Organization, W. H. (2022b). Consolidated guidelines on HIV, viral hepatitis and STI prevention, diagnosis, treatment and care for key populations. https://books.google.com/books?hl=en&lr=&id=Lri0EAAAQBAJ&oi=fnd&pg=PR6&dq=Sex+workers+can+substantially+reduce+the+risk+of+HIV+transmission+from+clients+and+to+clients+through+consistent+and+correct+condom+use,+testing+for+HIV,+and+not+sharing+injecting+equipment+with+others+&ots=jvI9pvKyXP&sig=WOPDf9IDejuuWoD11OKnKj5xJfU
18. Putra, I. G. N. E., Phuengsamran, D., Jampaklay, A., Thammawijaya, P., & Januraga, P. P. (2020). Psychological factors associated with protected sex among indirect female sex workers in Denpasar, Bali, Indonesia. Taylor & FrancisIGNE Putra, D Phuengsamran, A Jampaklay, P Thammawijaya, PP JanuragaAIDS Care, 2020•Taylor & Francis, 32(6), 749–757. https://doi.org/10.1080/09540121.2019.1640851
19. Putra, I., Infectious, P. J.-T. M. and, & 2020, undefined. (n.d.). Social capital and HIV testing uptake among indirect female sex workers in Bali, Indonesia. Pmc.Ncbi.Nlm.Nih.Gov. Retrieved September 5, 2025, from https://pmc.ncbi.nlm.nih.gov/articles/PMC7345714/
20. Raza, H., Raja, M., Khakwani, M., regions, B. J.-I., & 2024, undefined. (n.d.). Pakistan's HIV high-risk populations: Critical appraisal of failure to curtail spread beyond key populations. Elsevier. Retrieved September 5, 2025, from https://www.sciencedirect.com/science/article/pii/S2772707624000353
21. Reynish, T., Hoang, H., Bridgman, H., & Nic Giolla Easpaig, B. (2021). Barriers and enablers to sex workers' uptake of mental healthcare: A systematic literature review. Springer, 18(1), 184–201. https://doi.org/10.1007/S13178-020-00448-8
22. Salje, K. H. A. (2021). Exploring the drivers and impact of policing on female sex workers' HIV risk. https://researchonline.lshtm.ac.uk/id/eprint/4659902
23. Syarifah, S., Demartoto, A., Promotion, R. D.-J. of H., & 2018, undefined. (2018a). Health Belief Model on the Predictors of Healthy Sex Behavior among Commercial Female Sex Workers in Surakarta, Central Java. Thejhpb.ComS Syarifah, A Demartoto, R DharmawanJournal of Health Promotion and Behavior, 2018•thejhpb.Com, 3(2), 116–125. https://doi.org/10.26911/thejhpb.2018.03.02.05
24. Syarifah, S., Demartoto, A., Promotion, R. D.-J. of H., & 2018, undefined. (2018b). Health Belief Model on the Predictors of Healthy Sex Behavior among Commercial Female Sex Workers in Surakarta, Central Java. Thejhpb.ComS Syarifah, A Demartoto, R DharmawanJournal of Health Promotion and Behavior, 2018•thejhpb.Com, 3(2), 116–125. https://doi.org/10.26911/thejhpb.2018.03.02.05
25. Syarifah, S., Demartoto, A., Promotion, R. D.-J. of H., & 2018, undefined. (2018c). Health Belief Model on the Predictors of Healthy Sex Behavior among Commercial Female Sex Workers in Surakarta, Central Java. Thejhpb.ComS Syarifah, A Demartoto, R DharmawanJournal of Health Promotion and Behavior, 2018•thejhpb.Com, 3(2), 116–125. https://doi.org/10.26911/thejhpb.2018.03.02.05
26. Taflinger, S., Medicine, S. S.-S. S. &, & 2024, undefined. (n.d.). A situational test of the health belief model: How perceived susceptibility mediates the effects of the environment on behavioral intentions. ElsevierS Taflinger, S SattlerSocial Science & Medicine, 2024•Elsevier. Retrieved September 5, 2025, from https://www.sciencedirect.com/science/article/pii/S027795362400159X
27. Tang, M., Shao, J., Jiang, Y., Li, Y., Li, S., Song, Y., Wu, W., Tang, J., & Chen, Z. (2025). Global, regional, and national burden and trends of HIV/AIDS among women of childbearing age from 1990 to 2021: results from Global Burden of Disease 2021. Frontiersin.Org, 12. https://doi.org/10.3389/FMED.2025.1605092/ABSTRACT
28. Vandepitte, J., Lyerla, R., Dallabetta, G., … F. C.-S. transmitted, & 2006, undefined. (n.d.). Estimates of the number of female sex workers in different regions of the world. Sti.Bmj.Com. Retrieved October 22, 2025, from https://sti.bmj.com/content/82/suppl_3/iii18.short
29. Zeng, C., Li, X., Qiao, S., Yang, X., Shen, Z., & Zhou, Y. (2020). Anticipated stigma and medication adherence among people living with HIV: the mechanistic roles of medication support and ART self-efficacy. Taylor & Francis, 32(8), 1014–1022. https://doi.org/10.1080/09540121.2020.1728213
30. Zhao, R., Wang, B., Fang, X., Li, X., & Stanton, B. (2008a). Condom use and self-efficacy among female sex workers with steady partners in China. Taylor & Francis, 20(7), 782–790. https://doi.org/10.1080/09540120701694030
31. Zhao, R., Wang, B., Fang, X., Li, X., & Stanton, B. (2008b). Condom use and self-efficacy among female sex workers with steady partners in China. Taylor & Francis, 20(7), 782–790. https://doi.org/10.1080/09540120701694030