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Health belief model constructs and HIV-related risk behaviours among female sex workers: A cross-sectional study in Palopo, Indonesia

Konstruk model keyakinan kesehatan dan perilaku berisiko terkait HIV di kalangan pekerja seks wanita: Studi potong lintang di Palopo, Indonesia

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Abstract

Although the Health Belief Model (HBM) has increasingly been used to explain HIV prevention behaviour, evidence on how specific HBM constructs shape HIV-related risk among female sex workers in Indonesian urban settings remains limited, making this study a context-specific contribution from Palopo City. This cross-sectional study examined associations between HBM constructs and HIV transmission risk among female sex workers in Palopo City, Indonesia. The study was conducted from August to October 2025 and involved 182 female sex workers recruited through total sampling. Data were collected using a structured HBM-based questionnaire assessing perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. The instrument had established content validity and internal reliability. HIV transmission risk was measured using self-reported sexual risk behaviour indicators and categorised as high or low risk. Variables with $p < 0.25$ in bivariate analysis were included in multivariable logistic regression. The findings showed that low perceived susceptibility was significantly associated with higher HIV transmission risk (AOR = 2.84; 95% CI: 1.67–4.83; $p < 0.001$), as was high perceived barriers (AOR = 2.31; 95% CI: 1.36–3.92; $p = 0.002$). In contrast, high self-efficacy was significantly associated with lower HIV transmission risk (AOR = 0.41; 95% CI: 0.24–0.69; $p < 0.001$). These findings suggest that HIV prevention programmes for female sex workers should strengthen perceived susceptibility, reduce perceived barriers, and enhance self-efficacy.

Abstrak

Meskipun Model Keyakinan Kesehatan (HBM) semakin sering digunakan untuk menjelaskan perilaku pencegahan HIV, bukti mengenai bagaimana konstruk-konstruk spesifik HBM memengaruhi risiko terkait HIV di kalangan pekerja seks wanita di lingkungan perkotaan Indonesia masih terbatas, sehingga penelitian ini menjadi kontribusi yang spesifik terhadap konteks Kota Palopo. Penelitian cross-sectional ini mengkaji hubungan antara konstruk-konstruk HBM dan risiko penularan HIV di kalangan pekerja seks wanita di Kota Palopo, Indonesia. Penelitian ini dilakukan dari Agustus hingga Oktober 2025 dan melibatkan 182 pekerja seks wanita yang direkrut melalui pengambilan sampel total. Data dikumpulkan menggunakan kuesioner terstruktur berbasis HBM yang menilai persepsi kerentanan, persepsi tingkat keparahan, persepsi manfaat, persepsi hambatan, isyarat untuk bertindak, dan efikasi diri. Instrumen tersebut telah memiliki validitas isi dan reliabilitas internal yang teruji. Risiko penularan HIV diukur menggunakan indikator perilaku berisiko seksual yang dilaporkan sendiri dan dikategorikan sebagai risiko tinggi atau rendah. Variabel dengan nilai $p < 0,25$ dalam analisis bivariat dimasukkan ke dalam regresi logistik multivariat. Hasil penelitian menunjukkan bahwa persepsi kerentanan yang rendah secara signifikan terkait dengan risiko penularan HIV yang lebih tinggi (AOR = 2,84; 95% CI: 1,67–4,83; $p < 0,001$), begitu pula dengan persepsi hambatan yang tinggi (AOR = 2,31; 95% CI: 1,36–3,92; $p = 0,002$). Sebaliknya, efikasi diri yang tinggi secara signifikan terkait dengan risiko penularan HIV yang lebih rendah (AOR = 0,41; 95% CI: 0,24–0,69; $p < 0,001$). Temuan ini menunjukkan bahwa program pencegahan HIV bagi pekerja seks wanita harus memperkuat persepsi kerentanan, mengurangi persepsi hambatan, dan meningkatkan efikasi diri.

Keywords :

female; hiv; perceived susceptibility; self-efficacy; sex workers

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INTRODUCTION

A Human Immunodeficiency Virus (HIV) remains a major global public health challenge. According to UNAIDS, approximately 40 million people were living with HIV worldwide in 2024, with an estimated 1.3 million new infections occurring annually, indicating continued HIV incidence despite substantial advances in prevention, testing, and antiretroviral therapy (UNAIDS, 2023). The global HIV epidemic is increasingly concentrated among key populations, including female sex workers (FSWs), men who have sex with men, people who inject drugs, and transgender people. Female sex workers remain disproportionately affected by HIV because of the combined influence of behavioural, biological, and structural vulnerabilities (Nuari Khan Rivu et al., 2026; UNAIDS, 2025).

In Indonesia, HIV remains a persistent epidemiological challenge. National surveillance data indicate that new HIV cases continue to be reported annually, with the epidemic increasingly concentrated among key populations (Merati et al., 2025). Female sex workers are consistently identified as a population at elevated risk because of frequent sexual contact, limited access to preventive services, and unequal power dynamics that constrain condom negotiation during commercial sexual encounters (Llavero-Molino et al., 2025). Epidemiological studies in Indonesia further indicate that inconsistent condom use, economic dependence on clients, and limited capacity to negotiate safer sex contribute substantially to HIV transmission risk among female sex workers (Najmah et al., 2025; Natalis, 2025).

At the provincial level, South Sulawesi remains among the regions reporting a substantial HIV burden, particularly among key populations (Hamalding et al., 2025). This epidemiological context highlights the need for locally generated evidence to better understand determinants of HIV-related risk behaviours among female sex workers and to inform context-specific HIV prevention strategies in Palopo City (Yanti et al., 2023). At the provincial level, South Sulawesi remains among the regions reporting a considerable HIV burden, particularly among key populations (Kementerian Kesehatan, 2024). These epidemiological patterns highlight the need for locally generated evidence to better understand determinants of HIV-related risk behaviours among female sex workers and to inform context-specific prevention strategies in Palopo City (Yanti et al., 2023)

Previous research has shown that HIV-related risk behaviours among female sex workers are shaped by both structural conditions and individual cognitive factors. Recent studies applying the Health Belief Model (HBM) have consistently reported that higher perceived susceptibility and stronger self-efficacy are associated with safer sexual practices, whereas greater perceived barriers are linked to inconsistent condom use and increased HIV-related risk behaviours (Akhondzadeh et al., 2025; Amarachi Chinyeaka Ugbor et al., 2024). However, evidence regarding other HBM constructs remains inconsistent. Some studies have reported significant associations between perceived severity, perceived benefits, and preventive behaviours, whereas others found these constructs to have limited or non-significant effects after adjustment for other determinants (Asefa et al., 2022; Silas et al., 2025). These inconsistencies suggest that the relative contribution of individual HBM constructs may vary across populations and sociocultural contexts.

Despite the growing body of evidence, few studies have comprehensively evaluated all six HBM constructs simultaneously among female sex workers in Indonesia using multivariable analysis. Furthermore, evidence from eastern Indonesia, particularly Palopo City, remains scarce. Addressing this knowledge gap is important because behavioural determinants identified in other settings may not be directly applicable to local epidemiological and sociocultural contexts. Therefore, this study examined the associations between all six HBM constructs and HIV transmission risk among female sex workers in Palopo City to provide locally relevant evidence for HIV prevention programmes.

The Health Belief Model (HBM) has been widely applied to explain HIV preventive behaviours by proposing that individuals are more likely to adopt protective actions when they perceive themselves to be susceptible to infection, recognise the seriousness of the disease, perceive greater benefits than barriers, receive cues to action, and possess sufficient self-efficacy. Although the HBM primarily emphasises individual cognitive processes, its application among female sex workers remains relevant because behavioural decisions are made within complex structural contexts. Economic dependence on clients, unequal power relationships, stigma, and the threat of violence may constrain women's ability to translate health beliefs into preventive behaviours, even when awareness of HIV risk is high. Consequently, the HBM should be interpreted as a framework for understanding how individual perceptions interact with structural constraints rather than as a model

assuming complete behavioural autonomy. Previous studies among female sex workers have consistently shown that perceived susceptibility, perceived barriers, and self-efficacy are associated with condom use and other HIV preventive behaviours, whereas evidence for perceived severity and perceived benefits remains inconsistent across settings (Chabata et al., 2025).

In Indonesia, studies applying the Health Belief Model to HIV prevention among female sex workers remain relatively limited. Existing studies have primarily focused on descriptive analyses, specific HBM constructs such as knowledge, perceived susceptibility, or self-efficacy, and have largely been conducted in major urban settings. Few studies have simultaneously examined all six HBM constructs using multivariable analytical approaches to identify their independent associations with HIV-related risk behaviours. Moreover, evidence from smaller urban settings in eastern Indonesia, including Palopo City, remains scarce, limiting the availability of context-specific behavioural evidence to inform local HIV prevention programmes. These methodological and geographical limitations highlight the need for a comprehensive assessment of all HBM constructs within the local context addressed in the present study (Darabi et al., 2023; Nuvunga et al., 2025).

Therefore this study aims to analyze the influence of Health Belief Model constructs on HIV transmission risk among female sex workers in Palopo City. It is hypothesized that low perceived susceptibility and high perceived barriers increase HIV transmission risk, whereas high self-efficacy acts as a protective factor against risky sexual behavior. By applying a theory-driven epidemiological approach, this study seeks to contribute empirical evidence to strengthen targeted HIV prevention interventions for female sex workers in similar urban settings.

METHODS

This research employed a quantitative analytic design with a cross-sectional approach. The cross-sectional design was selected because it enables the assessment of relationships between variables at a single point in time, thereby providing a snapshot of the association between Health Belief Model (HBM) constructs and HIV transmission risk among the study participants during the data collection period. This approach is commonly used in public health research to explore behavioral determinants of disease risk within specific populations.

The study was conducted in Palopo City, South Sulawesi, Indonesia. Data collection took place from August to October 2025. Palopo City was chosen as the research setting because it represents an urban area with an identifiable population of female sex workers and limited published empirical evidence addressing behavioral and perceptual factors related to HIV transmission risk in this context. The setting also allowed feasible access to respondents through collaboration with local community networks.

The study population consisted of all active female sex workers operating in Palopo City during the study period. A total of 182 respondents participated in the study. Given the relatively small and clearly identifiable population size, a total sampling technique was applied. All individuals who met the inclusion criteria and were available at the time of data collection were invited to participate, thereby minimizing selection bias and enhancing the representativeness of the sample.

The research was conducted in several stages. The initial stage involved coordination with field facilitators and relevant community contacts to identify potential respondents and facilitate access to the study population. This was followed by the preparation of research instruments and data collection. Data were gathered through face-to-face interviews to ensure that respondents clearly understood the questions and to improve the completeness and accuracy of responses. The final stage included data verification, coding, entry, and statistical analysis.

Data were collected using a structured questionnaire developed based on the Health Belief Model framework. The questionnaire assessed perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy related to HIV prevention. HIV transmission risk was measured using indicators of self-reported sexual risk behaviors. Prior to data collection, the questionnaire was reviewed for content validity and underwent reliability testing to ensure consistency of measurement.

Collected data were coded and entered into statistical software for analysis. Descriptive analysis was performed to summarize respondent characteristics. Bivariate analysis using chi-square tests was conducted to examine associations between independent variables and HIV transmission risk. Variables with potential associations were further analyzed using multivariate logistic regression to identify independent predictors. Statistical significance was determined at a 95% confidence level with a p-value of less than 0.05.

Table 1
Characteristics of respondents (n = 182)

Category	n	%
Age (years)		
< 25	54	29.7
25 - 34	79	43.4
≥ 35	49	26.9
Education level		
Low (≤ junior high school)	109	59.9
Senior high school	56	30.8
College or higher	17	9.3
Marital status		
Not married	86	47.3
Married	41	22.5
Divorced / separated	55	30.2
Duration of work as FSW		
< 1 year	38	20.9
1 - < 3 years	74	40.7
≥ 3 years	70	38.4
Main working venue		
Street-based	64	35.2
Venue-based (cafe, karaoke, hotel)	118	64.8
Average number of clients/week		
< 5 clients	47	25.8
5 - 10 clients	78	42.9
> 10 clients	57	31.3
Condom use with clients		
Consistent	69	37.9
Inconsistent	113	62.1
History of HIV testing		
Ever tested	124	68.1
Never tested	58	31.9
HIV transmission risk		
High risk	96	52.7
Low risk	86	47.3

This study was approved by the Research Ethics Committee of Mitra Husada Foundation, South Sulawesi, Indonesia (Ethical Approval No. 042/Etik/YMH-SulSel/VI/2025). The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Before enrolment, all participants received a detailed explanation of the study objectives, procedures, potential risks, and benefits. Written informed consent was obtained from all participants before data collection. Participation was entirely voluntary, and participants were informed of their right to decline or withdraw from the study at any time without any consequences. Participant confidentiality was strictly maintained by anonymising all questionnaire data and restricting access to the study database to the research team.

RESULTS

Table 1 summarises the characteristics of the 182 female sex workers included in the study. Overall, the study population was characterised by relatively low educational attainment, with nearly 60% of participants having completed junior high school or lower. Most respondents worked in venue-based settings and reported one to three years of sex work experience. Behavioural indicators showed that inconsistent condom use was common (62.1%), despite more than two-thirds of participants (68.1%) reporting previous HIV testing. Furthermore, over half of the respondents (52.7%) were classified as having a high risk of HIV transmission based on self-reported sexual risk behaviours. These findings indicate that HIV preventive services have reached a substantial proportion of participants through HIV testing; however, high-risk sexual behaviours remain prevalent, underscoring the need for

Table 2
Bivariate analysis of health belief model constructs and HIV transmission risk among female sex workers

Variable	High HIV Risk (%)	Low HIV Risk (%)	Total (n)	p-value
Perceived Susceptibility				
Low	68 (67.3)	33 (32.7)	101	<0.001
High	28 (34.6)	53 (65.4)	81	
Perceived Severity				
Low	40 (54.1)	34 (45.9)	74	0.398
High	56 (51.9)	52 (48.1)	108	
Perceived Benefits				
Low	37 (53.6)	32 (46.4)	69	0.587
High	59 (52.2)	54 (47.8)	113	
Perceived Barriers				
High	65 (66.3)	33 (33.7)	98	0.002
Low	31 (36.9)	53 (63.1)	84	
Cues to Action				
Low	48 (54.5)	40 (45.5)	88	0.451
High	48 (51.1)	46 (48.9)	94	
Self-Efficacy				
Low	64 (69.6)	28 (30.4)	92	<0.001
High	32 (35.6)	58 (64.4)	90	

behavioural interventions that extend beyond testing and focus on improving consistent condom use and reducing HIV-related risk behaviours.

Most respondents reported working in venue-based settings, such as cafés, karaoke venues, or hotels (64.8%), whereas 35.2% were street-based sex workers. In terms of client volume, 42.9% of respondents reported having five to ten clients per week, and 31.3% reported serving more than ten clients weekly. Risk-related behaviors indicated that condom use with clients was inconsistent for the majority of respondents (62.1%), while only 37.9% reported consistent condom use. Furthermore, more than two thirds of respondents (68.1%) had previously undergone HIV testing. Based on reported sexual risk behaviors, 52.7% of respondents were classified as having a high risk of HIV transmission.

Table 2 presents the results of the bivariate analysis examining the associations between Health Belief Model (HBM) constructs and HIV transmission risk among female sex workers. Perceived susceptibility was significantly associated with HIV transmission risk ($p < 0.001$). Respondents with low perceived susceptibility were more frequently classified in the high-risk group than those with high perceived susceptibility. In contrast, perceived severity was not significantly associated with HIV transmission risk ($p > 0.05$), with similar distributions of high- and low-risk participants across both categories. Likewise, perceived benefits showed no significant association with HIV transmission risk ($p > 0.05$).

Conversely, perceived barriers were significantly associated with HIV transmission risk ($p = 0.002$). Female sex workers reporting higher perceived barriers were more frequently classified in the high-risk group than those reporting lower perceived barriers. Cues to action were not significantly associated with HIV transmission risk ($p > 0.05$). Self-efficacy also demonstrated a significant association with HIV transmission risk ($p < 0.001$), with respondents reporting lower self-efficacy more frequently classified in the high-risk group, whereas those with higher self-efficacy were predominantly classified in the low-risk group. These findings indicate that perceived susceptibility, perceived barriers, and self-efficacy were significantly associated with HIV transmission risk at the bivariate level, while perceived severity, perceived benefits, and cues to action were not.

Table 3 presents the results of the multivariate logistic regression analysis examining the association between Health Belief Model constructs and HIV transmission risk among female sex workers. After adjustment for other constructs in the model, perceived susceptibility, perceived barriers, and self-efficacy remained significantly associated with HIV transmission risk.

Respondents with low perceived susceptibility had a significantly higher likelihood of being classified as having high HIV transmission risk compared to those with high perceived susceptibility (OR=2.84; 95% CI: 1.67–4.83; $p<0.001$). This finding indicates that underestimation of personal vulnerability substantially increased the probability of engaging in risky sexual behaviors. High perceived

Table 3
Multivariate logistic regression analysis

Variable	AOR	95% CI	p-value
Perceived Susceptibility	2.84	1.67–4.83	<0.001
Perceived Barriers	2.31	1.36–3.92	0.002
Self-Efficacy	0.41	0.24–0.69	<0.001
Perceived Severity	1.18	0.71–1.96	0.503
Perceived Benefits	1.12	0.65–1.91	0.668
Cues to Action	0.96	0.57–1.61	0.873

barriers were also independently associated with increased HIV transmission risk (OR=2.31; 95% CI: 1.36–3.92; p=0.002). Female sex workers who perceived greater obstacles to practicing preventive behaviors were more likely to report behaviors that placed them at higher risk of HIV infection.

In contrast self-efficacy demonstrated a protective effect. Respondents with higher self-efficacy were significantly less likely to experience high HIV transmission risk compared to those with lower self-efficacy (OR=0.41; 95% CI: 0.24–0.69; p<0.001), suggesting that confidence in negotiating and maintaining safe sexual practices plays a crucial role in risk reduction. Other Health Belief Model constructs, including perceived severity, perceived benefits, and cues to action, were not significantly associated with HIV transmission risk in the adjusted model (p>0.05). These findings suggest that, within this population, perceived vulnerability, perceived barriers, and self-efficacy are more influential determinants of HIV-related risk behavior than awareness of disease severity or exposure to preventive cues.

DISCUSSION

A This study demonstrates that Health Belief Model (HBM) constructs do not exert uniform effects on HIV transmission risk among female sex workers. Among the six constructs examined, perceived susceptibility, perceived barriers, and self-efficacy were identified as significant determinants of HIV transmission risk, whereas perceived severity, perceived benefits, and cues to action were not significantly associated after adjustment. These findings reinforce the relevance of cognitive and behavioral determinants within public health theory, particularly the Health Belief Model, while also underscoring the importance of contextual and structural constraints that shape HIV-related behavior among female sex workers (Glanz et al., 2008). The results suggest that HIV risk in this population is less influenced by general awareness and more by how individuals interpret their vulnerability, assess constraints, and perceive their ability to act within constrained environments.

Perceived Susceptibility

Consistent evidence has been reported in previous studies conducted among female sex workers in different epidemiological contexts. Research from China and India demonstrated that low perceived susceptibility was strongly associated with inconsistent condom use and limited engagement with HIV prevention services (Agasty et al., 2025; Sari Indah & Eryando, 2023). Similar findings were observed in Tanzania, where female sex workers who underestimated their risk were less likely to adopt preventive behaviors despite operating in high-prevalence environments (Akatukwasa et al., 2025). These consistent patterns across settings indicate that perceived susceptibility remains a robust predictor of risk behavior.

Within the Palopo City context, these findings may also reflect the occupational and social realities faced by female sex workers. Many women rely on sex work as their primary source of income, limiting their ability to refuse clients who reject condom use or to negotiate safer sexual practices. Persistent stigma surrounding sex work and HIV may further discourage open discussion of HIV risk and reduce engagement with prevention services. Under these circumstances, repeated exposure to risky situations may gradually normalize HIV risk, leading women to perceive unsafe sexual practices as an unavoidable aspect of their occupation rather than as preventable behaviours. This contextual interpretation may explain why lower perceived susceptibility was significantly associated with higher HIV transmission risk in the present study.

From an epidemiological perspective, low perceived susceptibility among female sex workers may reflect normalization of risk in high-exposure occupational

settings. Continuous exposure to sexual risk may lead individuals to perceive risk as routine or unavoidable, thereby diminishing its psychological salience. This process is consistent with optimism bias theory, which suggests that individuals tend to believe they are less likely than others to experience adverse health outcomes (Ngaybe et al., 2025). Empirical studies have shown that individuals in high-risk occupations often rely on peer comparison rather than objective epidemiological indicators, leading to systematic underestimation of personal vulnerability (Munthali et al., 2025). These findings highlight the need for interventions that address collective risk perception and challenge normalized views of vulnerability within sex work communities.

Perceived Severity

Another possible explanation is the presence of a measurement ceiling effect. HIV has long been recognised as a serious and potentially life-threatening disease through extensive public health campaigns and community-based HIV education in Indonesia. Consequently, most participants may have already perceived HIV as highly severe, resulting in limited variability in perceived severity scores across respondents. When a construct demonstrates little variation, its ability to discriminate between individuals with different behavioural risk profiles is reduced, which may partly explain the absence of a statistically significant association observed in this study.

One explanation for this finding lies in the presence of competing priorities. For many female sex workers, immediate concerns related to income generation, client retention, and personal safety may outweigh concerns about long-term health consequences. In such contexts, perceived severity may be acknowledged cognitively but remain secondary in day-to-day decision-making processes (Stegman et al., 2025). This suggests that severity-focused messaging may fail to resonate when individuals perceive limited control over their circumstances.

In addition, advances in antiretroviral therapy have reshaped public perceptions of HIV. Improved treatment outcomes and expanded access to care have contributed to a view of HIV as a manageable chronic condition rather than an inevitably fatal disease (Noorman et al., 2024). While this shift represents a significant public health achievement, it may also reduce the motivational impact of perceived severity on preventive behavior. As HIV becomes less associated with immediate mortality, fear-based messaging may lose its effectiveness, particularly among populations facing daily survival challenges.

Perceived Benefits

Within the Health Belief Model, perceived benefits are expected to influence behaviour only when individuals believe that the expected benefits outweigh perceived barriers. In contexts where structural and interpersonal barriers remain substantial, awareness of the benefits of HIV prevention alone may be insufficient to promote consistent protective behaviour. Female sex workers may recognise the value of condom use and HIV testing but still encounter economic pressures, client preferences, and unequal power relations that limit their ability to act on these beliefs (Makhakhe & Khumalo, 2025). These findings suggest that interventions should combine health education with strategies that reduce structural barriers and strengthen women's capacity to negotiate safer sexual practices.

Moreover, perceived benefits may be weakened by doubts about effectiveness or consistency. Some individuals may question condom reliability or believe that prevention efforts cannot fully eliminate risk, particularly in environments characterized by frequent exposure. Such beliefs can undermine the perceived utility of preventive actions and reduce motivation to adopt safer behaviors (Maringwa et al., 2025). These findings underscore the limitations of interventions that focus primarily on increasing awareness of benefits without addressing feasibility and context.

Perceived Barriers

Perceived barriers emerged as one of the strongest determinants of HIV transmission risk in this study. Female sex workers reporting higher perceived barriers were significantly more likely to engage in risky sexual behavior. This finding is consistent with extensive literature identifying perceived barriers as the most powerful predictor of health behavior within the Health Belief Model (Moameri et al., 2025).

Barriers faced by female sex workers are multifaceted and operate at multiple levels. Interpersonal barriers include client refusal to use condoms, power imbalances in sexual negotiation, and fear of physical or sexual violence. Structural barriers include economic dependence on sex work, stigma, limited access to health services, and legal or policy environments that marginalize sex workers (Kawuma et al., 2025). These barriers constrain individual agency and limit the feasibility of preventive behavior, even among those who are knowledgeable and

motivated.

From an epidemiological standpoint, perceived barriers reflect structural vulnerability rather than individual failure. Risk behavior in this context should be understood as a product of constrained choices shaped by social, legal, and economic environments (Merga et al., 2025). These findings emphasize the need for multilevel interventions that address not only individual perceptions but also broader structural conditions, including economic empowerment, stigma reduction, and legal protections.

In the context of Palopo City, interventions targeting interpersonal and health-system barriers are likely to be the most immediately actionable. Strengthening peer outreach, expanding community-based HIV testing and counselling, improving provider capacity to deliver stigma-free services, and enhancing condom negotiation skills through peer educators may help reduce barriers to HIV prevention. These strategies are consistent with Indonesia's National HIV/AIDS Prevention and Control Programme, which emphasizes comprehensive prevention, community engagement, improved access to HIV services, and reduction of stigma among key populations.

Cues to Action

Cues to action were not significantly associated with HIV transmission risk in this study. The cues to action construct assessed respondents' exposure to HIV-related information, counselling, and encouragement to undertake preventive behaviours. However, the instrument measured the presence of these cues rather than their frequency, intensity, quality, or timing. Consequently, repeated exposure to HIV prevention messages may not necessarily translate into behavioural change, particularly when messages are not accompanied by interventions that strengthen self-efficacy or reduce perceived barriers. This interpretation is consistent with previous studies showing that informational cues alone have limited behavioural impact when structural and interpersonal barriers remain unresolved (Nuvunga et al., 2025; Su et al., 2025). These findings suggest that HIV prevention programmes should integrate informational messages with peer support, skills training, and structural interventions to facilitate sustained behaviour change.

Self-Efficacy

Self-efficacy demonstrated a strong protective association with HIV transmission risk. Female sex workers with higher self-efficacy were significantly less likely to engage in risky behaviours. This finding is consistent with Social Cognitive Theory (Ozer, 2022) and the extended Health Belief Model, both of which identify self-efficacy as a central determinant of behaviour change. Higher self-efficacy enables women to negotiate condom use, refuse unsafe clients, and maintain consistent HIV prevention practices. Previous studies have similarly reported that greater self-efficacy is associated with safer sexual behaviour, improved condom negotiation skills, and increased uptake of HIV testing among female sex workers (Graf et al., 2021). As a modifiable construct, self-efficacy can be strengthened through peer-led outreach, community empowerment, and skills-based HIV prevention programmes. In Indonesia, these approaches have been incorporated into the national HIV prevention strategy for key populations to improve condom negotiation, service uptake, and sustained preventive behaviours among female sex workers(Whitford et al., 2021). Together with evidence from peer-based interventions in comparable settings (Zakiei et al., 2022), these findings support prioritising self-efficacy as a central component of HIV prevention programmes for female sex workers.

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design precludes establishing temporal precedence or causal relationships between Health Belief Model constructs and HIV transmission risk. Second, HIV transmission risk was assessed using self-reported sexual behaviours, which may be subject to recall and social desirability bias despite assurances of confidentiality. Third, although total sampling was employed, participants were recruited from an identifiable community-based population of female sex workers in Palopo City rather than through probability sampling, which may limit the generalisability of the findings to other settings. Fourth, although the questionnaire underwent content validity assessment and reliability testing, it was developed for this study and has not been externally validated across different populations. Finally, the multivariable model did not include several structural factors, such as policing practices, housing instability, and other contextual determinants that may influence HIV-related behaviours. Future longitudinal and multi-site studies using externally validated instruments and incorporating broader structural determinants are needed to strengthen causal inference and improve the generalisability of the findings.

CONCLUSION

This study demonstrates that lower perceived susceptibility, higher perceived barriers, and lower self-efficacy were significantly associated with higher HIV transmission risk among female sex workers in Palopo City, whereas perceived severity, perceived benefits, and cues to action were not independently associated after multivariable adjustment. These findings suggest that individual cognitive factors remain important behavioural determinants within broader structural and social contexts.

The findings have several implications for HIV prevention programmes. First, behavioural interventions should strengthen risk perception by improving awareness of personal HIV vulnerability. Second, community- and peer-based programmes should reduce practical and psychosocial barriers to consistent condom use by addressing stigma, unequal power relationships, and limited access to prevention services. Third, interventions should prioritise strengthening self-efficacy through condom negotiation training, peer support, and empowerment-based education to improve sustained protective behaviours among female sex workers. This study should be interpreted in light of several limitations. The cross-sectional design precludes causal inference, self-reported behavioural data may be affected by social desirability bias, and the multivariable model did not include all potential sociodemographic confounders. Future studies should employ longitudinal designs, incorporate structural and contextual determinants, and combine quantitative and qualitative approaches to better understand behavioural decision-making and to inform more effective HIV prevention strategies for female sex workers.

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AUTHORS' CONTRIBUTIONS

Muhammad Azwar contributed to the conceptualisation of the study, study design, data analysis, and manuscript drafting. Syamsul Bahri contributed to data collection, data acquisition, and fieldwork implementation. Dian Furqani Hamdan contributed to literature review, interpretation of findings, and manuscript preparation. Lilis Widiastuty contributed to methodological guidance, manuscript review, and critical revision. All authors read and approved the final version of the manuscript.

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COMPETING INTERESTS

The authors affirm that there are no conflicts of interest related to the research, writing, or publication of this article.

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