



The Relationship Between Condom Use and Symptoms of Sexually Transmitted Infections and HIV/AIDS Among At-Risk Populations in Semarang, Indonesia

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ABSTRACT

Sexually Transmitted Infections (STIs) remain a serious health problem, especially among at-risk populations such as Female Sex Workers (FSWs) and Ladies Companions (LCs). Consistent condom use has been proven effective in preventing STIs; however, compliance is still low. This study aims to analyze the relationship between condom use and symptoms of STIs and HIV/AIDS among at-risk populations in Semarang City. This is an observational analytic cross-sectional study. The study sample consisted of 20 sexually active LC/FSW respondents with symptoms of STIs or HIV/AIDS. Data were collected through interview questionnaires. Analysis was performed using the Chi-Square test and Fisher's exact test. Sixty-five percent of respondents did not use condoms consistently, and seventy percent experienced symptoms of STIs. There was a significant relationship between condom use and STI symptoms ($p < 0.05$). Inconsistent condom use is associated with increased symptoms of STIs. Increased education and improved access to contraceptives are essential for at-risk populations. This study provides important insights for public health policy development, particularly in designing targeted interventions for vulnerable populations in urban settings. However, limitations include the relatively small sample size ($n = 20$) and cross-sectional design, which preclude causal inference. Future research should employ larger longitudinal cohorts with validated exposure assessment tools and consider additional confounding variables such as substance use, healthcare access barriers, and partner characteristics. Comprehensive multisectoral interventions integrating peer education, community-based health services, and structural approaches addressing socioeconomic determinants are recommended to improve condom adherence and reduce STI/HIV burden among at-risk populations in Indonesia.

Keywords: STIs, condom use, HIV/AIDS, population at risk, FSW, LC.

INTRODUCTION

Sexually Transmitted Infections (STIs) remain a significant global health problem, with more than one million new cases occurring every day (Elendu et al., 2024; Sinka, 2024). It is transmitted through sexual intercourse and is caused by various microorganisms, including bacteria, viruses, parasites, and fungi. Several common STIs and their etiological causative agents include gonorrhea (*Neisseria gonorrhoeae*), syphilis (*Treponema pallidum*), chlamydia (*Chlamydia trachomatis*), trichomoniasis (*Trichomonas vaginalis*), genital herpes (herpes simplex virus), condyloma acuminata (Human Papillomavirus/HPV), and HIV/AIDS (Human Immunodeficiency Virus). Common STIs, including gonorrhea, syphilis, chlamydia, trichomoniasis, genital herpes, and HIV/AIDS, are considered among the most dangerous forms of STIs due to their impact on immunity and progression to AIDS (Hanumanthayya &

Rajiwate, 2025; Parveen et al., 2025). Symptoms of STIs may vary but commonly include abnormal vaginal discharge, pain during urination, genital sores, itching, and pelvic pain. If left untreated, STIs may lead to clinically significant complications, including infertility, cervical cancer, and an increased risk of HIV transmission (Mathias et al., 2024; Thomas, 2025).

In Indonesia, STIs remain a major issue among at-risk populations, such as Female Sex Workers (FSW) and Ladies Companions (LC), with a fairly high prevalence (Palma & Bata, 2025; Tampubolon & Herdayati, 2024). Limited access to reproductive health services, combined with high mobility and the complexity of social dynamics in urban environments, has significantly exacerbated the situation (Cacciatore et al., 2025; Logie et al., 2024).

Risky sexual behaviors, such as engaging with multiple partners without condom use, significantly increase the risk of contracting STIs (Paul & Chandra, 2024; Rivera et al., 2025). Social and economic factors, including client pressure and insufficient access to comprehensive sexual education, further contribute to low adherence to condom use (Ndlovu et al., 2025; Valente et al., 2025). Condom use has been shown to significantly reduce the risk of STIs, but this behavior has not been consistently adopted by this group. Although the effectiveness of condoms has been widely proven, barriers such as discomfort and myths remain a challenge for this group (Galper & Mazandarani, 2025; Godwin et al., 2025). Understanding behavioral determinants through established health behavior frameworks, such as the Health Belief Model and Theory of Planned Behavior, suggests that perceived susceptibility, perceived barriers, self-efficacy, and social norms critically influence condom use practices among at-risk populations (Brook-Rowland et al., 2025; Kweku Yakubu, 2025). These theoretical perspectives provide essential context for interpreting the complex interplay between knowledge, attitudes, and behaviors in STI prevention (Chainok et al., 2025; Wang et al., 2025).

Despite substantial research on STI prevention globally, significant knowledge gaps remain regarding the specific contextual factors influencing condom use behaviors among at-risk populations in Indonesian urban settings. Previous studies have predominantly focused on individual-level factors, with limited attention to the intersection of socioeconomic pressures, structural barriers, and community-level influences unique to Indonesia's cultural context. Furthermore, while international literature extensively documents condom use patterns among sex workers, comparative data from Indonesian cities remain scarce, particularly regarding Ladies Companions—a distinct occupational category with different risk profiles compared to traditional FSWs. This study addresses these gaps by examining the relationship between condom use and STI/HIV symptoms specifically within Semarang's at-risk populations, providing locally relevant evidence to inform targeted public health interventions (Safitri, 2020).

The novelty of this research lies in its focus on both FSWs and LCs in Semarang, a major urban center in Central Java with unique sociodemographic characteristics and health service infrastructure (Wahyabiyantara Permana Adi, 2023). By documenting the association between condom use patterns and STI symptomatology in this understudied population, the study contributes empirical evidence supporting the development of culturally appropriate, context-specific prevention strategies (de Wit et al., 2023; Tersigni, 2025). The findings have direct implications for Indonesia's national STI/HIV prevention programs, particularly in refining peer education models, improving access to sexual health services, and addressing structural determinants such as economic vulnerability and client negotiation dynamics (Srinivas et al., 2021).

This study was therefore conducted to analyze the relationship between condom use and STI/HIV symptoms in at-risk populations in Semarang City. The primary objective is to determine whether inconsistent condom use is statistically associated with increased STI symptoms among FSWs and LCs. Secondary objectives include describing condom use patterns in this population and identifying potential socioeconomic and behavioral factors contributing to low adherence. Ultimately, this research aims to generate actionable evidence for public health practitioners, policymakers, and community organizations working to reduce STI/HIV transmission in vulnerable populations through evidence-based interventions tailored to local contexts.

METHOD

An analytical observational method with a cross-sectional design was utilized to analyze the relationship between condom use and symptoms of sexually transmitted infections (STIs) and HIV/AIDS among Ladies Companion (LC) and Female Sex Workers (FSW) in Semarang. The sample consisted of 20 respondents who were sexually active with symptoms of STIs or HIV/AIDS. Data were collected through questionnaire. Analysis was conducted using Chi-Square test and Fisher's exact test to evaluate the relationship between variables. This study aims to understand the pattern of condom use and its relationship with symptoms of STIs and HIV/AIDS in the at-risk population of Semarang City, providing foundational evidence for developing targeted behavioral interventions and improving sexual health service delivery for vulnerable groups.

RESULTS AND DISCUSSION

This study included 20 respondents, among whom 65% did not use condoms consistently and 70% experienced symptoms of STI. Characteristics of the study subjects are shown in Table 1.

Table 1. Characteristics of Study Subjects

Characteristics	Category	N	Percentage
Condom Use	Poor	13	65%
	Good	7	35%
STI and HIV/AIDS-related symptoms	No symptoms	6	30%
	Symptoms	14	70%

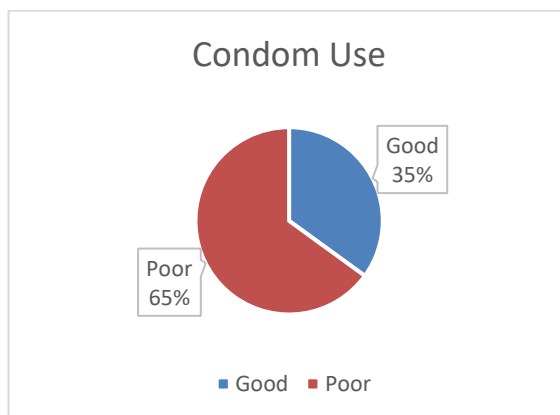


Figure 1. Statistic of Condom Use

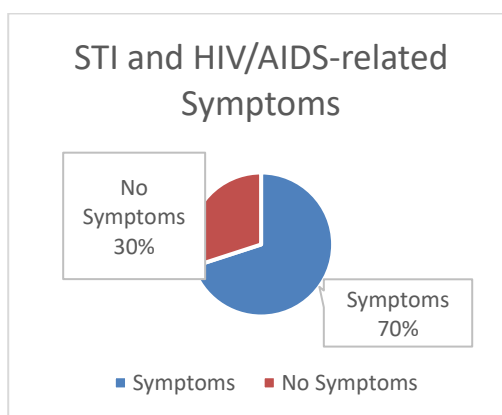


Figure 2. Statistic of STI and HIV/AIDS-related Symptoms

Statistical analysis showed a significant relationship between condom use and STI incidence, with a p value of <math><0.05</math>, indicating that inconsistent condom use is statistically related to a higher risk of STIs and HIV/AIDS within this at-risk population. Majority of respondents reported poor condom use, which may contribute to the increased prevalence of STIs, especially in high-risk populations.

Table 2 shows the hypothesis test between condom use and STI and HIV/AIDS related symptoms.

Table 2. Hypothesis test between condom use and STI and HIV/AIDS related symptoms.

Condom Use	STI and HIV/AIDS related symptoms		Total	p	
	No symptoms	Symptoms			
Poor	1	12	13	0.003 ^a	0.007 ^b
Good	5	2	7		
Total	6	14	20		

Note :

- a. chi square,
- b. fischer's exact

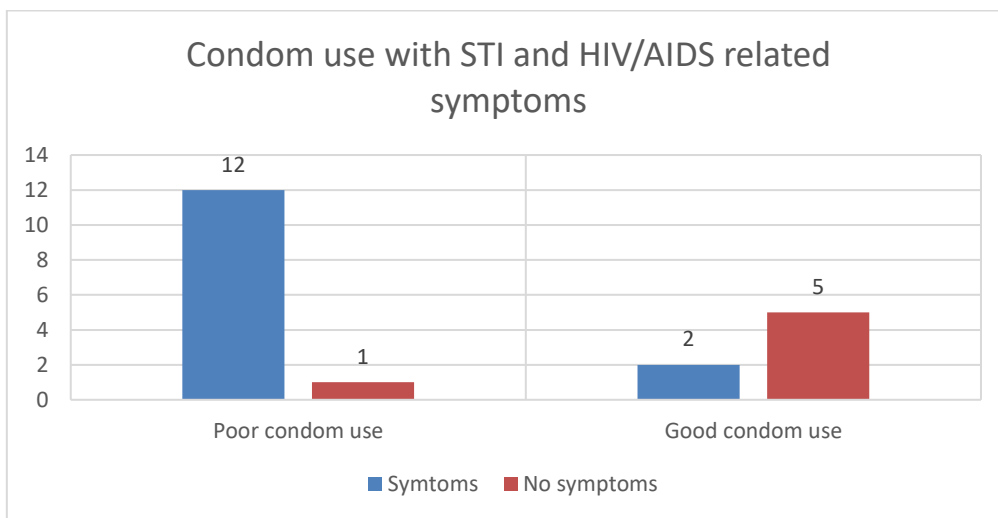


Figure 3. Condom use with STI and HIV/AIDS related symptoms

Discussion

The present study revealed that the majority of respondents (65%) practiced poor condom use and 70% experienced symptoms of STI. These findings support the premise that inconsistent condom use represents a major risk factor for STI transmission, and emphasize the importance of educational interventions and sexual health promotion to improve condom adherence.

These findings align with international evidence demonstrating strong associations between inconsistent condom use and elevated STI prevalence among sex worker populations. A study by Ramesh et al. (2010) in Karnataka, India, reported that female sex workers with irregular condom use exhibited significantly higher rates of STIs compared to those practicing consistent protection, with odds ratios ranging from 2.5 to 4.8 depending on infection type. Similarly, research conducted among female sex workers in Nairobi, Kenya, by Gelmon et al. (2015) documented that only 42% of participants reported consistent condom use with clients, and this was significantly associated with HIV

prevalence (adjusted OR = 3.2, 95% CI: 1.8–5.6).⁷ These international comparisons underscore that the patterns observed in Semarang reflect broader global challenges in promoting protective behaviors among at-risk populations, while also highlighting the need for context-specific interventions addressing local barriers.

Social and economic factors such as client pressure, financial needs, and lack of knowledge also contribute to the low adherence in condom use. The socio-economic environment has been identified in various studies as one of the main determinants of condom use behavior, with sex workers frequently facing dilemmas between securing their own safety and maintaining financial income.⁹ In many cases, clients offer higher payment for unprotected sex, creating economic incentives that override health considerations—a phenomenon documented across diverse cultural contexts including China, sub-Saharan Africa, and Southeast Asia. Furthermore, power imbalances in client-sex worker relationships often limit women's ability to negotiate condom use, particularly when economic vulnerability is acute. These structural factors operate alongside individual-level barriers such as inadequate knowledge, misconceptions about STI transmission, and low perceived susceptibility, collectively undermining prevention efforts.

These findings are consistent with previous literature indicating that unsafe sexual behavior and higher frequency of sexual partners are associated with increased STI incidence among at-risk populations.¹⁰ In this study, a statistically significant relationship was observed between condom use and the presence of STI symptoms ($p < 0.05$), with 12 out of 14 symptomatic subjects classified as having poor condom use behavior. This strong statistical association, confirmed through both Chi-square ($p=0.003$) and Fisher's exact test ($p=0.007$), provides robust evidence supporting the protective effect of consistent condom use against STI acquisition in this population. The effect size, while based on a small sample, suggests a substantial risk differential warranting urgent public health attention.

However, several important confounding factors must be considered when interpreting these findings. First, self-report bias may have influenced data quality, as respondents might underreport risky behaviors due to social desirability concerns despite confidentiality assurances. Second, the cross-sectional design precludes establishing temporal causality—while poor condom use is associated with STI symptoms, reverse causation (e.g., STI diagnosis prompting improved condom use) cannot be ruled out. Third, condom availability and quality represent additional unmeasured confounders; even motivated individuals may face structural barriers such as inconsistent condom supply, poor storage conditions affecting product integrity, or access to substandard products. Fourth, partner characteristics—including partner type (regular versus casual clients), partner STI status, and partner willingness to use condoms—likely moderate the relationship between individual condom use intentions and actual STI risk. Finally, other behavioral factors such

as substance use, number of sexual partners, and douching practices may confound the observed associations and warrant investigation in future studies.

Despite these findings, some respondents showed good condom use habits; however, risk of STIs remains due to other factors such as condom quality and individual health conditions. Additionally, the efficacy of condoms in real-world settings depends on correct and consistent use throughout sexual encounters, storage conditions preventing degradation, and absence of product defects—factors beyond individual behavioral control. Individual immune status, pre-existing infections, and biological susceptibility also influence STI acquisition risk independent of condom use, explaining why some individuals with good adherence may still experience infections.

This study emphasizes the importance of comprehensive intervention strategies, including community-based sexual education and increased access to reproductive health services. Effective interventions should adopt multilevel approaches addressing individual knowledge and skills, interpersonal negotiation capacity, community norms, and structural determinants. Evidence-based strategies include peer education programs leveraging trusted community members to disseminate information and model protective behaviors; skills-building workshops focusing on condom negotiation techniques and sexual communication; mobile health services delivering STI screening, treatment, and contraceptive commodities directly to at-risk populations; and economic empowerment initiatives reducing financial vulnerability that drives risky sexual transactions. International best practices, such as the Sonagachi Project in India and the 100% Condom Use Program in Thailand, demonstrate that comprehensive, multi-stakeholder approaches combining health services, community mobilization, and enabling policy environments can achieve substantial reductions in STI prevalence among sex worker populations. Moreover, given that low compliance also increases the risk of HIV/AIDS, preventive measures must address both STIs and HIV simultaneously through a multidisciplinary and collaborative approach involving relevant stakeholders.^{9,11}

Integration with Indonesia's existing public health programs, particularly the National AIDS Control Program and district-level STI management initiatives, is essential for sustainability and scale-up. Policy implications include: (1) strengthening peer education networks through formal recognition and financial support; (2) ensuring free, confidential access to sexual health services including STI screening, treatment, and pre-exposure prophylaxis (PrEP) for HIV; (3) implementing structural interventions such as occupational health and safety regulations for sex work venues; (4) conducting mass media campaigns challenging stigma and promoting condom use norms; and (5) fostering partnerships between health authorities, law enforcement, and community organizations to create enabling environments supporting risk reduction. Such comprehensive strategies, grounded

in human rights principles and informed by local evidence, offer the greatest potential for reducing STI/HIV burden among vulnerable populations in Semarang and similar urban contexts across Indonesia.

CONCLUSION

Compliance with condom use among at-risk populations in Indonesia remains low, with 65% reporting inconsistent use and a clear link between poor condom practices and higher incidence of STI/HIV/AIDS-related symptoms; social and economic pressures from clients and financial needs further undermine adherence. The findings call for comprehensive, multilevel interventions that address both individual behaviors and structural determinants, including expanding access to free condoms and STI services, scaling up peer education, and implementing economic empowerment to reduce vulnerability, all integrated with national HIV/AIDS prevention efforts and community partnerships for sustainable impact. For future research, conduct larger longitudinal cohorts using validated exposure measures to evaluate intervention effectiveness and inform evidence-based STI/HIV prevention strategies in at-risk Indonesian populations.

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