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Research Article

Understanding HIV Risk and Prevention among Female Sex Workers in Urban India: Behavioral Insights from Targeted Public Health Interventions

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Abstract: ***Background:*** In India, HIV remains a concentrated epidemic disproportionately affecting key populations, including female sex workers (FSWs). Urban FSWs face elevated risks due to high client turnover, limited bargaining power, and structural barriers such as stigma, violence, and restricted healthcare access. India's National AIDS Control Programme Phase III (NACP-III), launched in 2007, introduced targeted interventions (TIs) emphasizing peer education, condom distribution, and STI/HIV service linkage to mitigate these risks. ***Objective:*** This study evaluates HIV prevalence, risk behaviors, and the effectiveness of TIs among FSWs in Kolkata, India, during 2010, exploring how behavioral and structural factors shape intervention outcomes. ***Methods:*** A cross-sectional study was conducted from January to August 2010 with 75 FSWs recruited via peer-referral sampling. Data were collected through structured interviews, clinical HIV/STI testing, and program records. Quantitative analysis assessed condom use, service uptake, knowledge levels, and behavioral patterns, with statistical correlations examined using SPSS. ***Results:*** HIV prevalence was 10.7%, with 15% of participants reporting at least one STI. Consistent condom use was high with clients (88%) but significantly lower with regular partners (42.7%). Peer-led interventions improved HIV knowledge (92% correct responses) and health service engagement (70.7% interacted with peer educators). Barriers such as partner refusal, trust in regular partners, and stigma persisted, undermining prevention efforts. ***Conclusion:*** TIs have enhanced awareness and service access among Kolkata's FSWs, but behavioral inconsistencies and systemic inequities limit their impact. Sustainable HIV prevention requires community-driven, behaviorally nuanced interventions addressing stigma, gender dynamics, and structural vulnerabilities.
Keywords: HIV prevention, female sex workers, targeted interventions, condom use, STIs, peer education, urban health, behavioral risk factors, Kolkata, India.

1. INTRODUCTION

1.1 Background and Context

India's HIV epidemic, concentrated among high-risk groups, poses significant public health challenges for female sex workers (FSWs). In 2010, the National AIDS Control Organisation (NACO) estimated 2.4 million people living with HIV, with FSWs, men who have sex with men, and injecting drug users bearing a disproportionate burden (NACO, 2010). FSWs face heightened risks due to occupational factors—high client volumes, economic dependence, and limited negotiation power—compounded by social marginalization, violence, and restricted healthcare access (Gupta *et al*., 2008; Blanchard *et al*., 2005). These vulnerabilities are particularly pronounced in urban settings like Kolkata, a major hub for sex work where diverse FSW populations operate in brothels, streets, and informal networks (Sarkar *et al*., 2006).

Structural barriers, including stigma and discrimination, deter FSWs from seeking timely medical care, while gender power imbalances often prevent consistent condom use, especially with regular or non-paying partners (Singh *et al*., 2009; Beattie *et al*., 2009). Poverty and mobility further exacerbate risks, as FSWs navigate precarious livelihoods and transient client bases (Dandona *et al*., 2006; Shannon *et al*., 2008). The interplay of these factors creates a complex risk environment necessitating targeted, context-specific interventions (Moses *et al*., 2008; Ramesh *et al*., 2008).

1.2 Evolution of India's HIV Response

India's response to HIV has evolved significantly since the epidemic's onset. The National AIDS Control Programme (NACP), launched in 1992, transitioned to its third phase (NACP-III) in 2007, prioritizing high-risk groups through targeted interventions (TIs) (Basu *et al*., 2010). These interventions integrated peer education, condom distribution, STI/HIV testing, and community mobilization, delivered via partnerships with non-governmental organizations (NGOs) and community-

based organizations (CBOs) (Jana *et al*., 2004; Bhave *et al*., 1995). By 2010, TIs reached over 80% of identified FSWs in urban centers, with Kolkata's Sonagachi Project exemplifying community-driven empowerment (Ghosh *et al*., 2007; Jana *et al*., 1998). Such models have demonstrated success in reducing HIV prevalence by fostering collective agency and improving service access (Nagelkerke *et al*., 2002; Steen *et al*., 2006).

1.3 Study Rationale

Despite progress, gaps in HIV prevention persist. While TIs have increased awareness, behavioral change remains uneven, particularly regarding condom use with non-commercial partners and STI service uptake (Panda *et al*., 2011; Gangopadhyay *et al*., 2005). Structural barriers, such as healthcare inaccessibility and societal stigma, continue to undermine intervention efficacy (Chakrapani *et al*., 2007; Go *et al*., 2004). This study, conducted in Kolkata from January to August 2010, examines the behavioral and structural impacts of TIs on FSWs, assessing HIV prevalence, risk behaviors, and intervention outcomes. By identifying successes and shortcomings, it aims to inform policy refinements for sustainable HIV prevention (Rotheram-Borus *et al*., 2009; Shahmanesh *et al*., 2008).

2. OBJECTIVES

This study pursues three primary objectives:

1. To quantify HIV prevalence and associated risk behaviors among FSWs in Kolkata during 2010.
2. To evaluate the effectiveness of NACP-III TIs in improving HIV knowledge, condom use, and health service uptake.
3. To identify persistent behavioral and structural barriers to HIV prevention and propose strategies for addressing them.

3. METHODOLOGY AND MATERIALS

3.1 Study Design and Setting

This cross-sectional study was conducted in Kolkata, a metropolitan city with a well-documented sex work industry. Data collection spanned January to August 2010, coinciding with NACP-III TI scale-up. The study targeted FSWs in urban zones, including Sonagachi, Bowbazar, and Tollygunge, where NGOs facilitated outreach (Jana *et al*., 2004).

3.2 Sampling and Recruitment

A sample of 75 FSWs was recruited using snowball and peer-referral sampling, suitable for hidden populations (Magnani *et al*., 2005). Initial participants were identified through NACO-affiliated NGOs, with referrals expanding the sample.

3.3 Eligibility Criteria

Inclusion Criteria:

- Biologically female, aged ≥18 years.
- Engaged in commercial sex work for ≥6 months.
- Resided and worked in Kolkata's urban zones.
- Provided informed written consent.

Exclusion Criteria:

- Enrolled in concurrent HIV-related studies.
- Receiving treatment for known HIV-positive status.
- Exhibiting cognitive impairment, intoxication, or inability to consent.

3.4 Data Collection

Data were gathered via structured interviews, clinical HIV/STI testing (syphilis, gonorrhea, chlamydia), and NGO program records. Interviews used a pre-tested, Bengali-translated questionnaire covering demographics, sexual behavior, condom use, substance use, knowledge, and service uptake. Testing followed national protocols, with pre- and post-test counseling.

3.5 Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of the Society of Participatory Action and Engagement. Informed consent was secured, anonymity maintained, and participants could withdraw without penalty. Referrals were provided for HIV/STI-positive cases.

3.6 Statistical Analysis

Data were analyzed using SPSS version 17.0. Descriptive statistics summarized demographics and behaviors. Chi-square tests and Pearson's correlations assessed relationships ($p < 0.05$). Visualizations illustrated trends.

4. RESULTS

4.1 Participant Demographics

Participants (N = 75) had a mean age of 29.4 years (SD = 6.2). Most (68%) worked in brothels, 20% on streets, and 12% independently. Over half (52%) had minimal education, and monthly income averaged INR 8,500 (~USD 180 in 2010).

4.2 HIV and STI Prevalence

HIV prevalence was 10.7% (8/75), with 15% reporting at least one STI (Table 1). Syphilis (8%) was most common, followed by gonorrhea (5.3%) and chlamydia (4%).

Table 1: HIV and STI Prevalence (N = 75)

Infection Type	Prevalence (%)	Number Affected
HIV	10.7%	8
Syphilis	8.0%	6
Gonorrhea	5.3%	4
Chlamydia	4.0%	3
Any STI	15.0%	11

4.3 HIV/STI Risk, Awareness, and Service Engagement among Female Sex Workers in Urban India

The data reveals a concerning HIV prevalence rate of 10.7% and an overall STI rate of 15% among female sex workers, with syphilis (8%), gonorrhea (5.3%), and chlamydia (4%) contributing significantly. While condom use is high with clients (88% reporting consistent use), it drops markedly with regular partners (42.7%), influenced by barriers such as partner refusal (44%) and trust in partners (38.7%). Encouragingly, HIV knowledge is strong—92% understand that condoms can prevent HIV, and 78.7% recognize the link between STIs and HIV. Service utilization rates are moderate, with 70.7% having contact with peer educators and 64% having undergone HIV testing, indicating ongoing engagement with prevention and care services. (Table 2)

Table 2: HIV/STI Prevalence, Condom Use, HIV Knowledge, Service Utilization, and Reported Barriers among Female Sex Workers

Category	Variable	Percentage (%)
HIV/STI Prevalence	HIV	10.7
	Any STI	15.0
	└ Syphilis	8.0
	└ Gonorrhea	5.3
	└ Chlamydia	4.0
Condom Use	Consistent use with clients	88.0
	Consistent use with regular partners	42.7
HIV Knowledge	Knew condoms prevent HIV	92.0
	Recognized STI-HIV linkage	78.7
Service Utilization	Contacted peer educators	70.7
	Tested for HIV	64.0
Reported Barriers	Partner refusal	44.0
	Trust in partners	38.7

4.4 Condom Use Patterns

Consistent condom use was 88% with clients, 42.7% with regular partners, and 55% with casual non-paying partners (Table 3).

Table 3: Condom Use Patterns

Partner Type	Consistent Use (%)	Inconsistent Use (%)
Paying Clients	88.0%	12.0%
Regular Partners	42.7%	57.3%
Casual Non-Paying	55.0%	45.0%

4.5 HIV Knowledge

Knowledge was high: 92% recognized condoms' preventive role, 87% needle-sharing risks, 81.3% testing importance, and 78.7% STI-HIV linkages (Table 4).

Table 4: HIV Knowledge Indicators

Indicator	Correct Response Rate (%)
HIV preventable by condom use	92.0%
HIV transmissible via needle-sharing	87.0%
Regular HIV testing important	81.3%
STIs increase HIV risk	78.7%

4.6 Service Utilization

In the prior six months, 64% accessed HIV testing, 48% STI screening/treatment, 70.7% peer educators, and 56% drop-in centers (Table 5). Peer contact correlated with testing ($r = 0.42$, $p < 0.01$).

Table 5: Service Utilization

Service Type	Accessed (%)
HIV Testing	64.0%
STI Screening/Treatment	48.0%
Peer Educator Contact	70.7%
Drop-In Center Visit	56.0%

4.7 Barriers to Prevention

Barriers included partner refusal (44%), trust in regular partners (38.7%), condom unavailability (12%), and intoxication (18.7%) (Table 6). Stigma deterred 30% from STI care.

Table 6: Barriers to Condom Use

Barrier	Reported by (%)
Partner refusal	44.0%
Trust in regular partners	38.7%
Lack of availability	12.0%
Intoxication during intercourse	18.7%

4.8 Visualizations

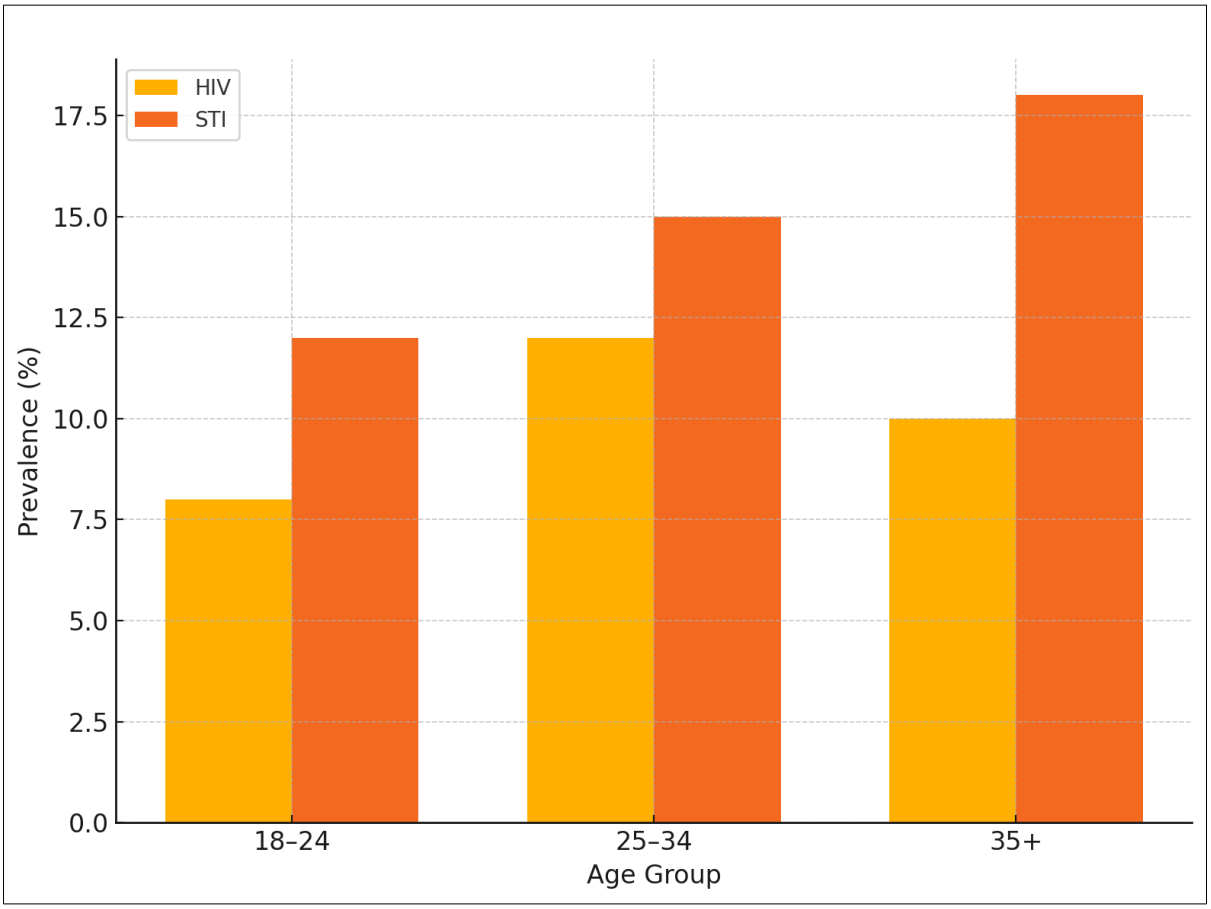

Figure 1: HIV and STI Prevalence by Age Group

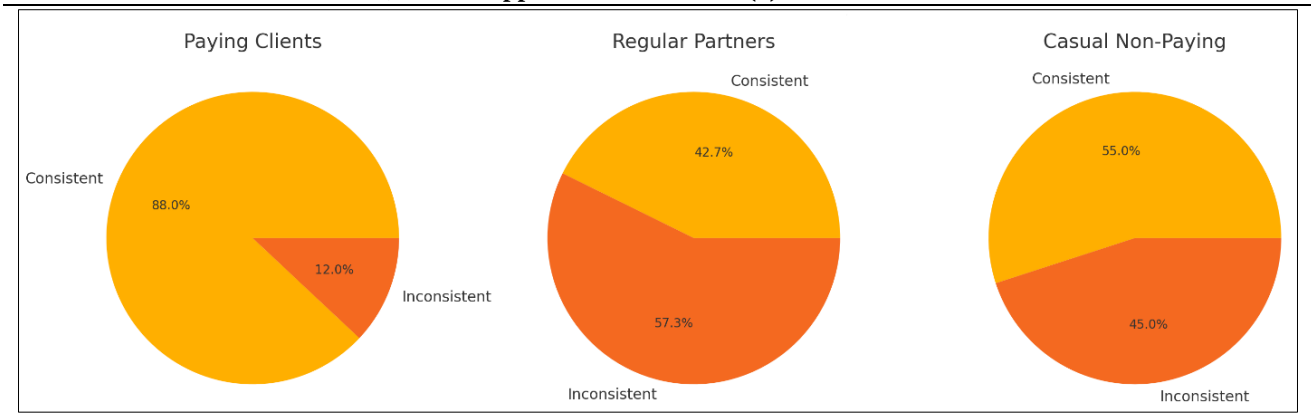

Figure 2. Condom Use Consistency Across Partner Types

5. DISCUSSION

5.1 Key Findings in Context

The 10.7% HIV prevalence aligns with NACO's 2010 estimates (5-12%) for urban FSWs, reflecting their disproportionate risk (NACO, 2010; Alary *et al*., 2004). High client condom use (88%) demonstrates TI efficacy, consistent with declines in HIV/STI rates in southern India (Reza-Paul *et al*., 2008; Kumar *et al*., 2006). However, low regular partner condom use (42.7%) highlights a persistent vulnerability driven by trust and power imbalances, a pattern observed across Asia (Wiwattanacheewin *et al*., 2004; Lau *et al*., 2007). Knowledge levels (>80%) indicate successful peer education, though gaps in STI-HIV linkage awareness (78.7%) suggest targeted needs (Brahmam *et al*., 2008; Medhi *et al*., 2006).

Moderate service uptake (64% testing, 48% STI care) reflects structural barriers—stigma, clinic inaccessibility, and discrimination—echoing findings in Mumbai and Chennai (Chakrapani *et al*., 2007; Shinde *et al*., 2009). Peer educators' role in bridging these gaps (70.7% contact) underscores community-based models' value, as seen in Sonagachi (Jana *et al*., 2004; Cornish *et al*., 2006).

5.2 Behavioral and Structural Barriers

Low condom use with regular partners stems from emotional trust and gender norms, limiting intervention impact (Swendeman *et al*., 2009; Wong *et al*., 2008). Partner refusal (44%) and intoxication (18.7%) further complicate negotiation, exacerbated by economic dependence (O'Neil *et al*., 2004; Panchanadeswaran *et al*., 2008). Stigma and clinic inaccessibility deterred STI care, consistent with global FSW studies (Halli *et al*., 2006; Hong *et al*., 2007). These barriers highlight the need for interventions addressing social determinants like poverty and violence (Asthana *et al*., 1996; Varghese *et al*., 2002).

5.3 Strengths of TIs

Peer-led TIs, with 70.7% engagement, fostered trust and service linkage, building on Sonagachi's empowerment model (Jana *et al*., 1998; Laga *et al*., 1994). Drop-in centers (56% visits) provided safe spaces, reducing isolation (Ghose *et al*., 2008; Tucker *et al*., 2009). These strengths align with successful interventions in Thailand and Bangladesh (Rojanapithayakorn *et al*., 1996; Jenkins *et al*., 2003).

5.4 Comparison with Regional Studies

Kolkata's TIs show stronger peer engagement than Mumbai's but similar regular partner challenges (Dandona *et al*., 2005; Solomon *et al*., 2008). Southern states' decentralized health systems yield higher STI uptake (~60%), suggesting localized models for Kolkata (Reza-Paul *et al*., 2008; Kumar *et al*., 2006). Globally, Thailand's condom campaigns highlight client-focused success but limited non-commercial applicability (Lowndes *et al*., 2003).

5.5 Policy Implications

Interventions must:

1. Target regular partners via couple counseling (Wiwattanacheewin *et al*., 2004).
2. Enhance access with mobile clinics and stigma training (Chakrapani *et al*., 2007).
3. Scale peer networks (Jana *et al*., 2004).
4. Address inequities through legal and economic support (Gupta *et al*., 2008; O'Neil *et al*., 2004).

6. LIMITATIONS

The cross-sectional design limits causality inference, and the small sample (N = 75) may not generalize. Snowball sampling risks selection bias, potentially inflating positive behaviors (Magnani *et al*., 2005). Self-reports are prone to recall and desirability biases, and voluntary testing may miss cases (Cornish *et al*., 2006).

While this study provides valuable insights into HIV risk behaviors and the impact of targeted interventions among female sex workers (FSWs) in Kolkata, several limitations should be acknowledged. First, the use of a cross-sectional design limits the ability to establish causal relationships between intervention exposure and behavior change. The data capture only a single point in time and cannot account for behavioral variations or changes in health status over the longer term.

Second, the relatively small sample size (N = 75) and the use of non-probability sampling techniques such as snowball and peer referral may limit the generalizability of the findings. Participants may have been more engaged with services or more open to discussing their experiences than the broader FSW population, introducing potential selection bias. This could result in an overestimation of positive behaviors such as condom use or service utilization.

Third, the study relies heavily on self-reported data, which is subject to recall bias and social desirability bias. Participants may have underreported stigmatized behaviors, such as inconsistent condom use or substance abuse, and overreported socially accepted behaviors, like contact with peer educators or frequency of HIV testing. Additionally, logistical constraints and ethical considerations limited the inclusion of more comprehensive clinical assessments or in-depth qualitative interviews that might have enriched the contextual understanding of risk behaviors. Future studies with larger, more diverse samples and longitudinal follow-up are recommended to build on these findings.

7. CONCLUSION AND RECOMMENDATIONS

This study demonstrates that targeted public health interventions have positively influenced HIV awareness and service linkage among FSWs in Kolkata. Yet, significant behavioral and structural barriers persist, particularly in the context of condom use with regular partners and consistent STI care. To achieve sustainable reductions in HIV vulnerability, programs must evolve beyond awareness-building to embrace community-led strategies that tackle the root causes of risk—including stigma, relationship power dynamics, and healthcare accessibility. Long-term success depends on continued investment in inclusive, peer-supported models that empower FSWs as agents of change in their own health journeys.

Strengthening the structural and social support systems surrounding FSWs is imperative to the success of future HIV prevention efforts. Interventions must extend their scope beyond clinical services to address the intersecting challenges of poverty, housing insecurity, gender-based violence, and legal marginalization that often limit FSWs' ability to consistently engage with healthcare. Programs that incorporate legal literacy, psychosocial counseling, financial empowerment, and community mobilization have demonstrated increased resilience and collective agency among sex workers in earlier interventions such as the Sonagachi Project (Jana *et al*., 2004). Ensuring that FSWs are not merely passive recipients but active stakeholders in intervention design and delivery is vital for creating responsive and sustainable public health strategies.

Moreover, the findings underscore the urgency of customizing interventions to address varying partner dynamics. The stark difference in condom use between paying clients and regular or emotional partners suggests a behavioral blind spot that current interventions have yet to fully overcome. Culturally sensitive communication tools, couple-based counseling, and relationship-focused education could play a critical role in bridging this gap. As HIV prevention efforts continue to evolve, adopting a nuanced, behaviorally informed framework—grounded in community realities and co-created with FSWs themselves—will be essential to reducing transmission risks and advancing sexual and reproductive health equity in India's urban contexts. Stakeholder inclusion, particularly the meaningful involvement of FSWs in program design and implementation, remains vital for achieving equitable, sustainable health outcomes

7.1 Summary of Findings

NACP-III TIs achieved high knowledge (92%), client condom use (88%), and peer engagement (70.7%), but the 10.7% HIV prevalence and low regular partner condom use (42.7%) highlight gaps. Behavioral trust and structural barriers like stigma limit outcomes (Swendeman *et al*., 2009; Hong *et al*., 2007).

7.2 Recommendations

1. Develop partner-focused education (Lau *et al*., 2007).
2. Expand access via mobile units (Chakrapani *et al*., 2007).
3. Strengthen FSW-led models (Jana *et al*., 1998).
4. Integrate legal and economic empowerment (O'Neil *et al*., 2004; Panchanadeswaran *et al*., 2008).

7.3 Future Research

Longitudinal studies and qualitative insights into partner dynamics are needed (Shahmanesh *et al*., 2008; Ghose *et al*., 2008). Comparative urban-rural analyses could clarify contexts (Halli *et al*., 2006).

7.4 Broader Implications

Sustainable HIV prevention requires empowering FSWs as stakeholders, addressing stigma, poverty, and violence to foster resilient communities (Gupta *et al*., 2008; Asthana *et al*., 1996; Varghese *et al*., 2002).

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