Social and Structural Drivers of HIV Risk among High-Risk Populations in Aizawl City, Mizoram

Abstract

This study investigates the social and structural drivers shaping HIV risk among high-risk populations (HRGs)—Injecting Drug Users (IDUs) and Female Sex Workers (FSWs)—in Aizawl City, Mizoram, the epicentre of India's HIV epidemic. While behavioural factors remain important, the research emphasizes the wider social, economic, and spatial conditions that frame vulnerability and constrain prevention efforts. A cross-sectional descriptive study was conducted among 354 IDUs and 22 FSWs during 2021 through Targeted Intervention (TI) programmes using a semi-structured questionnaire. Data were analyzed through both descriptive statistics and thematic interpretation to understand the intersection of structural and behavioural risk factors.

Findings reveal that HIV vulnerability in Aizawl is deeply embedded in socioeconomic marginalization, housing instability, and limited access to harm reduction services. IDUs are predominantly young males engaged in poly-substance use and risky injecting practices driven by withdrawal symptoms, syringe scarcity, and fear of policing. FSWs, mostly young and married, face heightened HIV prevalence due to inconsistent condom use, economic dependency, and concealed sex work within domestic spaces. Structural constraints such as criminalization, stigma, and spatial exclusion—particularly in neighborhoods like Dawrpui and Venghlui—create 'spaces of risk' that perpetuate the epidemic. The study underscores the need for spatially sensitive interventions that integrate social protection, harm reduction, and gender-responsive approaches into HIV prevention strategies in Mizoram.

Keywords: HIV, Injecting Drug Users, Female Sex Workers, Social Determinants, Structural Vulnerability, Aizawl City, Mizoram

Introduction

The HIV epidemic in India continues to exhibit significant geographic and population-level disparities. Among these, the northeastern state of Mizoram has emerged as the epicentre of India's HIV crisis, recording an adult prevalence rate far above the national average. According to the National AIDS Control Organisation (NACO, 2023), Aizawl District reports the highest HIV adult prevalence rate in the country at 3.93 percent, with over 12,000 people

living with HIV. This growing public health concern is shaped not only by behavioural factors but also by the complex interplay of social, economic, and spatial determinants.

In Aizawl City, the context of HIV vulnerability is deeply rooted in the city's social fabric, economic marginalization, and spatial patterns of risk. IDUs and FSWs represent overlapping yet distinct populations; both shaped by poverty, stigma, limited access to healthcare, and criminalization. Substance use, particularly heroin injection, has long been associated with HIV transmission through needle sharing, while FSWs face dual risks from both unsafe sexual practices and, in some cases, concurrent substance use. The structural environment, marked by housing instability, unemployment, and community policing practices—further constrains harm reduction efforts, making prevention and treatment outreach more challenging.

Understanding the socio-demographic characteristics and behavioral patterns of these high-risk populations is therefore essential for effective HIV intervention and policy planning in Mizoram. This study examines the socio-economic profile, substance use behavior, and risk practices of IDUs and FSWs in Aizawl City. By highlighting how social and structural vulnerabilities shape individual risk behaviors, the paper aims to contribute to a more context-specific understanding of HIV transmission dynamics in one of India's most affected urban settings.

Literature Review

Drug use and HIV vulnerability are shaped not merely by individual behavior but by the social and spatial contexts in which users operate. Epstein et al. (2014) demonstrated that variations in drug-use risk behaviours are more strongly influenced by social dynamics than by the physical environment. Latkin et al. (1994) similarly found that injecting drugs with others increases the frequency of syringe sharing, while hygienic practices such as cleaning syringes tend to decrease under social pressure. Semi-public injection settings—such as friends' residences—often lack the privacy or resources necessary for safe injection, making it difficult to refuse sharing or maintain sterile practices.

Social networks play a central role in shaping these behaviors. De et al. (2007) emphasized that syringe-sharing practices are closely tied to network size, density, and composition, including members' age, gender, and relationship quality. Substance users are also more likely to associate with others who use drugs—up to 16 times more likely than non-users (Mason et al., 2004). Early initiation of substance use, particularly during adolescence, often

reflects family influence, peer norms, and social environment rather than purely individual choice (Valente, 2003).

Mobility further intensifies risk. Mobile IDUs frequently engage in poly-substance use and exhibit higher rates of risky injecting due to the instability of their living and social conditions (Hahn et al., 2008). Their environments are shaped by overlapping social, economic, and political inequalities—such as unemployment, housing insecurity, and punitive drug policies—that collectively heighten vulnerability to HIV.

Structural and cultural factors also constrain access to harm reduction services. Stigma and moral judgments surrounding drug use influence policies and limit the geographical reach of interventions like needle exchange programs (Tempalski & McQuie, 2009). Within social networks, trust may paradoxically encourage syringe sharing among close peers, while individuals embedded in unsupportive or fragmented networks often inject in public or commercial spaces, increasing exposure to infection (Suh et al., 1997). Despite being aware of the risks, many continue to inject publicly due to homelessness, lack of private space, or social exclusion (Nelson, 2020). These overlapping vulnerabilities highlight the importance of interventions that address not only individual behavior but also the social-structural conditions of drug use.

Neighborhood deprivation and spatial marginality further compound the problem. Poor living environments negatively affect the mental health of substance users, often reinforcing high-risk injecting behaviors (Chaix et al., 2005). Street-based injectors, in particular, face greater health complications and higher rates of overdose due to frequent injecting in unsafe public spaces such as streets, toilets, or parks (Darke et al., 2001). In such contexts, even minor behavioral shifts can significantly influence the trajectory of HIV transmission (Kawa-Cuadros et al., 2013).

Regional evidence underscores these dynamics in Mizoram, the epicentre of India's drug-driven HIV epidemic. Spatial mapping across the Northeast identified Mizoram, along with Manipur and Nagaland, as having the highest concentration of IDU congregation sites—often in abandoned buildings, graveyards, and riversides—illustrating how social exclusion and spatial marginality converge (Medhi et al., 2011). Mizoram's IDU population is also the youngest in India, with early initiation into drug use (mean age 17.8 years) and injection (20 years), and nearly one-third starting directly with injection (Biswas et al., 2020a). Recent studies show an HIV prevalence exceeding 19 percent among people who inject drugs, driven

by group injecting, use of common containers, and limited syringe access despite extensive Targeted Intervention (TI) coverage (Pachuau et al., 2023).

Furthermore, both IDUs and female sex workers (FSWs) in Mizoram face compounded risks stemming from criminalization, economic precarity, and social stigma, which contribute to unsafe injection practices and inconsistent condom use (Biswas et al., 2020a, 2020b). Notably, home-based FSWs exhibit higher HIV prevalence than non-home-based workers, revealing how domestic and occupational spaces intersect to create overlapping risk environments. Collectively, these findings demonstrate that HIV vulnerability is not merely a function of behavior but is embedded in the spatial and social fabric of everyday life—produced through exclusion, marginality, and structural inequality

Methodology

This study was designed as a cross-sectional descriptive investigation conducted in Aizawl City during 2021, following ethical approval from the Mizoram State AIDS Control Society (MSACS). Verbal informed consent was obtained from all participants after explaining the purpose, procedure, and confidentiality of the study. No personal identifiers were recorded to ensure anonymity. The research was carried out over a period of ten months in collaboration with Targeted Intervention (TI) programs, which facilitated access to participants and provided safe spaces for data collection.

Two high-risk groups (HRGs)—Injecting Drug Users (IDU) and Female Sex Workers (FSW)—were selected due to their high vulnerability to HIV and their central role in the city's epidemic dynamics. Using a semi-structured questionnaire, data were collected from 354 IDUs and 22 FSWs through face-to-face interviews conducted in the Mizo language by trained field investigators. The questionnaire included sections on socio-demographics, substance use, sexual behavior, housing and mobility, healthcare access, and experiences of stigma. The small FSW sample reflected both their lower representation in TI records and the challenges of reaching this hidden population due to stigma and concealment.

Data were analyzed using a descriptive and comparative approach to identify key patterns in socio-demographic and behavioral characteristics. Quantitative data were summarized in frequencies and percentages, while open-ended responses were examined through thematic analysis to capture the social and behavioral contexts of HIV vulnerability. This combined approach allowed for a nuanced understanding of how structural and individual factors intersected to shape HIV risk among HRGs in Aizawl

Study Area

Aizawl City, the capital of Mizoram, is situated in the north-eastern region of India between 23°39'52"–23°48'43" N latitudes and 92°39'49"–92°46'39" E longitudes. Perched at an elevation of about 1,132 metres above sea level, Aizawl lies on a series of steep ridges and hilltops, offering a unique topography dominated by rugged terrain and narrow valleys.

Administratively, Mizoram is divided into 11 districts, with Aizawl serving as both the political and economic centre of the state. The state shares an international boundary of 510 km with Myanmar to the east and south and 318 km with Bangladesh to the west, while bordering the Indian states of Manipur, Assam, and Tripura. Aizawl is connected to other parts of Mizoram and the region primarily by National Highway 6 and serves as the main hub for governance, commerce, education, and healthcare.

According to the Census of India (2011), Aizawl district had a population of approximately 400,309, with a high literacy rate of over 97%, one of the highest in India. Most of the population belongs to various Mizo tribes, and the dominant language spoken is Mizo (Lusei dialect). Christianity is the predominant religion, deeply influencing the city's social and cultural life.

The urban morphology of Aizawl reflects a linear growth pattern along the ridge lines, constrained by its hilly terrain. Such physical and infrastructural limitations have influenced patterns of mobility, residential clustering, and accessibility to services. The city also accommodates a mix of formal and informal settlements, reflecting growing urbanization and rural-to-urban migration trends.

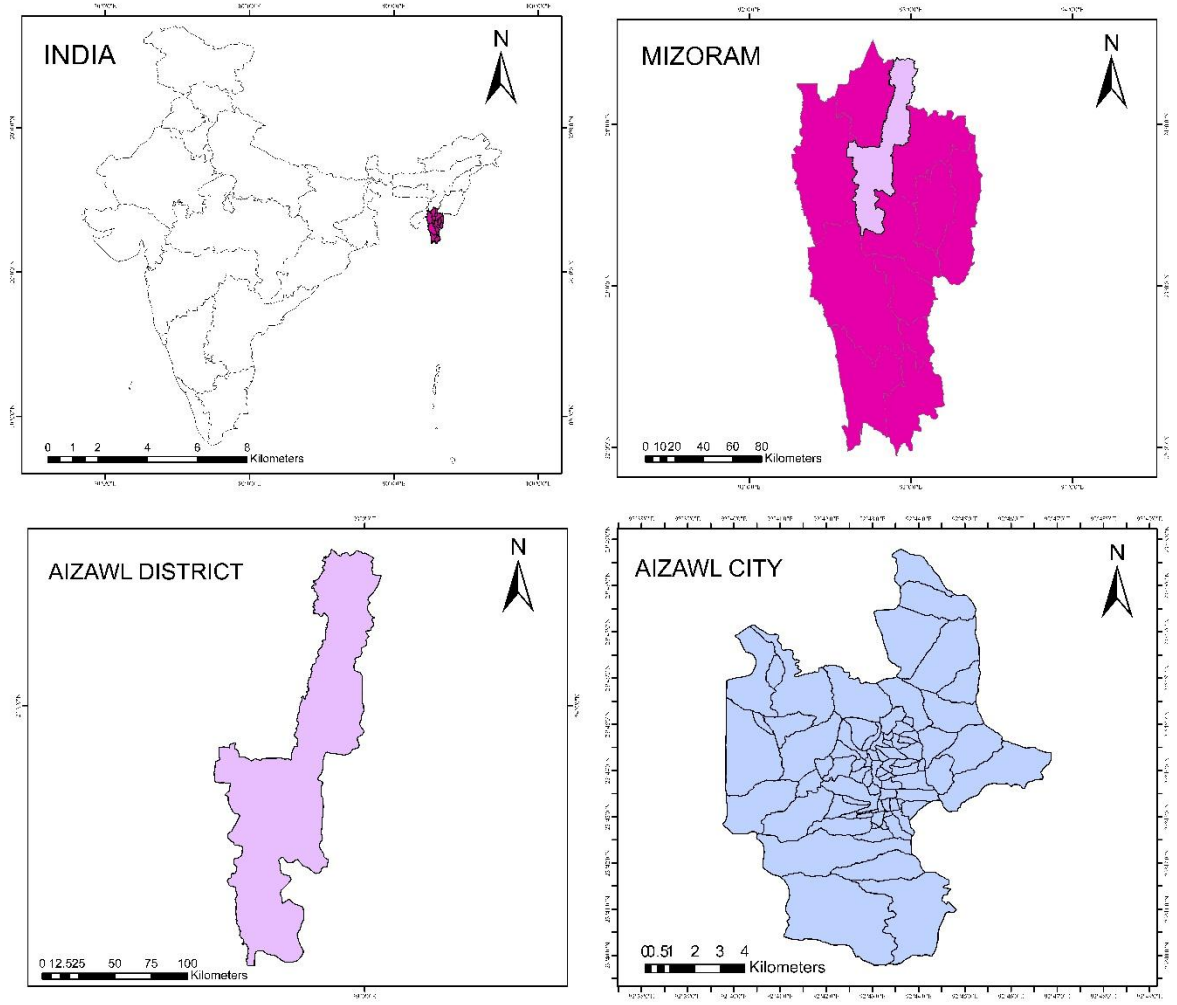

Figure 1 Study area map

HIV in Aizawl City

Aizawl District reports the highest HIV adult prevalence rate in the nation—3.93%, with 12,150 persons living with HIV (PLHIV), and 554 new HIV infections in a single year, according to the latest 2023 NACO report. The district also has the second-highest incidence rate, at 1.38 per 1,000 uninfected persons. These figures highlight Aizawl's critical position in India's HIV landscape.

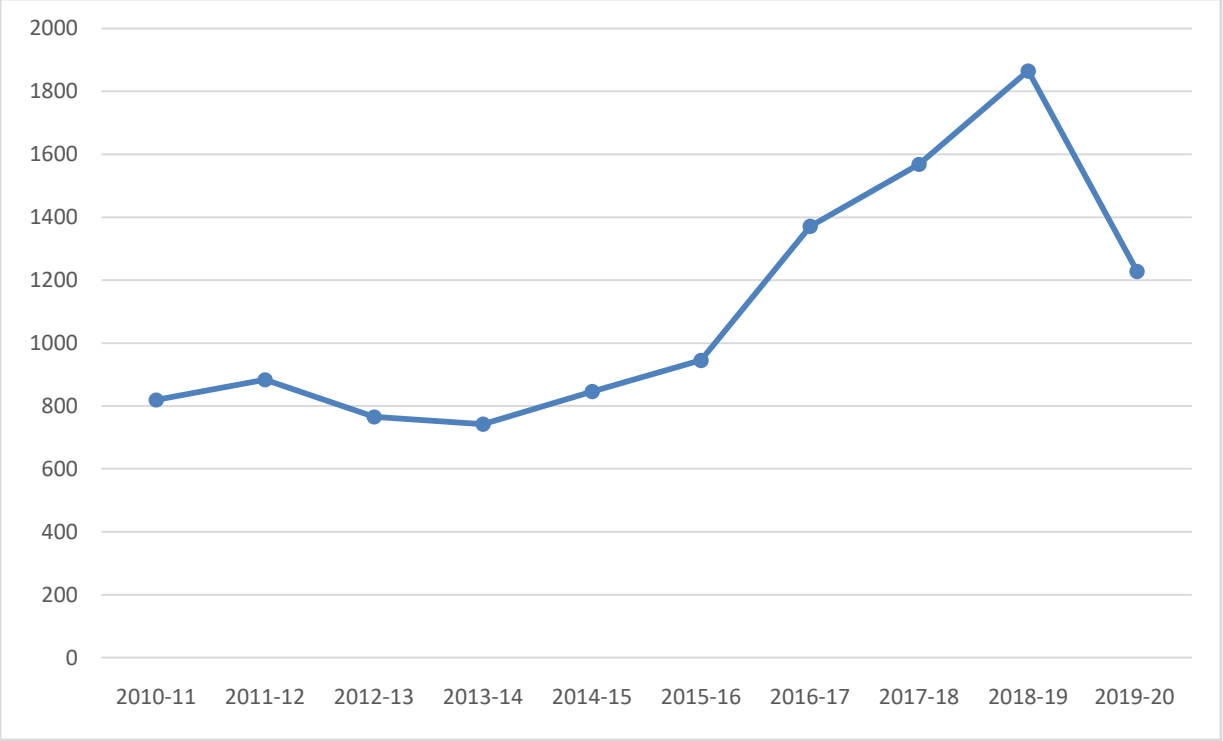

Figure 2 Trend of HIV positive in Aizawl City from 2010 to 2020.

Source: Mizoram State AIDS Control Society, 2020

Trends of HIV infection (Figure 1.3) reveal a steady increase in new cases between 2014 and 2019, reaching a peak in 2018–2019. The sharp increase during this period may be linked to multiple reasons, such as increasing HIV testing, high urban migration, and an increase in the trend of high-risk behaviors. The drop during 2019-2020 may be attributed to reduced testing and outreach programmes during the COVID-19 pandemic.

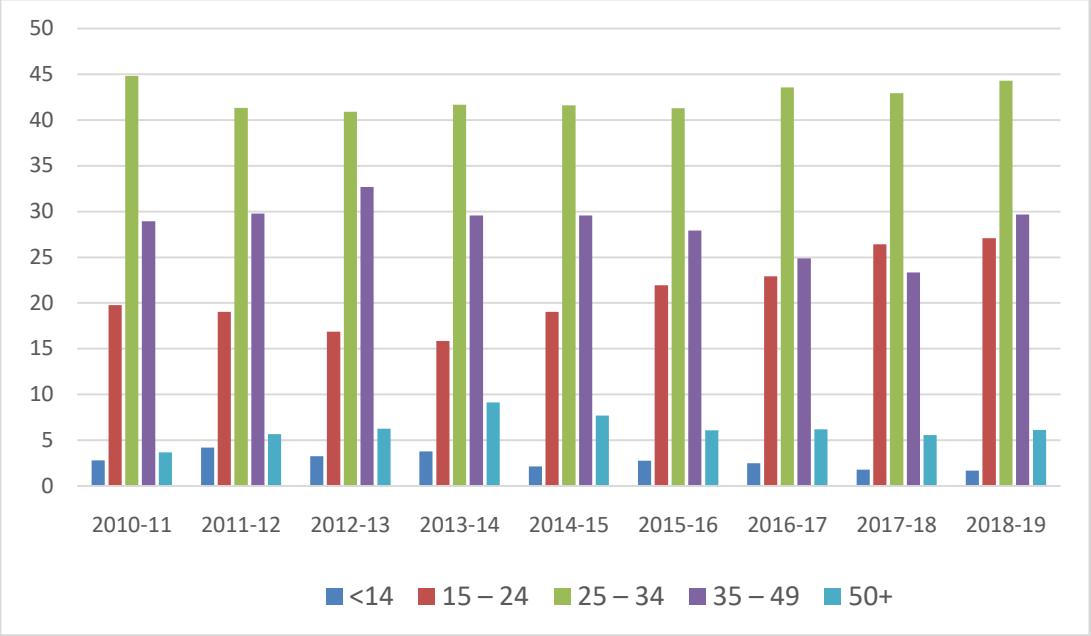

Figure 3 Percentage of age-group-wise HIV positives in Aizawl, 2020.

Source: Mizoram State AIDS Control Society, 2020.

Age distribution (Figure 1.4) indicates that the age group of 25-34 has the highest number of HIV positives, followed by the age groups of 35-49 and 15-24. The lowest prevalence is observed among children below 14 and individuals above 50 years. This distribution aligns with national and regional trends, indicating that young and economically active adults are the most affected demographic.

Analysis

Socio-demography of high-risk groups

Socioeconomic Status is a crucial determinant of the health, awareness of the disease, and risk behaviours of high-risk groups, regardless of drug usage from various social strata. (Galea &Vlahov, 2002). Social determinants such as income, employment, housing, education, cultural norms, and social networks shape the living conditions and resources available to individuals, intensifying disparities in behaviour and environments of drug use. These factors culminate in heightened HIV vulnerability. Ngigi (2007) further argues that cultural expectations and family background influence how individuals interact with their environment, embedding risk behaviors into spatial practices. In the context of Aizawl, these determinants manifest in complex ways among Injecting Drug Users (IDU) and Female Sex Workers (FSW).

Table 1 Gender distribution of HRG

Sex	IDU	FSW
Female	5.37	0
Male	94.63	100

Source: Primary Survey, 2021

The data reveal that IDUs are overwhelmingly male (94.63%), with women comprising only a small minority (5.37%). Women IDUs, although having a separate NGO for them, are distributed in small numbers across other IDU NGOs.

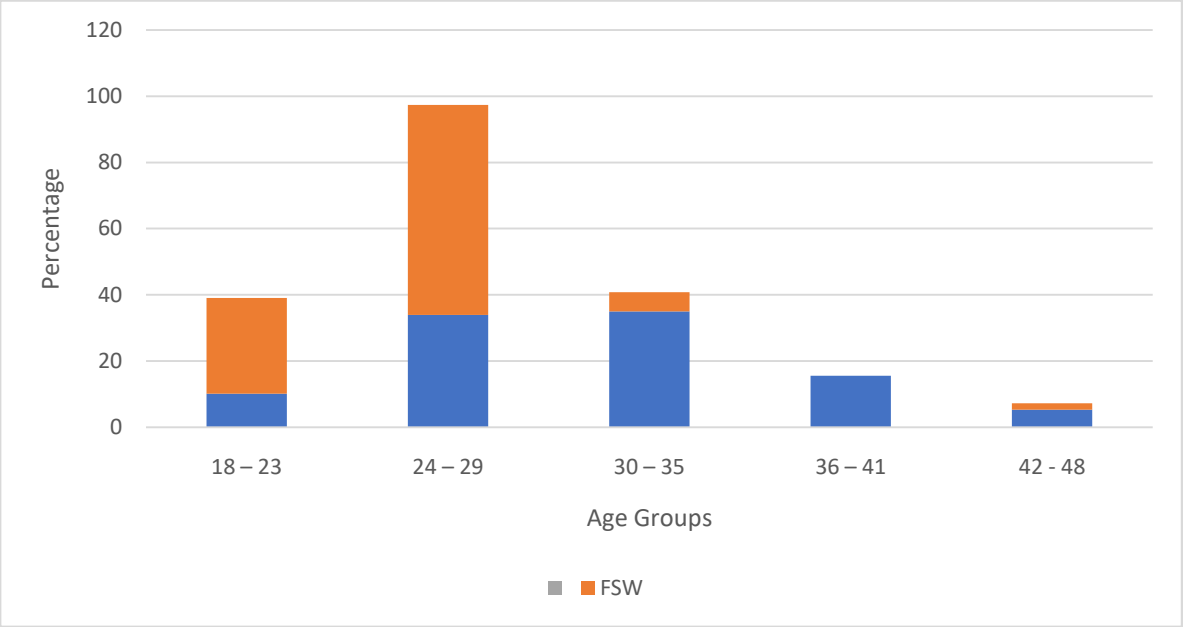

Figure 4 Age Distribution of HRG

Source: Primary Survey, 2021

The surveyed population is relatively young, with a significant proportion falling into the age groups 24-29 and 30-35, reflecting a demographic in their socially and sexually active years.

Among IDUs, the distribution is relatively spread across age categories, with the largest share in the 30–35 age group (35.03%), followed closely by the 24–29 age group (33.90%). Notably, a significant proportion continues into later stages, with 15.54% in the 36–41 bracket and 5.36% in 42–48. This pattern indicates a tendency for drug use to persist into older ages compared to the other groups.

In contrast, FSWs are heavily concentrated in the younger age groups. More than 63% fall within 24–29 years, and 28.85% are in 18–23, together accounting for over 90% of the total. Beyond the age of 30, participation drops sharply, with only 5.77% in 30–35 and negligible representation after 36. This highlights a distinctly young age profile, with very limited continuation into later years.

Marital status also plays a complex role. Kwena et al. (2019) argue that reducing extramarital sexual encounters is crucial to comprehensive HIV prevention, particularly in high-risk populations where family life and risk behaviors may coexist. While married individuals generally exhibit a lower likelihood of HIV infection, the presence of extramarital sexual partnerships significantly undermines this protection.

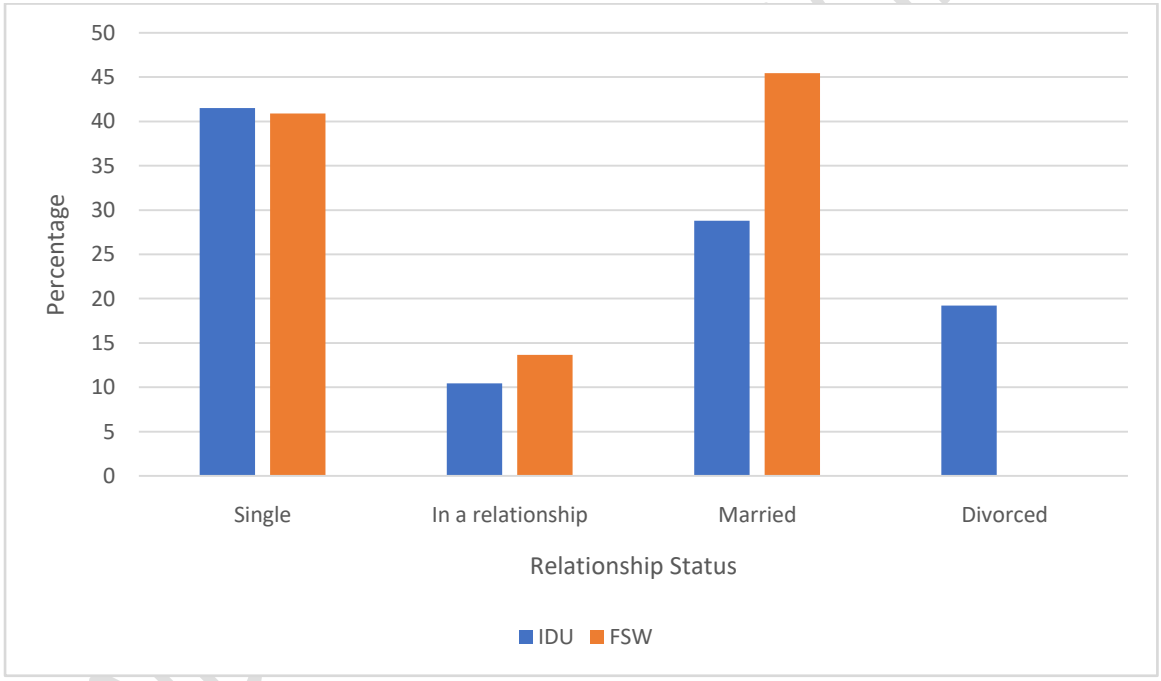

Figure5 Relationship status of HRG

Source: Primary Survey, 2021

A large proportion of IDUs (41.52%) are single, while most FSWs (45.46%) are married. The percentage of divorcees in IDUs (19.22%) may indicate social disruption or instability linked to drug use. There was no record of marriage and divorce in MSMs. FSWs' mixed profile of married, single, and in a relationship indicates a complex interplay between sex work and family life overplay probably due to economic necessity.

Table 2 Education level of HRG.

Highest Educational level attained	IDU	FSW
Primary	1.13	0
Middle	13.84	31.82
High School	40.96	50.00
Higher	28.54	18.18
UG	14.68	0
PG	0.85	0
Dropout	62.71	86.36
Currently Enrolled	1.41	0

Source: Primary Survey, 2021

High school is the most common educational level across all groups: IDU (40.96%), and FSW (50%). IDUS shows the highest proportion of higher education (UG and PG), whereas this is not the case with FSWs. FSWS reflects the lowest educational attainment overall, with the majority in middle school and high school.

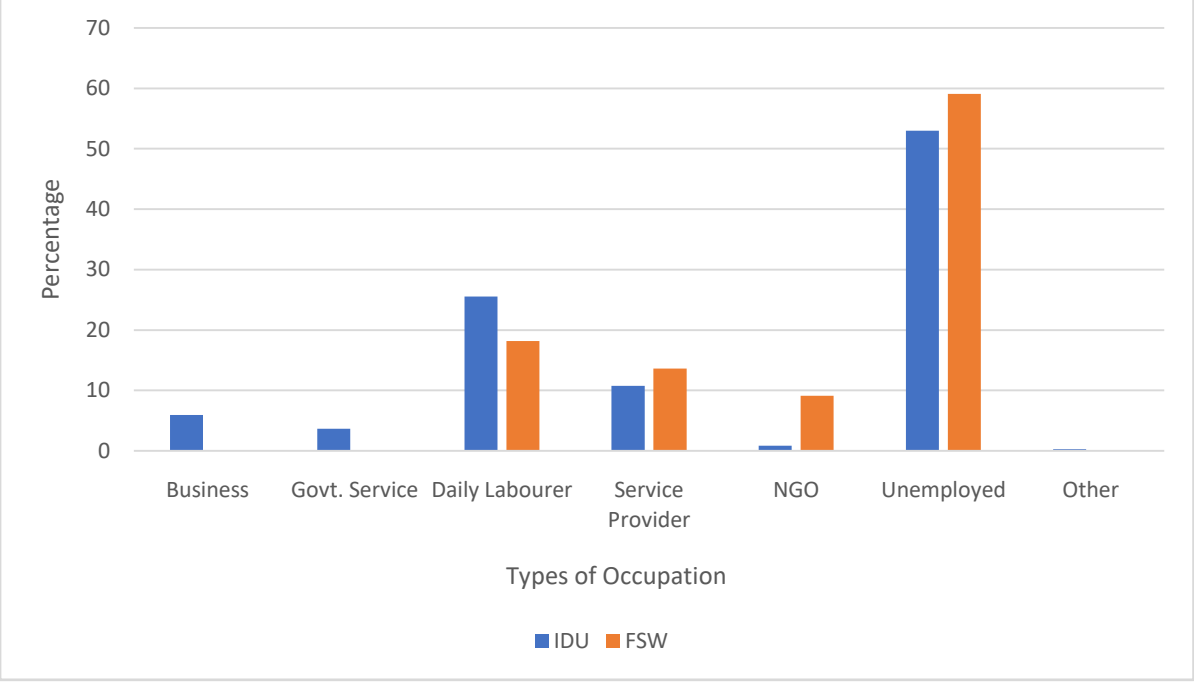

Figure 6 Occupation status of HRG

Source: Primary Survey, 2021

Employment status reflects sharp inequalities. IDUs (52.97%) and FSWs (59.09%) is predominantly higher. Daily labor is a prominent occupation for IDUs (25.54%) and FSWs (18.18%), indicating engagement in unskilled or low-income work. It may also be attributed to the flexibility and informal nature of such work, which allows individuals to earn income on a day-to-day basis without long-term commitment or fixed schedules.

For many, labor work structure aligns with the realities of drug use or sex work, where time and physical condition may vary unpredictably. Daily wage labor provides the option to work when needed for immediate financial needs, meanwhile allowing them to disengage without penalty when experiencing withdrawal, health issues, or needing to prioritize sex work engagements. Moreover, this sector may offer less scrutiny and more accessibility to socially marginalized individuals who may face exclusion or discrimination from formal employment due to stigma, health status, or lack of educational qualifications.

Secure living conditions are an important factor for HRGs to avoid HIV risk behavior. Housing instability and living conditions may also increase exposure to unsafe environments. The following section outlines the living conditions experienced by HRG members during the past six months, providing insights into the structural factors that influence their risk landscape.

Table 3 Indicators of Housing and Social Vulnerability among High-Risk Groups

HRG	% of shifting homes	% of individuals living without family
IDU	10.45	3.67
FSW	13.63	0

Source: Primary Survey, 2021

Residential instability differs across groups. IDUs, while often facing relational instability through divorce, show relatively stable housing, with only 10.45% shifting homes. FSWs, meanwhile, overwhelmingly live with families, concealing their work and navigating secrecy to balance family roles with sex work.

Substance Use Profiles among High-Risk Groups

A study made by the National Survey on Drug Use and Health (2007), indicated that the type of drug used varies from race/ethnicity, time, geographical locations, gender, age group, and the injecting and non-injecting groups. Substance abuse plays an enormous role in the lives of HRG. Especially among heroin users, the drug commands the daily life of the user. Table 3.5 represents the type of substance abused by the HRGs.

Table 4 Substance Use Profiles and Poly-Substance Abuse among Key Populations.

Substance abuse	IDU	FSW
Alcohol only	0	**40.91**
Pills only	0	0
Heroin only	**28.81**	**18.18**
Heroin and Alcohol	**19.77**	**22.73**
Heroin and Inhalants/Marijuana	7.91	0
Heroin and Pills	**18.08**	4.54
Pills/Marijuana w/wo alcohol	0	0
Alcohol, Heroin, Inhalants/Marijuana/Pills	**25.43**	**9.1**
No Substance abuse	**0**	**4.54**
Multiple Substance abuse	**71.19**	**40.91**
Single Substance abuse	**28.81**	**59.09**

Source: Primary Survey, 2021

Among the HRGs, except for the use of heroin among IDU, alcohol is the most common substance abused, followed by Pills. Pills include prescribed medicines such as Alprazolam, Pregabalin, Mahagaba M, Cyclopam, Nap 10, Tramadol, etc. Alprazolam is a sleeping pill commonly known as AP among regular users. It is the most popular pill consumed. Among HRGs, IDUs have the highest percentage of multiple drug abuse.

Among IDU and FSW, the concurrent use of heroin with alcohol and pills seems to be a common practice. IDU exhibits the highest prevalence of multiple substance abuse and the lowest incidence of single substance abuse. However, the identity of IDU is rooted in substance misuse, and due to the pronounced effects of heroin injection, they often resort to

any intoxicating substance during periods of heroin scarcity. This elucidates the elevated prevalence of multi-drug usage among intravenous drug users (IDUs). Female sex workers who use heroin exhibit comparable characteristics to IDUs.

Out of the multiple drug users, many participants reported having used multiple drugs to prolong their 'time of high'. When inquired why IDUs are most prone to multiple drug use, many refer to the adulteration of heroin in Mizoram, which cannot suffice the needs of IDUs.

Syringe Use Patterns and Risk Practices among IDUs and FSWs

An insulin syringe is the primary instrument for an injecting drug user. The absence of it increases the likelihood of transmitting infections such as HIV and hepatitis. TIs administer syringe exchange programs. Injecting drug users indicate the quantity of insulin syringes required weekly, and they receive the specified amount. The workers of TI will collect these used syringes for appropriate disposal. However, it is observed that frequently this syringe exchange program cannot be implemented effectively due to the high mobility of injection drug users (IDUs), which complicates tracking efforts, and the disproportionate ratio of IDUs to workers, rendering it unfeasible for a single person to manage numerous IDUs. Table 3.8 shows the state of syringe use in the lives of IDUs and FSWs.

Table 5 Syringe Access, Sources, and Sharing Practices among High-Risk Groups (IDU and FSW) in percentage

HRG	Reported lacking Syringes	Place of getting syringes	Shared syringes
IDU	23.23	48.65 - both from TI and buy syringes 32.24 - buy their syringes 17.43 - received from TI 1.68 - old and used syringes from roadsides.	36.45
FSW	40	70 - buy their syringes 30 - received from TI	66.66

Source: Primary Survey, 2021

TIs distribute insulin syringes, but this does not meet the required needs of many. In addition, many of them buy extras from pharmacies. Half of them have faced trouble while buying

syringes; some shopkeepers would not allow them to purchase syringes if they are suspicious of the customers being heroin users. Localities where these are encountered are Bawngkawn, Khatla, Vaivakawn, Bazar, and Dawrpui. 46% of IDU and 50% of FSW have been caught because of carrying syringes alone. 51.5% have been detained by SRS, YMA, and the Police because of carrying a syringe, for being IDU/FSW, usually by '*Khawm Case'*, where every person located in hotspots is taken in custody by the police. The consequences for possessing a syringe include physical assault in some cases or deportation to rehabilitation homes.

The majority of heroin users reuse their syringes after rinsing them with water. In localities like Edenthar and Rangvamual, respondents have shared their view that they have shared their cleaned syringe after waiting for 3 to 6 seconds despite being HIV positive. They believe that the brief waiting period could kill the virus after rinsing it with water. The main reasons for sharing used syringes are the awareness of the partner's HIV-positive status and the insistence of the other individual to share the syringe due to withdrawal symptoms.

3.6 HIV Status, Transmission Drivers, and ART Adherence among HRGs

HIV incidence rates in India reveal a stark disparity among high-risk groups (HRGs), underscoring the heterogeneity of the epidemic. This section explores the self-reported HIV status, perceived causes of infection, locations of exposure, and the regularity of Antiretroviral Therapy (ART) adherence among the study's participants.

Table 6 Self-Reported HIV Status and Testing Reluctance in High-Risk Groups.

HRG	Positive	Negative	Did not want to specify	Did not know their status	Did not want to test
IDU	37.28	56.51	4.52	1.41	0.28
FSW	77.27	18.18	4.55	0	0

Source: Primary Survey, 2021

HIV positivity, according to Table 3.15, was the highest among FSW (77.27%), followed by IDUs (37.28%), and MSM (25%). Most respondents were aware of and willing to disclose their HIV status, though a small proportion of the population was reluctant to specify their status, and 1.41% of IDUs did not know their HIV status.

3.6.1 Behavioural Drivers of HIV Transmission

The key risk behaviours differ substantially across groups. Table 3.16 – 3.18 highlights the specific drivers.

Table 7 HIV Risk Behavior Drivers among IDUs in percentage.

Risk Behavior	Reasons (%)
Syringe Sharing (59.1%)	Withdrawal symptoms – 29.82
	Deceived by fellow IDU – 28.06
	Syringe unavailability – 19.3
	Regular partner (HIV status unknown) – 8.77
	Roadside/old syringe – 5.26
	Syringe caught by NGO – 3.52
	Syringe block – 3.52
	Accidental prick – 1.75

Source: Primary Survey, 2021

Syringe sharing was the dominant driver (59.1%), with withdrawal symptoms (29.82%) and deception by fellow users (28.06%) being the most cited reasons. Sexual transmission was less frequent (25%), primarily with regular partners (42.86%) or non-regular partners (28.57%), often linked to low awareness or condom failure.

Table 8 HIV Risk Behavior Drivers among FSW in percentage.

Risk Behavior	Reasons (%)
Syringe Sharing (41.17%)	Withdrawal symptoms – 33.33
	Deceived by fellow IDU – 33.33
	Regular partner, HIV status unknown – 16.67
	Roadside/old syringe – 16.67

Source: Primary Survey, 2021

Sexual risk behaviours dominated, with 58.82% reporting condomless sex. Trust in partners accounted for 80% of these cases, and notably, over 70% involved husbands, demonstrating how intimate relationships carry risk. Additional factors included intoxication (10%) and

forgetting to use a condom with clients (10%). Syringe sharing was also reported (41.17%), with withdrawal (33.33%) and deception (33.33%) again prominent.

3.6.2 Spatial Settings of HIV Exposure

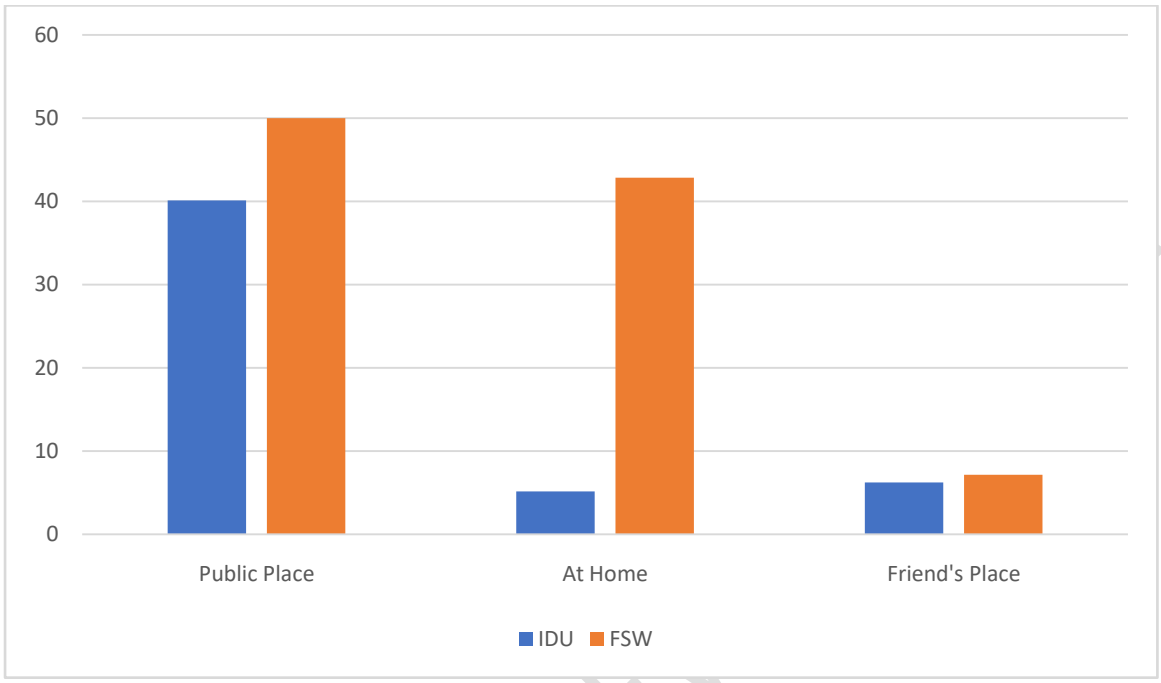

Figure7 Place of contracting HIV by HRGs

Source: Primary Survey, 2021

Table 3.19 further illustrates the physical settings of exposure. For IDUs, transmission was reported predominantly in public places (40.11%), and 48.49% of them could not recall the location of transmission. FSWs experienced transmission more evenly between public venues (50%) and their homes (42.86%), highlighting the dual nature of commercial and intimate encounters. Dawrpui and Venghlui were noted as significant risk sites. For MSM, exposures were concentrated in private settings, with half occurring at home and smaller shares in public places (25%) and friends' residences (25%).

These patterns highlight how different HRGs are situated within distinct but overlapping spatial risk ecologies: IDUs in public and semi-public injecting sites, FSWs across both commercial and domestic spaces, and MSM largely in private, hidden domains shaped by stigma and secrecy.

Conclusion

The study highlights that HIV risk in Aizawl City cannot be understood solely through individual behaviors but must be located within the social and structural contexts that shape them. Among IDUs and FSWs, vulnerability emerges from the convergence of poverty, stigma, and the spatial organization of risk environments. Syringe scarcity, public injecting, and punitive policing create structural barriers that sustain unsafe practices, while economic precarity and gendered expectations expose women to both sexual and social risks. The high prevalence of HIV among FSWs and the persistence of unsafe injecting among IDUs reflect systemic neglect of harm reduction within an environment of moral surveillance and urban marginality.

By identifying how socio-spatial inequalities and institutional responses co-produce risk, this research contributes to understanding the 'production of spaces of vulnerability' in Mizoram's HIV landscape. Addressing these challenges demands integrated interventions that combine harm reduction with social inclusion, community-led health services, and spatially targeted outreach. Strengthening TI programmes, improving syringe access, and mitigating stigma through education and policy reform are critical to curbing HIV transmission and fostering safer urban environments for marginalized populations.

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