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Original Research Article

Migration, risk behaviour and HIV vulnerability among rural migrants in Uttar Pradesh: evidence from the link worker scheme in Moradabad

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ABSTRACT

Background: Migration has emerged as an important socio-economic phenomenon influencing health vulnerabilities in rural India. In states such as Uttar Pradesh, seasonal and circular migration often expose individuals to environments that increase the risk of HIV transmission. This study examined the relationship between migration patterns and HIV vulnerability among high-risk groups in rural Moradabad district.
Methods: The study was conducted under the link worker scheme (LWS) implemented by Sharnam Sansthan in Moradabad district. A quantitative survey of 120 respondents was carried out using a structured questionnaire. Data were collected with the support of cluster link workers working under the programme to understand migration patterns, awareness levels, and risk behaviours related to HIV.
Results: The findings indicate that most migrants were young and middle-aged men engaged in informal labour sectors with low educational levels and unstable income. Migration was largely seasonal, with many migrants spending three to six months in urban destinations such as Delhi, Ludhiana, and Gurugram. Although awareness of HIV/AIDS was relatively widespread, misconceptions about transmission and prevention persisted. Risk behaviours, including inconsistent condom use and engagement with sex workers, were reported during migration periods.
Conclusions: The study highlights the need to strengthen community-based interventions, expand HIV testing services, and improve awareness programmes to reduce HIV vulnerability among migrant populations in rural areas.

Keywords: HIV vulnerability, Link Worker Scheme, Migrant workers, Migration, Rural health, Uttar Pradesh

INTRODUCTION

Migration is an important livelihood strategy for rural populations in India, particularly in economically marginalized regions where local employment opportunities remain limited. Seasonal and circular migration from rural to urban areas has increased as individuals seek employment in urban labour markets. While migration often improves household economic conditions through remittances, it also exposes migrants to several social and health vulnerabilities, including an increased risk of HIV infection.[1,2]

In many parts of rural India, including Uttar Pradesh, migration is largely male-driven and involves young and middle-aged workers moving to urban centres such as Delhi, Punjab, and Haryana. Migrants are commonly employed in informal sectors such as construction, manufacturing, and daily wage labour, which provide unstable income and limited social protection. They often live in overcrowded and temporary accommodations with poor sanitation and limited access to healthcare services.[3] Such conditions, combined with prolonged separation from family and community networks, may increase engagement in risky behaviours such as unprotected

sexual activity, thereby increasing vulnerability to HIV infection.[4]

HIV/AIDS remains a major public health concern globally and continues to pose challenges for developing countries such as India. Since the first reported HIV case in India in 1986, several initiatives have been introduced to control the spread of the disease. The National AIDS Control Programme (NACP), launched in 1992 under the National AIDS Control Organization (NACO), has progressed through multiple phases- from NACP-I to the current NACP-V (2021-2026)- with increasing emphasis on prevention, treatment, care, and community-based interventions aimed at reducing HIV transmission and improving the quality of life of people living with HIV (PLHIV).[5]

Global HIV control strategies also emphasize expanding testing, treatment, and prevention services among vulnerable populations. The 90-90-90 targets proposed by UNAIDS aim to improve diagnosis, treatment coverage, and viral suppression, while the World Health Organization highlights strengthening prevention strategies and improving access to testing services, particularly among vulnerable and mobile populations.[6,7]

Previous research highlights the role of social determinants such as migration, poverty, and gender inequality in shaping HIV vulnerability. Migrant workers often experience economic insecurity, social isolation, and limited healthcare access, which may increase engagement in high-risk behaviours.[1,2] Consequently, migrants are frequently described as a "bridge population," potentially transmitting infection acquired in urban environments to partners in rural communities.

National surveys and HIV estimations indicate that rural populations account for a substantial proportion of people living with HIV in India. Despite declining national prevalence rates, rural areas continue to face challenges related to limited awareness, inadequate healthcare infrastructure, and persistent stigma surrounding HIV/AIDS.[3,8-10] To address these challenges, the Government of India introduced the Link Worker Scheme (LWS) under the National AIDS Control Programme to strengthen HIV prevention in rural communities through awareness generation, condom promotion, and referrals for testing and treatment services.[4,11,12]

Despite growing research on migration and HIV vulnerability in India, limited empirical studies have examined how migration patterns interact with HIV awareness, risk behaviours, and access to prevention services at the local community level, particularly in migrant-sending districts of Uttar Pradesh. The conceptual framework presented in Figure 1 illustrates the relationship between migration patterns, socio-economic pressures, behavioural risks, and HIV vulnerability. Migration may increase exposure to high-risk environments, while interventions such as the link worker scheme act as protective mechanisms by improving awareness and facilitating access to health services.

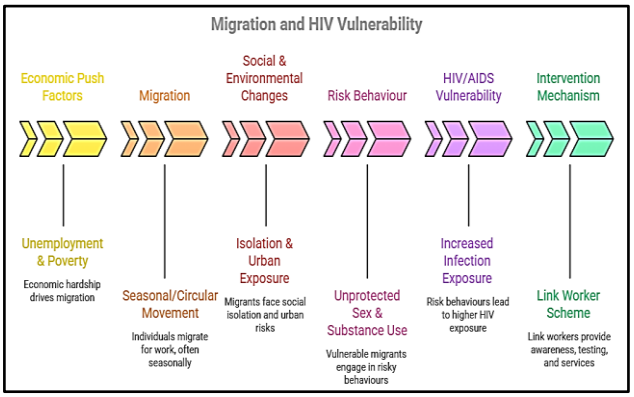

Figure 1: Conceptual framework linking migration patterns and HIV/AIDS vulnerability.

Against this background, the present study examined migration patterns among rural migrant populations in Moradabad district, assesses levels of HIV-related knowledge and awareness, and analyses migration-related risk behaviours while evaluating the role of the link worker scheme in facilitating access to HIV-related services.

METHODS

Study area

The study was conducted in Moradabad district, Uttar Pradesh, where the link worker scheme (LWS) is implemented by Sharnam Sansthan in collaboration with the Uttar Pradesh State AIDS Control Society (UPSACS). The programme covers seven administrative blocks and nearly 100 villages with an estimated population of about 358,256. The district experiences considerable seasonal and circular migration of rural labourers to urban and industrial centres, making it an appropriate setting to examine migration patterns and HIV vulnerability among high-risk and bridge populations.

Study design and sampling

The research adopted a quantitative cross-sectional design to examine migration patterns, HIV/AIDS awareness, and related risk behaviours. Fieldwork was conducted in 2025 under the link worker scheme. A total of 120 respondents aged 18 years and above, including migrants and members of migrant households identified as vulnerable populations, were selected through purposive sampling. Cluster link workers (CLWs) assisted in identifying eligible participants and facilitating community access.

Data collection

Primary data were collected through a structured bilingual questionnaire covering demographic characteristics,

migration patterns, HIV awareness, risk behaviours, and access to services. Data collection was conducted between 22 March and 16 April 2025.

Data analysis

The collected data were analysed using descriptive statistical techniques. Microsoft Excel and SPSS were used to compute frequencies and percentages and to interpret patterns related to migration characteristics, HIV awareness, risk behaviours, and access to services.

Ethical considerations

Participation was voluntary and informed consent was obtained. Confidentiality was maintained and no personal identifiers were recorded.

RESULTS

Demographic profile

The demographic characteristics of respondents provide insights into the socio-economic background of migrant populations in rural Moradabad district. As shown in Table 1, most respondents belonged to the 26-35-year age group (48%), followed by 36-45 years (22%) and 18-25 years (20%), while only 10% were aged 46-60 years. This indicates that migration is most common among young and economically productive age groups who possess the physical capacity for labour-intensive work and contribute significantly to household income. Similar patterns have been reported in migration studies across India, where young and middle-aged adults constitute a large share of internal migrant workers seeking employment in urban and industrial centres.[1,2]

Table 1: Socio-demographic characteristics of respondents (n=120).

Variables	Categories	Frequency	Percentage
Age group (years)	18-25	24	20
	26-35	58	48
	36-45	26	22
	46-60	12	10
Gender	Male	104	87
	Female	14	12
	Transgender	2	1
Marital status	Married	78	65
	Single	34	28
	Widowed/separated	8	7
Education level	No formal education	38	32
	Primary education	46	38
	Secondary education	28	23
	Higher secondary and above	8	7
Occupation	Construction worker	36	30
	Agricultural labour	28	23
	Factory worker	22	18
	Service sector	20	17
	Other	14	12

Gender distribution indicates that migration is predominantly male-driven, with 87% male respondents, compared to 12% female and 1% transgender individuals. This reflects the traditional gender division of labour in rural India, where men migrate for employment while women often remain in villages to manage household and agricultural responsibilities. Cultural norms, safety concerns, and limited employment opportunities continue to restrict female migration, though recent trends show a gradual increase in female mobility linked to economic necessity.[3]

In terms of marital status, 65% of respondents were married, indicating that migration is often undertaken to support household responsibilities such as education, healthcare, and debt repayment. Migrants frequently leave families in villages and send remittances to sustain household livelihoods.

Educational attainment among respondents was relatively low. Thirty-two percent had no formal education, while 38% had only primary education. Smaller proportions had secondary education (23%) or higher secondary education and above (7%). Limited education restricts access to formal employment and may reduce individuals' ability to access health information and understand HIV prevention messages.[3]

Occupationally, respondents were concentrated in informal labour sectors, particularly construction (30%), agricultural labour (23%), factory work (18%), and service sector jobs (17%). These occupations often involve unstable income and limited social protection. Monthly earnings generally ranged between INR 5,000 and INR 12,000, reflecting economic vulnerability and dependence on seasonal migration.

Overall, the demographic profile highlights the intersection of low education, informal employment, and economic instability- factors that influence migration decisions and shape health vulnerabilities among rural migrant populations.

Migration patterns

Migration patterns among respondents reveal important insights into the economic and social dynamics influencing rural labour mobility in Moradabad district. The findings indicate that seasonal and circular migration were the dominant forms of migration. As shown in Table 2, 45% of respondents reported seasonal migration, 40% circular migration, and only 15% permanent migration. These results suggest that migration among rural populations is largely temporary and cyclical, with workers frequently moving between rural and urban areas in response to employment opportunities. Such mobility patterns are common in rural India, where migration often occurs during agricultural off-seasons or periods of increased labour demand in urban centres.[1]

The duration of stay at migration destinations further reflects the temporary nature of migration. More than half of the respondents (53%) reported staying at destinations for three to six months, while 25% stayed for more than six months and 22% for less than three months. These patterns indicate that migrants regularly return to their villages before beginning another cycle of migration, allowing households to balance rural agricultural activities with urban employment opportunities.

Table 2: Migration characteristics of respondents.

Variables	Categories	Frequency	Percentage
Type of migration	Seasonal	54	45
	Circular	48	40
	Permanent	18	15
Duration of stay	Less than 3 months	26	22
	3-6 months	64	53
	More than 6 months	30	25
Migration destination	Delhi	36	30
	Punjab/Ludhiana	28	23
	Haryana/Gurugram	24	20
	Chandigarh	14	12
	Other cities	18	15
Migration with family	Yes	32	27
	No	88	73

Table 3: Knowledge and awareness of HIV/AIDS among respondents.

Variables	Categories	Frequency	Percentage
Heard about HIV/AIDS	Yes	104	87
	No	16	13
Correct knowledge of transmission	Sexual transmission	78	65
	Needle sharing	42	35
	Mother-to-child transmission	28	23
Misconceptions	Mosquito bites	34	28
	Casual contact	30	25
Source of information	Television/radio	46	38
	Link worker scheme	36	30
	Health workers	22	18
	Friends/Peers	16	14

Migration destinations also indicate the strong attraction of major urban and industrial centres. Delhi (30%) emerged as the most common destination, followed by Punjab/Ludhiana (23%), Haryana/Gurugram (20%), and Chandigarh (12%), while 15% migrated to other cities. These patterns are illustrated in Figure 2, which shows

the distribution of migration destinations among respondents. The concentration of migrants in these areas reflects employment opportunities in construction, manufacturing, transportation, and other informal service sectors.

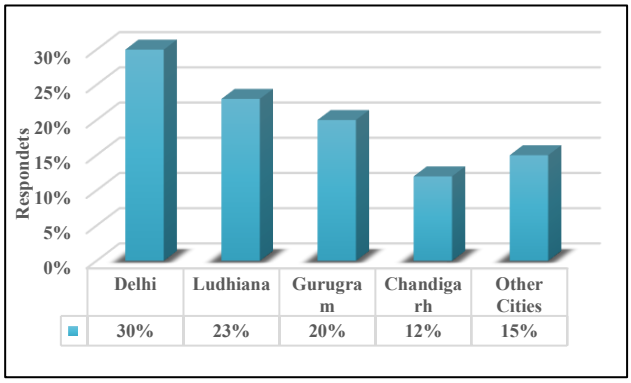

Figure 2: Distribution of migration destinations among respondents.

Economic factors strongly influence migration decisions. Many respondents reported that limited local employment opportunities, declining agricultural productivity, rising household expenses, and debt compelled them to migrate. For many households, migration functions as a livelihood strategy to diversify income and maintain economic stability.

Another important finding is that most migrants travelled alone, leaving families in their native villages. As indicated in Table 2, 73% migrated without their families, while 27% migrated with family members. Solo migration helps reduce living costs and increase remittances but may also result in social isolation and emotional stress- conditions that have been associated with risky behaviours and increased vulnerability to HIV infection.[2]

Overall, the migration patterns presented in Table 2 and Figure 2 highlight the close relationship between economic pressures, temporary labour mobility, and social vulnerability among rural migrant populations.

Knowledge and awareness of HIV/AIDS

The study examined respondents' knowledge and awareness of HIV/AIDS to assess how well migrant populations understand the disease and its prevention. The findings indicate that general awareness of HIV/AIDS was relatively high, although detailed knowledge about transmission and prevention remained limited. As shown in Table 3, 87% of respondents reported that they had heard about HIV/AIDS, while 13% were not familiar with the disease. This suggests that although the term HIV/AIDS is widely recognized in rural communities, comprehensive understanding remains inadequate.

With regard to knowledge of HIV transmission, 65% of respondents correctly identified unprotected sexual intercourse as a major transmission route. However, awareness of other modes was lower: 35% recognized needle sharing and 23% were aware of mother-to-child transmission. These findings suggest that while basic knowledge exists, understanding of multiple transmission pathways remains limited among rural migrant populations.

Several misconceptions about HIV transmission were also reported. Twenty-eight percent of respondents believed HIV could spread through mosquito bites, and 25% believed it could be transmitted through casual contact, such as sharing utensils or physical interaction. Such misconceptions may contribute to stigma and discrimination against people living with HIV/AIDS (PLHIV) and may discourage preventive behaviour.[9]

The findings also highlight multiple sources of HIV-related information. Mass media, particularly television and radio, was the most common source (38%). Community-based outreach also played an important role: 30% of respondents received information through the link worker scheme (LWS), 18% from health workers, and 14% from friends or peers.

The link worker scheme emerged as an important platform for spreading HIV awareness in rural communities. Link workers conduct village meetings, counselling sessions, and awareness campaigns on HIV prevention, safe sexual practices, and testing services. Their use of local languages and culturally appropriate communication methods helps convey health messages effectively, particularly among populations with low literacy levels.

Overall, the findings presented in Table 3 indicate that although awareness of HIV/AIDS is relatively widespread, significant gaps remain in comprehensive knowledge and misconceptions persist. Strengthening community-based awareness programmes and targeted educational interventions is therefore essential for reducing HIV vulnerability among migrant populations in rural areas.

Risk behaviour

Migration often exposes individuals to new social environments that may influence behavioural patterns and health-related practices. The findings of this study indicate that migration can be associated with increased engagement in high-risk behaviours, particularly when migrants remain separated from their families and traditional support systems. Factors such as loneliness, peer influence, alcohol consumption, and the availability of commercial sex services in urban areas may contribute to the adoption of risky practices among migrant workers.

Table 4: Risk behaviours reported during migration.

Variables	Categories	Frequency	Percentage
Engaged in high-risk behaviour during migration	Yes	42	35
	No	78	65
Condom Use	Always	24	20
	Sometimes	56	47
	Never	40	33
Visited commercial sex workers	Yes	30	25
	No	90	75
Shared needles/syringes	Yes	8	7
	No	112	93

Table 5: Awareness and access to HIV-related services.

Variables	Categories	Frequency	Percentage
Awareness of link worker scheme	Yes	72	60
	No	48	40
Participation in LWS activities	Health camps	38	32
	Counselling sessions	28	23
	HIV testing	24	20
	None	30	25
Barriers to accessing services	Stigma	42	35
	Distance to health facility	36	30
	Fear of discrimination	24	20
	Lack of awareness	18	15

As shown in Table 4, 35% of respondents reported engaging in high-risk behaviours during migration, while 65% indicated that they had not engaged in such practices. Although the majority denied participation in high-risk activities, the proportion reporting risky behaviour remains noteworthy because of its potential implications for HIV transmission within migrant populations.

Condom use, an important indicator of HIV prevention behaviour, was found to be inconsistent among respondents. Only 20% reported always using condoms, while 47% used them occasionally and 33% reported never using condoms. These results indicate that although awareness of condoms as a preventive measure exists, consistent usage remains relatively low, thereby increasing vulnerability to HIV infection.

Engagement with commercial sex workers was also reported by a notable proportion of migrants. According to Table 4, 25% of respondents reported visiting commercial sex workers during migration, while 75% did not report such behaviour. Migrants separated from their families for extended periods may experience social isolation and emotional stress, which may increase the likelihood of seeking companionship or engaging in transactional sexual relationships. Previous studies have similarly noted that migrant workers often face heightened vulnerability to HIV infection due to social isolation and limited awareness of preventive practices.[2]

The study also examined needle-sharing practices, another potential pathway for HIV transmission. Although relatively uncommon, 7% of respondents reported sharing needles or syringes, while 93% indicated that they had not engaged in such behaviour. Even a small proportion of needle sharing may pose a significant public health risk because contaminated needles can rapidly transmit HIV and other blood-borne infections.

Overall, the findings presented in Table 4 indicate the presence of several behavioural risk factors associated with migration. Inconsistent condom use, occasional engagement with commercial sex workers, and limited harm-reduction awareness may increase the vulnerability of migrant populations to HIV infection. These findings highlight the need for targeted awareness programmes, condom promotion initiatives, and harm reduction strategies among migrant workers.

Access to HIV-related services

Access to HIV-related services is essential for preventing transmission and ensuring timely diagnosis and treatment among vulnerable populations. The findings of this study indicate that awareness and utilization of HIV-related services were moderate among respondents, particularly regarding the link worker scheme (LWS). Individuals who had participated in community meetings, awareness programmes, or health camps organized under the scheme generally demonstrated better knowledge of HIV and

were more likely to access services such as testing and counselling.

As shown in Table 5, 60% of respondents were aware of the link worker scheme, while 40% reported no awareness of the programme. This indicates that although the scheme has achieved a reasonable level of outreach in rural communities, a substantial proportion of the population still remains outside its awareness network.

Participation in activities conducted under the link worker scheme was also examined. Thirty-two percent of respondents had participated in health camps, 23% attended counselling sessions, and 20% had undergone HIV testing through programme-related activities, while 25% reported no participation. These findings highlight the importance of community outreach initiatives in improving awareness and encouraging the use of HIV-related services.

Link workers play a crucial role in facilitating access to healthcare services in rural communities. Their responsibilities include identifying vulnerable individuals, conducting awareness campaigns, distributing condoms, and referring individuals to integrated counselling and testing centres (ICTCs) and antiretroviral therapy (ART) centres. By working directly within communities, they help build trust between local populations and healthcare providers.

Despite these efforts, several barriers to service access were identified. As presented in Table 5, social stigma (35%) was the most frequently reported barrier, followed by distance to health facilities (30%), fear of discrimination (20%), and lack of awareness (15%). These challenges highlight the social and structural factors that continue to limit HIV prevention and care in rural areas.

Overall, the findings suggest that while the link worker scheme has improved awareness and service linkages, further efforts are needed to address stigma, improve accessibility of healthcare facilities, and expand community outreach to strengthen HIV prevention among rural migrant populations.

DISCUSSION

The findings of this study demonstrate a clear relationship between migration patterns and increased vulnerability to HIV/AIDS among rural populations. Seasonal and circular migration expose individuals to unfamiliar social environments where traditional community support systems are weakened. Migrants often experience loneliness, social isolation, and psychological stress-conditions that may encourage engagement in risky behaviours such as unprotected sexual activity or substance use. Similar patterns have been reported in earlier studies indicating that migrant workers are more likely to engage in high-risk behaviours due to prolonged separation from family and limited social supervision in urban settings.[12] These findings are consistent with previous research highlighting migration as a significant factor shaping HIV vulnerability among mobile labour populations in India.[9]

The study also indicated that low levels of education and limited health literacy contribute significantly to HIV vulnerability among migrant populations. Although many respondents had heard about HIV/AIDS, comprehensive knowledge of transmission and prevention remained limited, and misconceptions regarding modes of infection were common. Similar findings have been reported in national surveys, which show that comprehensive awareness of HIV/AIDS is relatively low among rural populations, particularly among individuals with limited educational attainment.[3] Such gaps in knowledge may delay the adoption of preventive practices such as consistent condom use and voluntary HIV testing.

Socio-economic pressures also play an important role in shaping migration decisions and related health risks. Many respondents reported migrating due to unemployment, declining agricultural productivity, and the need to support household livelihoods. While migration provides economic opportunities, migrant workers often face precarious working and living conditions, including irregular employment, overcrowded housing, and restricted access to healthcare services. These structural inequalities may increase exposure to environments where risky behaviours are more likely to occur, thereby heightening vulnerability to HIV infection.

The findings further highlight the importance of community-based interventions such as the link worker scheme (LWS) in addressing migration-related HIV vulnerabilities. The programme helps connect rural communities with health services by promoting awareness, distributing condoms, providing counselling, and referring individuals for HIV testing and treatment. Respondents who had interacted with link workers demonstrated higher levels of HIV awareness and greater utilization of related health services. Similar programme assessments have emphasized that community outreach initiatives can effectively reach marginalized populations and strengthen HIV prevention efforts.[4,12]

Despite these positive outcomes, several challenges remain. Highly mobile migrant populations often experience interruptions in healthcare access, while stigma, fear of discrimination, and limited rural health infrastructure continue to discourage service utilization. These findings align with broader public health assessments indicating that social stigma and structural barriers remain significant obstacles to HIV prevention and treatment among vulnerable populations. Global health organizations have similarly emphasized the need to strengthen community-based prevention strategies and improve service accessibility for mobile and marginalized populations.[7]

Overall, the study suggests that migration-related HIV vulnerability is shaped by a complex interaction of behavioural, socio-economic, and structural factors. Seasonal migration, social isolation, and limited health awareness create conditions that increase exposure to HIV risk among migrant workers. Strengthening community-based outreach programmes, expanding mobile testing services, improving access to preventive resources, and addressing stigma within rural communities are therefore essential strategies for reducing HIV vulnerability among migrant populations. Integrating migration-sensitive HIV prevention strategies within rural health programmes is particularly important for migrant-sending regions.

This study has certain limitations. The sample size of 120 respondents from a single district limits the generalizability of the findings. Data were self-reported and may involve response bias, particularly regarding sensitive behaviours. Additionally, the cross-sectional design restricts causal interpretation. Nevertheless, the study provides useful insights into migration-related HIV vulnerability in rural Uttar Pradesh.

CONCLUSION

The present study highlights the complex relationship between migration patterns and HIV/AIDS vulnerability among rural populations in Moradabad district of Uttar Pradesh. Migration functions as an important livelihood strategy for economically disadvantaged rural households, enabling individuals to access employment opportunities and support their families through remittances. However, the findings indicate that migration can also create conditions that increase exposure to health risks, particularly HIV infection. Migrant workers often live in socially isolated environments with unstable living conditions and limited access to healthcare services, factors that may encourage risky behaviours such as unprotected sexual activity and substance use.

The study also reveals that low educational attainment and limited health literacy contribute to incomplete understanding of HIV transmission and prevention. Although most respondents had heard about HIV/AIDS, misconceptions regarding modes of transmission and inconsistent use of preventive measures, including condoms, were observed. These gaps highlight the need for more effective awareness programmes and culturally appropriate health education initiatives within rural communities.

The findings further underscore the importance of community-based interventions such as the link worker scheme (LWS) in addressing migration-related HIV vulnerabilities. Through awareness campaigns, counselling services, condom distribution, and referrals to integrated counselling and testing centres (ICTCs) and antiretroviral therapy (ART) centres, link workers help connect rural populations with healthcare services and improve access to HIV prevention and care.

Despite these efforts, significant challenges remain, particularly due to the high mobility of migrant workers and persistent barriers such as stigma, fear of discrimination, and limited healthcare infrastructure. Strengthening community outreach, expanding testing services, and improving health education are therefore essential for reducing HIV vulnerability among migrant populations in rural migrant-sending regions.

Recommendations

Based on the study findings, several measures can help reduce HIV vulnerability among migrant populations. First, community-based awareness programmes should be strengthened in migrant-sending villages to improve knowledge of HIV transmission, prevention, and testing. Information, education, and communication (IEC) materials should use simple language and visual formats to effectively reach populations with low literacy levels. Second, condom availability should be increased at migration hubs and workplaces such as construction sites, markets, and transport stations to promote safer sexual practices. Third, mobile HIV testing and counselling camps should be organized in rural areas, particularly during peak migrant return periods, to encourage early diagnosis and timely treatment. Fourth, training peer educators among migrant workers can enhance awareness and promote behaviour change within migrant networks. Finally, community sensitization programmes should address stigma and discrimination while strengthening counselling services. Integrating migration-related health concerns into broader rural health policies will further support HIV prevention efforts and reduce vulnerability among migrant populations.

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