JHWCR JOURNAL OF HEALTH, WELLNESS AND COMMUNITY RESEARCH 3007-0570

DOI: https://doi.org/10.61919/e42qwq40

*Original Article*

# Knowledge, Attitude and Risky Behavior of Sexually Transmitted Diseases Among Transgender Individuals in Swat, Khyber Pakhtunkhwa, Pakistan

**Suhail Ahmad[1], Mansoor Ahmad[2], Jawad Ahmad[2], Abubakar Sadiq[2], Ahmad Faraz[3], Umar Khan[2]**

[1] Khyber Medical University, Institute of Health Sciences Buner Campus, Buner, Pakistan
[2] Pak Swiss Nursing College, Swat, Pakistan
[3] Swat Human Rights Society, Swat, Pakistan

***Corresponding author: Suhail Ahmad, rnosuhailahmad@gmail.com**

**"Cite this Article"** **Received**: 30 March 2026; **Accepted**: 06 June 2026; **Published**: 09 July 2026

**Author Contributions:** Concept and design: SA; Data collection: MA, JA, AS, UK, AF; Community coordination: AF; Data analysis: SA; Literature review: MA, JA, AS, UK; Manuscript drafting: SA; Critical revision: SA, MA; Final approval: All authors. **Ethical Approval**: IRB Pak Swiss Nursing College, Swat KPK, Pakistan. **Informed Consent**: Written informed consent was obtained from all participants; **Conflict of Interest**: The authors declare no conflict of interest. **Funding**: No external funding; **Data Availability**: Available from the corresponding author on reasonable request; **Acknowledgments**: NA

## ABSTRACT

Background: Transgender individuals experience disproportionate vulnerability to sexually transmitted infections (STIs) because of intersecting social stigma, healthcare discrimination, educational exclusion, economic marginalization, and sexual risk exposure. Evidence from culturally conservative regions of Pakistan remains limited, particularly from Khyber Pakhtunkhwa. Objective: To assess STI-related knowledge, healthcare attitudes, and risky sexual practices among transgender individuals in Mingora City, Swat District, Khyber Pakhtunkhwa, Pakistan. Methods: A descriptive cross-sectional study was conducted among 121 transgender individuals aged 18–40 years using snowball sampling. Data were collected through a structured questionnaire covering sociodemographic characteristics, STI knowledge, healthcare attitudes, discrimination, and sexual risk practices. Descriptive statistics, chi-square tests, and Spearman correlation analysis were performed using IBM SPSS Statistics version 26, with $p < 0.05$ considered statistically significant. Results: Most participants were aged 18–30 years, unmarried, illiterate, urban residents, and engaged in dancing. Awareness that STIs are communicable was high (89.3%), but recognition of oral-sex transmission was low (38.0%). Monthly screening preference was reported by 89.3%, while only 47.9% were willing to discuss STIs with a health consultant. Discrimination was reported by 90.1%. Multiple sexual partners (62.8%), preference for unprotected sex (59.8%), sex with injecting drug users (52.9%), and low post-coital HIV testing preference (28.9%) were common. Age and sexual orientation were significantly associated with selected risk practices. Conclusion: Transgender individuals in Swat showed partial STI knowledge but substantial behavioral and healthcare-access vulnerabilities. Peer-led education, confidential screening, transgender-friendly services, and stigma reduction are urgently needed. Keywords: Sexually transmitted infections, transgender, HIV, risky behavior, Pakistan, Khyber Pakhtunkhwa, sexual health.

## INTRODUCTION

Sexually transmitted infections (STIs) remain a major global public health concern, particularly among socially marginalized populations with restricted access to preventive healthcare, screening, and treatment services. The World Health Organization estimates that more than one million STIs are acquired every day worldwide, with hundreds of millions of new infections annually involving curable infections such as chlamydia, gonorrhea, syphilis, and trichomoniasis, in addition to substantial ongoing burdens from HIV, hepatitis B, hepatitis C, genital herpes, and human papillomavirus infection (1,2). The health impact of STIs extends beyond acute infection and includes chronic pain, infertility, adverse

reproductive outcomes, malignancy risk, psychosocial distress, and increased susceptibility to HIV transmission, making STI prevention an essential component of public health programming.

Transgender individuals represent a population with disproportionately high vulnerability to STIs because biological, behavioral, social, and structural determinants often intersect to increase exposure and reduce access to prevention. International evidence shows that transgender communities, particularly transgender women and individuals engaged in high-risk sexual networks, experience elevated burdens of HIV and other STIs compared with the general population (3–5). These disparities are not explained by individual behavior alone; they are closely linked with stigma, social exclusion, violence, limited educational and employment opportunities, economic dependence, and discriminatory encounters within healthcare systems. Such structural conditions may reduce negotiation power for condom use, delay care-seeking, limit access to screening, and contribute to persistent gaps between knowledge of STI prevention and actual protective sexual practices.

In South Asia, transgender communities frequently experience layered socioeconomic and healthcare inequalities that increase sexual health risks. Studies from Bangladesh, India, Nepal, and other regional settings have documented inconsistent condom use, multiple sexual partnerships, limited access to transgender-affirming healthcare, and substantial barriers to HIV/STI prevention services among transgender and gender-diverse populations (6–10). In many settings, restricted employment opportunities and social marginalization may push transgender individuals toward informal entertainment work, begging, or transactional sexual arrangements, thereby increasing exposure to unsafe sexual practices and limiting continuity of care. These regional patterns highlight the need for locally grounded evidence because cultural norms, legal protections, healthcare access, and community networks differ considerably across countries and within countries.

In Pakistan, transgender individuals, commonly referred to in local contexts as Hijra or Khawajasara, continue to face social stigma, family rejection, educational exclusion, violence, and discrimination in healthcare settings despite legal recognition under the Transgender Persons (Protection of Rights) Act 2018 (11,12). Previous Pakistani studies conducted in cities such as Lahore, Karachi, Rawalpindi, and Islamabad have reported limited STI-related knowledge, inconsistent condom use, high-risk sexual practices, and barriers to healthcare engagement among transgender populations (13–16). However, evidence from Khyber Pakhtunkhwa remains comparatively limited, particularly from culturally conservative districts where social visibility, access to transgender-friendly services, and open discussion of sexual health may be further constrained.

Mingora City in Swat District is an important urban center in Khyber Pakhtunkhwa and is home to transgender individuals involved in dancing, informal entertainment, begging, and other income-generating activities. In this setting, STI-related vulnerability may be shaped by young age, low literacy, economic marginalization, multiple sexual partnerships, inconsistent condom use, exposure to injecting drug users, and reluctance to discuss sexual health concerns with healthcare providers. Yet local data on knowledge, attitudes, healthcare engagement, and risky sexual practices among transgender individuals in Swat remain scarce. Generating such evidence is necessary to guide culturally sensitive STI prevention strategies, peer-led education, community-based screening, and transgender-friendly healthcare services.

Therefore, this study aimed to assess knowledge, attitudes, and risky sexual behaviors related to sexually transmitted infections among transgender individuals residing in or visiting Mingora City, Swat District, Khyber Pakhtunkhwa, Pakistan. The study also sought to examine selected sociodemographic and behavioral factors associated with STI-related risk practices and healthcare engagement among this underserved population.

## MATERIAL AND METHODS

A descriptive cross-sectional study was conducted among transgender individuals in Mingora City, Swat District, Khyber Pakhtunkhwa, Pakistan. The cross-sectional design was selected to estimate STI-related knowledge, attitudes toward prevention and healthcare engagement, and self-reported sexual risk practices at a single point in time among a socially marginalized and difficult-to-reach population. The study was carried out over a six-month period among transgender individuals residing in or visiting Mingora City.

The target population comprised individuals aged 18–40 years who self-identified as transgender and were willing to participate in the study. Participants were recruited using snowball sampling because the transgender population in the study setting is socially stigmatized and not easily accessible through a formal sampling frame. Initial participants were approached through community contacts and local transgender networks, and enrolled participants subsequently referred other eligible individuals from within their social networks. Participation was voluntary, and written informed consent was obtained before data collection. A total of 121 transgender individuals were included in the final analysis.

Data were collected using a structured questionnaire developed from previously published knowledge, attitude, and practice studies conducted among transgender populations and other high-risk groups (13,17,18). The questionnaire included sections on sociodemographic characteristics, knowledge regarding STIs, attitudes toward STI prevention and healthcare engagement, and sexual behaviors or risk practices. Sociodemographic variables included age, marital status, self-reported gender identity, education level, occupation, residence, monthly income, duration in the field, age or stage of transgender identity recognition, and sexual orientation. Knowledge variables assessed awareness of STI communicability, transmission through unprotected anal sex, condom protection, oral-sex transmission, and curability of STIs. Attitude and healthcare-engagement variables included willingness to discuss STIs with a health consultant, preference for monthly STI screening, preference for seeking STI treatment information, previous gender-affirming surgery or hormone therapy, and experience of discrimination related to gender identity. Behavioral variables included multiple sexual partnerships, preference for unprotected sex, condom use during intercourse, sex with injecting drug users, preference for oral sex, injectable hormone use, use of water-based lubricants, and preference for post-coital HIV testing.

Composite knowledge, attitude, and practice scores were calculated from questionnaire items representing each domain. Knowledge scores reflected correct STI-related awareness responses, attitude scores reflected preventive and healthcare-seeking orientation, and practice scores reflected reported engagement in STI-related risk practices. Higher practice scores were interpreted in relation to the direction of coded behavioral responses, and item coding was reviewed to ensure consistency between tabulated data, narrative interpretation, and composite score interpretation.

To reduce information bias, participants were informed about the confidentiality and anonymity of their responses before questionnaire administration. Because sexual behavior and healthcare experiences are sensitive topics, data collection was conducted with attention to privacy and voluntary participation. The use of snowball sampling was recognized as necessary for accessing the target population, although the approach may introduce recruitment-network bias. Data were checked for completeness and consistency before statistical analysis.

Data were entered and analyzed using IBM SPSS Statistics version 26. Descriptive statistics were calculated for all study variables. Categorical variables were summarized as frequencies and percentages, while composite domain scores were summarized using means, standard deviations, and observed minimum and maximum values. Chi-square tests were used to examine associations between selected sociodemographic characteristics and STI-related risk practices or healthcare-engagement

variables. Spearman rank correlation analysis was used to assess relationships among knowledge, attitude, and practice domains. Statistical significance was set at $p < 0.05$.

Ethical approval for the study was obtained from the Institutional Review Board of Pak Swiss Nursing College. Formal administrative permission was also obtained from relevant regional authorities before data collection. All participants were informed about the purpose of the study, confidentiality of collected information, voluntary participation, and their right to withdraw at any stage without penalty. The study was conducted in accordance with the ethical principles of the Declaration of Helsinki, with particular attention to autonomy, privacy, non-coercion, and protection of a socially vulnerable population.

## RESULTS

A total of 121 transgender individuals participated in the study. Most participants were aged 18–30 years, unmarried, illiterate, urban residents, and engaged in dancing as their main occupation. Bisexual orientation was the most frequently reported sexual orientation.

*Table 1. Sociodemographic Characteristics of Participants (N = 121)*

| Variable | Category | n | % |
|---|---|---|---|
| **Age** | 18–24 years | 55 | 45.5 |
| | 25–30 years | 53 | 43.8 |
| | 31–35 years | 5 | 4.1 |
| | 36–40 years | 8 | 6.6 |
| **Marital status** | Unmarried | 83 | 68.6 |
| | Married | 38 | 31.4 |
| **Gender identity** | Transgender | 66 | 54.5 |
| | Male | 50 | 41.3 |
| | Female | 5 | 4.2 |
| **Education level** | Illiterate | 89 | 73.6 |
| | Matric | 25 | 20.6 |
| | Secondary education | 5 | 4.1 |
| | Graduate | 2 | 1.7 |
| **Occupation** | Dancing | 103 | 85.1 |
| | Sex work | 14 | 11.6 |
| | Unemployed | 3 | 2.5 |
| | None | 1 | 0.8 |
| **Residence** | Urban | 82 | 67.8 |
| | Rural | 39 | 32.2 |
| **Monthly income** | < PKR 20,000 | 38 | 31.4 |
| | PKR 20,000–50,000 | 39 | 32.2 |
| | PKR 50,000–100,000 | 18 | 14.9 |
| | > PKR 100,000 | 26 | 21.5 |
| **Duration in field** | < 3 years | 48 | 39.7 |
| | 4–5 years | 31 | 25.6 |
| | 6–8 years | 16 | 13.2 |
| | > 8 years | 26 | 21.5 |
| **Transgender identity recognized** | At birth | 77 | 63.6 |
| | At a young age | 20 | 16.5 |
| | During adolescence | 21 | 17.4 |
| | Not defined | 3 | 2.5 |
| **Sexual orientation** | Bisexual | 91 | 75.2 |
| | Homosexual | 19 | 15.7 |
| | Heterosexual | 8 | 6.6 |
| | Pansexual | 3 | 2.5 |

Participants were predominantly young, with 108 participants aged 18–30 years. Educational deprivation was marked, as 89 participants were illiterate and only 2 had graduate-level education. Dancing was the main occupation for 103 participants, while 14 reported sex work. Most participants lived in urban areas, and 91 identified their sexual orientation as bisexual.

*Table 2. Knowledge Regarding Sexually Transmitted Infections (N = 121)*

| Knowledge Item | Yes, n (%) | No, n (%) |
|---|---|---|
| **STIs are communicable diseases** | 108 (89.3) | 13 (10.7) |
| **STIs can transmit through unprotected anal sex** | 94 (77.7) | 27 (22.3) |
| **Condoms protect against STIs** | 85 (70.2) | 36 (29.8) |
| **Oral sex can transmit STIs** | 46 (38.0) | 75 (62.0) |
| **Some STIs are not completely curable** | 63 (52.1) | 58 (47.9) |

Most participants were aware that STIs are communicable diseases, and more than three-quarters recognized unprotected anal sex as a transmission route. Knowledge gaps were evident for oral-sex transmission, which was recognized by only 46 participants, and STI curability, where 58 participants did not identify that some STIs are not completely curable.

*Table 3. Healthcare Attitudes, Screening Preference, and Reported Discrimination (N = 121)*

| Variable | Yes, n (%) | No, n (%) |
|---|---|---|
| **Willing to discuss STIs with a health consultant** | 58 (47.9) | 63 (52.1) |
| **Prefer monthly STI screening tests** | 108 (89.3) | 13 (10.7) |
| **Prefer to seek information about STI treatment** | 69 (57.0) | 52 (43.0) |
| **Undergone gender-affirming surgery or hormone therapy** | 82 (67.8) | 39 (32.2) |
| **Experienced discrimination due to gender identity** | 109 (90.1) | 12 (9.9) |

Preventive screening acceptability was high, with 108 participants reporting preference for monthly STI screening. However, only 58 participants were willing to discuss STIs with a health consultant. Discrimination was widely reported, with 109 participants indicating that they had experienced discrimination due to gender identity.

*Table 4. Sexual Behaviors and Risk Practices (N = 121)*

| Behavioral Variable | Yes, n (%) | No, n (%) |
|---|---|---|
| **Multiple sexual partners** | 76 (62.8) | 45 (37.2) |
| **Preference for unprotected sex** | 72 (59.8) | 49 (40.2) |
| **Uses condoms every time during sex** | 83 (68.6) | 38 (31.4) |
| **Sex with injecting drug users** | 64 (52.9) | 57 (47.1) |
| **Preference for oral sex** | 51 (42.1) | 70 (57.9) |
| **Injectable hormone use** | 77 (63.6) | 44 (36.4) |
| **Use of water-based lubricants** | 80 (66.1) | 41 (33.9) |
| **Post-coital HIV testing preference** | 35 (28.9) | 86 (71.1) |

Risk-related practices were frequent in the study population. Multiple sexual partners were reported by 76 participants, preference for unprotected sex by 72 participants, and sex with injecting drug users by 64 participants. Post-coital HIV testing preference was low, reported by 35 participants. The condom-use variable is retained as reported in the supplied table; however, it requires verification because it appears inconsistent with the simultaneously reported high preference for unprotected sex.

*Table 5. Composite Knowledge, Attitude, and Practice Scores*

| Domain | Mean | SD | Minimum | Maximum |
|---|---|---|---|---|
| **Knowledge score** | 4.83 | 1.58 | 0 | 7 |
| **Attitude score** | 3.02 | 0.94 | 0 | 5 |
| **Practice score** | 7.35 | 3.07 | 0 | 13 |

Composite scores showed a mean knowledge score of 4.83 ± 1.58 and a mean attitude score of 3.02 ± 0.94. The mean practice score was 7.35 ± 3.07, indicating frequent reporting of behavioral items included in the practice domain. Interpretation of these composite scores should be linked to the final scoring key because the number of displayed questionnaire items does not fully match the reported maximum score ranges.

*Table 6. Reported Associations Between Sociodemographic Variables and Selected Outcomes*

| Exposure Variable | Outcome Variable | $\chi^2$ | df | p-value |
|---|---|---|---|---|
| **Age group** | Unprotected sex | 11.56 | 3 | 0.009 |
| **Age group** | Multiple sexual partners | 8.56 | 3 | 0.036 |
| **Age group** | Gender-affirming treatment utilization | 24.77 | 3 | <0.001 |
| **Sexual orientation** | Multiple sexual partners | 13.06 | 3 | 0.005 |

| Exposure Variable | Outcome Variable | $\chi^2$ | df | p-value |
|---|---|---|---|---|
| **Sexual orientation** | Unprotected sex | 10.96 | 3 | 0.012 |
| **Residence** | Gender-affirming treatment utilization | 4.47 | 1 | 0.035 |
| **Previous discrimination** | Discussion of sexual health concerns with healthcare professionals | NR | NR | 0.018 |

Younger age groups were associated with unprotected sex, multiple sexual partners, and gender-affirming treatment utilization. Sexual orientation was associated with multiple sexual partnerships and unprotected sex. Urban residence was associated with gender-affirming treatment utilization. Previous discrimination was associated with discussion of sexual health concerns with healthcare professionals, although the chi-square value and degrees of freedom were not reported in the supplied manuscript.

*Table 7. Correlation Between Knowledge, Attitude, and Practice Domains*

| Domain Pair | Spearman's ρ | p-value |
|---|---|---|
| **Knowledge score and practice score** | −0.129 | 0.158 |
| **Knowledge score and attitude score** | −0.055 | 0.546 |

Spearman correlation analysis did not show statistically meaningful alignment between knowledge and reported practice or between knowledge and attitude. The weak negative correlation between knowledge and practice suggests that greater STI-related awareness did not clearly correspond with lower engagement in the behavioral items measured in the practice domain. Similarly, the weak correlation between knowledge and attitude indicates limited relationship between awareness and healthcare-oriented attitudes in this sample.

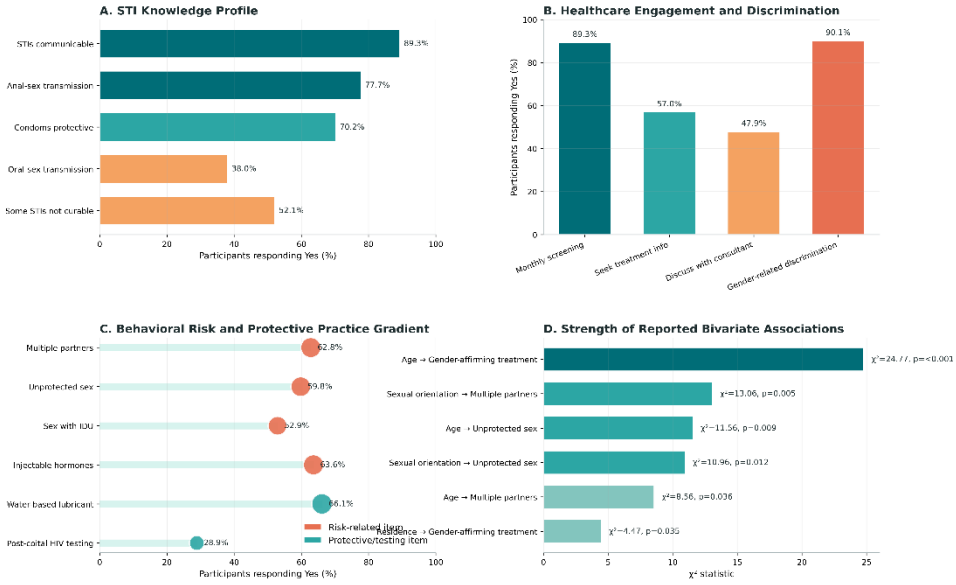


*Figure 1 Knowledge–practice gap and STI risk context among transgender individuals in Swat, Pakistan. Panel A shows STI-related knowledge, with high awareness of STI communicability (89.3%) and anal-sex transmission (77.7%), but lower recognition of oral-sex transmission (38.0%) and incomplete curability of some STIs (52.1%). Panel B summarizes healthcare engagement and discrimination, showing high preference for monthly STI screening (89.3%) alongside low willingness to discuss STIs with a health consultant (47.9%) and high reported gender-related discrimination (90.1%). Panel C presents behavioral risk and protective practice patterns, including multiple sexual partners (62.8%), preference for unprotected sex (59.8%), sex with injecting drug users (52.9%), and low post-coital HIV testing preference (28.9%). Panel D displays the strength of reported bivariate associations, with the strongest association observed between age group and gender-affirming treatment utilization ($\chi^2 = 24.77$, $p < 0.001$), followed by sexual orientation and multiple sexual partners ($\chi^2 = 13.06$, $p = 0.005$). Percentages are based on N = 121.*

Overall, the Results indicate that participants had relatively high awareness of STI communicability and anal-sex transmission, but important gaps remained regarding oral-sex transmission and curability. Risk-related sexual practices, discrimination, reluctance to discuss sexual health with healthcare providers, and low post-coital HIV testing preference were common. The findings support the presence of a knowledge–practice gap, but final interpretation should be made after verification of condom-use coding and clarification of composite KAP score construction.

## DISCUSSION

This study assessed knowledge, attitudes, healthcare engagement, and STI-related risk practices among transgender individuals in Mingora City, Swat District, Khyber Pakhtunkhwa, Pakistan. The findings indicate that participants had relatively high awareness of STI communicability and anal-sex transmission, but important knowledge gaps persisted regarding oral-sex transmission and the incomplete curability of some STIs. At the same time, risk-related practices were common, including multiple sexual partnerships, preference for unprotected sex, sexual contact with injecting drug users, injectable hormone use, and low post-coital HIV testing preference. These findings suggest a clear knowledge–practice gap in which basic awareness of STI transmission did not consistently correspond with safer sexual behavior or stronger engagement with preventive services.

The sociodemographic profile of participants reflects substantial social and educational marginalization. Most participants were young adults, and nearly three-quarters were illiterate, indicating limited access to formal education. Similar patterns have been reported in studies from Pakistan and other South Asian settings, where transgender individuals experience educational exclusion, family rejection, stigma, and restricted employment opportunities (13–16,19). Low educational attainment may reduce access to accurate sexual health information, limit health literacy, and make it more difficult for transgender individuals to navigate formal healthcare services. In the present study, most participants were engaged in dancing, while a smaller proportion reported sex work as their main occupation. These findings should be interpreted in relation to structural vulnerability rather than individual blame, as restricted employment opportunities may place transgender individuals in informal or high-risk income-generating environments.

Knowledge regarding STI communicability was high, and most participants recognized unprotected anal sex as a transmission route. However, fewer participants recognized oral sex as a possible route of STI transmission, and nearly half did not identify that some STIs are not completely curable. These knowledge gaps are clinically important because partial awareness may create a false sense of safety around specific practices. Regional and international studies have similarly reported incomplete STI knowledge among transgender populations, particularly regarding modes of transmission, condom negotiation, treatment-seeking, and prevention practices (6–10,20). The present findings therefore reinforce the need for targeted, community-appropriate sexual health education that goes beyond general awareness and addresses practical prevention, risk negotiation, testing, and treatment pathways.

A notable finding was the coexistence of high screening acceptability and low willingness to discuss STIs with healthcare consultants. Most participants preferred monthly STI screening, yet fewer than half reported willingness to discuss STIs with a health consultant. This pattern suggests that healthcare engagement may not be limited by lack of interest in prevention alone; rather, fear of stigma, prior discrimination, confidentiality concerns, and negative expectations from healthcare providers may discourage open discussion. More than 90% of participants reported discrimination due to gender identity, which supports this interpretation. Similar evidence from Pakistan and other settings shows that transgender individuals often avoid healthcare because of humiliation, misgendering, denial of care, breach of confidentiality, and provider insensitivity (16,21–23). Transgender-friendly clinical spaces, trained healthcare staff, peer navigators, and confidential screening services are therefore essential components of STI prevention.

Risk-related sexual practices were frequent. Multiple sexual partnerships, preference for unprotected sex, and sex with injecting drug users were reported by substantial proportions of participants. These behaviors are important because they may increase exposure to HIV, hepatitis B, hepatitis C, syphilis, gonorrhea, chlamydia, and other STIs, particularly when preventive services are inaccessible or underused. The reported low preference for post-coital HIV testing further suggests missed opportunities for early diagnosis and linkage to care. Global evidence consistently shows elevated HIV

and STI vulnerability among transgender populations, especially where sexual risk behaviors intersect with stigma, economic marginalization, violence, and healthcare exclusion (3–5,9,20). However, because the present study was cross-sectional and based on self-reported data, these findings should be interpreted as associations and descriptive patterns rather than causal relationships.

The association results provide further insight into potential risk clustering. Younger age was associated with unprotected sex, multiple sexual partners, and gender-affirming treatment utilization, while sexual orientation was associated with multiple sexual partnerships and unprotected sex. Urban residence was associated with gender-affirming treatment utilization. These findings suggest that STI prevention strategies should consider age, sexual networks, urban access patterns, and gender-affirming healthcare needs. However, because cross-tabulated subgroup counts and adjusted regression estimates were not available, the magnitude and direction of these associations should be interpreted cautiously. Future studies should present group-wise frequencies, odds ratios, confidence intervals, and adjusted models to better identify independent predictors of STI risk and healthcare engagement.

The weak correlations between knowledge, attitude, and practice domains further support the presence of a knowledge–practice gap. Knowledge alone may be insufficient to reduce STI-related risk when participants face economic dependence, partner pressure, client preference, stigma, or lack of accessible healthcare. Therefore, interventions should not rely only on information delivery. Effective programming should include peer-led education, free or low-cost condoms and lubricants, confidential STI screening, linkage to HIV prevention and treatment services, harm-reduction referral for injecting drug exposure, and provider training in transgender-affirming care. Community-based outreach through trusted transgender networks may be particularly relevant in conservative settings such as Swat, where stigma may limit open access to conventional health facilities.

This study has several limitations. Snowball sampling was appropriate for reaching a hidden and stigmatized population, but it may have introduced recruitment-network bias and limits generalizability beyond the sampled transgender networks in Mingora City. The cross-sectional design prevents causal inference between sociodemographic characteristics, discrimination, knowledge, attitudes, and risk behaviors. Sexual behaviors and healthcare experiences were self-reported and may be affected by recall bias or social desirability bias, especially because the questions involved sensitive and stigmatized practices. Biological testing for HIV or other STIs was not performed, so the study reports perceived knowledge and self-reported risk rather than laboratory-confirmed infection burden. The questionnaire scoring system also requires clearer reporting, including the full item list, coding direction, and reliability evidence for composite knowledge, attitude, and practice scores. Finally, the condom-use item requires verification because the reported table value needs to be reconciled with the broader narrative on unprotected sex.

Despite these limitations, the study contributes locally relevant evidence from an underrepresented population in Khyber Pakhtunkhwa. The findings highlight the need for STI prevention approaches that combine sexual health education with structural and service-level interventions. Transgender-friendly healthcare services, peer-led outreach, confidential screening, stigma reduction, and linkage to prevention and treatment services should be prioritized to reduce STI vulnerability among transgender individuals in Swat and similar settings.

## CONCLUSION

This study identified substantial STI-related vulnerability among transgender individuals in Mingora City, Swat, characterized by partial STI knowledge, high reported discrimination, limited willingness to discuss sexual health with healthcare providers, frequent risk-related sexual practices, and low post-coital HIV testing preference. Although awareness of STI communicability and anal-sex transmission was relatively high, knowledge gaps regarding oral-sex transmission and curability remained evident, and awareness did not consistently translate into safer sexual practices. These findings support the need for

culturally sensitive, transgender-affirming, peer-led, and confidential STI prevention services that integrate health education, regular screening, condom and lubricant access, harm-reduction referral, and stigma reduction within healthcare settings.

## REFERENCES


1. World Health Organization. Sexually transmitted infections (STIs). Geneva: World Health Organization; 2023.
2. Centers for Disease Control and Prevention. Sexually transmitted infections treatment guidelines. Atlanta: Centers for Disease Control and Prevention; 2021.
3. Poteat T, Reisner SL, Radix A. HIV epidemics among transgender women. Curr Opin HIV AIDS. 2014;9(2):168-73.
4. Baral SD, Poteat T, Stromdahl S, Wirtz AL, Guadamuz TE, Beyrer C. Worldwide burden of HIV in transgender women: a systematic review and meta-analysis. Lancet Infect Dis. 2013;13(3):214-22.
5. Van Gerwen OT, Jani A, Long DM, Austin EL, Musgrove K, Muzny CA. Prevalence of sexually transmitted infections and HIV in transgender persons: a systematic review. Transgend Health. 2020;5(2):90-103.
6. Rahman MM, Alam UK, Dastider S, et al. HIV-related knowledge and risk behaviors among transgender individuals in Dhaka, Bangladesh. Glob Health Econ Sustain. 2024;2(1):1643.
7. Rana AM, Reza MM, Alam MS, et al. Effects of mobility on condom use among transgender women in Bangladesh. AIDS Behav. 2016;20:2165-77.
8. Khan SI, Hussain MI, Parveen S, Bhuiyan MI, Gourab G, Sarker GF, et al. Living on the extreme margin: social exclusion of the transgender population in Bangladesh. J Health Popul Nutr. 2009;27(4):441-51.
9. Operario D, Soma T, Underhill K. Sex work and HIV status among transgender women: systematic review and meta-analysis. J Acquir Immune Defic Syndr. 2008;48(1):97-103.
10. Chakrapani V, Newman PA, Shunmugam M, Kurian AK, Dubrow R. Barriers to free antiretroviral treatment access among kothi-identified men and aravanis in India. AIDS Care. 2011;23(12):1687-94.
11. Abdullah MA, Basharat ZB, Shafqaat A, et al. Awareness about sexually transmitted infections among Hijra sex workers of Rawalpindi/Islamabad. J Ayub Med Coll Abbottabad. 2012;24(3-4):33-7.
12. Government of Pakistan. Transgender Persons (Protection of Rights) Act 2018. Islamabad: Government of Pakistan; 2018.
13. Rehan N, Chaudhary I, Shah SK. Socio-sexual behaviour of hijras of Lahore. J Pak Med Assoc. 2009;59(6):380-4.
14. Baqi S, Shah SA, Baig MA, et al. Seroprevalence of HIV, HBV and syphilis among hijras in Karachi, Pakistan. J Pak Med Assoc. 2006;56 Suppl 1:S17-21.
15. John A, Rana MS, Hanif A, et al. Knowledge, attitudes and practices of male transgenders regarding HIV transmission in Lahore, Pakistan. Pak Biomed J. 2021;4(1).
16. Manzoor I, Khan ZH, Tariq R, Anwar N, Riaz F. Health problems and barriers to healthcare services for the transgender community in Lahore, Pakistan. Pak J Med Sci. 2022;38(1):138-44.
17. UNAIDS. Global AIDS update. Geneva: Joint United Nations Programme on HIV/AIDS; 2022.

18. World Health Organization. HIV prevention among transgender populations. Geneva: World Health Organization; 2022.

19. Banik S, Khan MSI, Jami H, et al. Social determinants of sexual health among sexual and gender diverse people in South Asia. Singapore: Springer; 2023.

20. Nemoto T, Operario D, Keatley J, Villegas D. HIV risk behaviors among male-to-female transgender persons of color in San Francisco. Am J Public Health. 2004;94(7):1193-9.

21. Poteat T. Transgender people and sexually transmitted infections. San Francisco: Center of Excellence for Transgender Health; 2016.

22. Budhwani H, Hearld KR. Muslim women's experiences with stigma and abuse. J Womens Health. 2017;26(5):435-41.

23. Farah S, Rizk Y, Azar M. Transgender health in the Middle East region: a literature review. Transgend Health. 2024;9(5):375-88.