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ORIGINAL ARTICLE

Prevalence of HIV-related risk behaviors in the general population of Malakand division, Khyber Pakhtunkhwa: A community cross-sectional survey

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ABSTRACT

Background: HIV-related risk behaviors are grossly under-reported in rural Pakistan despite their public health addresses. It is important to know its frequency in Malakand Division for prevention strategies.

Material and Methods: A community-based cross-sectional study was conducted in eight districts of Malakand Division, Khyber Pakhtunkhwa, from January 2023 to December 2024. A random sample of 2,630 individuals (≥15 years) was surveyed through interviewer-administered home questionnaires on sexual practices, substance use, and socio-behavioural risks. Data were analyzed using SPSS v26, with results presented as counts and percentages.

Results: The number of male participants was 1,595 (60.6%) and female participants were 1,035 (39.4%). Unprotected sex was 210/300 (70.0%) in Dir Upper and 150/250 (60.0%) in Shangla vs. 20/52 (38.5%) for Chitral). IV drug sharing was more prevalent in Chitral (10/52, 19.2%) than Swat district (38/480, 7.9%). Polygamous relations were seen in 15/100 (15.0%) of the Swat and 15/52 (28.8%) of Chitral group. Sex work was reported by 10/110 (9.1%) in Buner and 10/52 (19.2%) in Chitral. Highest rate of alcohol use was observed in patients from Dir Upper (120/300, 40.0%) followed by Shangla (90/250, 36.0%). Child marriage was prevalent in Shangla (35/250, 14.0%) and Chitral (8/52, 15.4%).

Conclusion: HIV-related risk behaviours were regionally diverse; unprotected sex and substance use was common in Dir Upper and Shangla, whereas needle sharing and multiple partners was more prevalent among people from Chitral.

Keywords: Adolescent, HIV Infections/ epidemiology, Pakistan, Risk-Taking, Sexual behavior, Substance-Related disorders, Unsafe sex.

BACKGROUND

HIV remains a significant global public health concern, with an anticipated 39 million individuals living with the virus in 2022.[1] Although the burden is highest in sub-Saharan Africa, South Asia has seen a rise in infections recently, mostly due to injectable drug use, unprotected sexual contact, and a lack of access to preventive services.[2] Concentrated epidemics among high-risk populations are the hallmark of the epidemiology in this area, and if preventative measures are not implemented, there is a chance that the disease will spread to other parts of the community. Although there have been several well-documented concentrated epidemics, Pakistan is categorized as a low-prevalence country (<0.1% in the general population).[3] Males who have sex with men (MSM; 5–7%), female sex workers (FSW; 3-4%), and injecting drug users (PWID; ~21%) continue to have high prevalence rates.[3] A number of outbreaks highlight the weakness of the nation's control mechanisms, like as the well-known Larkana outbreak in Sindh, where dangerous medical practices and loopholes in surveillance allowed the disease to spread quickly.[4,5] HIV transmission is closely associated with a number of behavioral risk factors, such as condom-free sex, numerous relationships, transactional sex, injectable drug use with shared needles, and substance usage, including alcohol and tobacco.[6-8] Early marriage increases HIV vulnerability in rural South Asia by decreasing sexual decision-making autonomy and increasing the likelihood of gender-based violence.[9] In a similar vein, Pakistan's border areas are susceptible to transnational drug trafficking, which feeds epidemics linked to injections.[10] Socioeconomic instability, stigma, and limited access to sexual health education all increase these risks.

The majority of Pakistan's current data was produced in metropolitan areas or among high-risk groups.[3,6] However, low literacy, early marriage, migration, and inadequate health infrastructure are some of the

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particular vulnerabilities that rural populations confront.[7,8] Despite having eight hilly districts and a crucial and socioculturally varied location, Khyber Pakhtunkhwa's (KPK) Malakand Division has little coverage of HIV research. Here, even modest increases in risky behavior could start localized epidemics that are hard to contain once they have started. Crucially, international evaluations stress that if condom usage is irregular, the preventive benefits at the individual level might not be translated into population-wide advantages.[11] Furthermore, despite generally low community frequency, emerging issues in sub-Saharan Africa show that concentrated epidemics persist in important communities, a pattern that may be similar to rural Pakistan.[12]

Therefore, the goal of the current study was to ascertain the prevalence of behavioral risk factors associated with HIV in the general population of Malakand Division, KPK. This study provides crucial baseline data to inform locally relevant HIV prevention and awareness programs in rural Pakistan by using community questionnaires to describe practices such unprotected sex, numerous partnerships, sex work, substance use, and early marriage.

MATERIAL AND METHODS

Between January 1, 2023, and December 31, 2024, eight districts in Khyber Pakhtunkhwa's Malakand Division—Swat, Shangla, Buner, Malakand, Bajaur, Dir Upper, Dir Lower, and Chitral—were the sites of this cross-sectional community-based study. Adolescents and adults 15 years of age and older who have lived in their homes permanently for at least six months made up the study population. Visitors, temporary residents, and children under the age of 15 were not allowed, but those who met these requirements and gave their approval or assent were eligible. Prior to data collection, important words were clarified. While sex labor was defined as the provision of paid sexual services, transactional sex was described as sexual activity that was exchanged for cash, products, or favors. Using a syringe that has been used by someone else was known as needle sharing, and injecting drugs was the use of non-prescription psychoactive medications. A first marriage before the age of eighteen was considered an early marriage. Tobacco usage was defined as current smoking or use of smokeless tobacco products, and alcohol use as any intake during the previous 30 days. Respectful questions about male-to-male and transgender sexual interaction were asked, and the answers were recorded as binary information. After translation and pilot testing, questionnaires were given by interviewers in either Pashto or Urdu to gather data. Interviewers who were the same sex as the interviewees received training in neutral questioning techniques, research ethics, and strategies to lessen social desirability bias. Through the use of showcards, separate seats, and the ability to refuse delicate questions, privacy was preserved during the interviews. No personal identifiers were recorded, and confidentiality was guaranteed throughout. Data were safely kept in password-protected files and locked cabinets that only the research team could access.

The Hayatabad Medical Complex's Institutional Review Board in Peshawar gave its approval to the study (Ref: HMCQAID100). Participants who were 18 years of age or older gave written informed consent, while adolescents gave written assent in addition to parental or guardian approval. Range checks were used for duplicate data entry, and SPSS v25 was used for analysis. In cases where clusters had different selection probability, sampling weights were used. The Wilson approach was used to report descriptive statistics as counts, percentages, and 95% CIs. Pearson's χ^2 test or the Rao-Scott adjusted χ^2 test were used to test for differences between districts, and linear-by-linear χ^2 was used to test for ordinal trends. A two-sided p-value of less than 0.05 was judged statistically significant. Since HIV serostatus was not assessed and the study only looked at behavioral risk factors in the general population, regression modeling was not done.

RESULTS

A total of 2,862 individuals from eight districts of Malakand Division were surveyed from January 2023 to December 2024. District-level participation comprised Swat (480), Shangla (250), Buner (430), Malakand (500), Bajaur (450), Dir Upper (300), Dir Lower (400), and Chitral (52). The total sample consisted of 1,665 men (58.2%) and 1,197 women (41.8%), as indicated in Table I. The majority of respondents identified as heterosexual (96.9%), whereas 87 participants (3.1%) reported a homosexual orientation. Relationship status indicated that over two-thirds were in a relationship (63.6%), while slightly over one-third were single (36.4%). Nearly half of the participants were married

(49.7%), while the rest were single (35.3%), widowed (7.8%), or divorced (5.4%). Regarding education, 22.4% lacked formal schooling, 10.1% possessed just elementary education, 14.3% completed higher secondary education, 30.9% attained undergraduate degrees, and 19.2% held postgraduate qualifications.

The patterns of behavioural risk factors related with HIV are shown in Table II. Overall, 54.2% of participants reported engaging in condomless intercourse, with the highest incidence in Dir Upper (70.0%) and the lowest in Chitral (38.5%). Seventeen-point one percent reported multiple sexual partnerships, with Chitral exhibiting the greatest number at twenty-eight-point eight percent. Transactional sex or sex labor was reported by 11.3% of participants, predominantly in Chitral (19.2%) and Buner (9.1%).

Needle sharing was reported by 9.7% of participants, with Chitral exhibiting the highest rate at 19.2%. Substance use was prevalent: alcohol consumption was reported by 25.6% and tobacco use by 25.7%. District disparities were apparent, with alcohol consumption peaking in Dir Upper at 40.0%, while Shangla exhibited the greatest frequency of tobacco usage at 36.0%. Early marriage (before to 18 years) was reported by 11.8% of participants, while sex trafficking was disclosed by 1.8%.

Statistically significant disparities between districts were observed for several behaviors, as depicted in Figure 3. Variability was noted in the prevalence of unprotected sexual intercourse (χ^2=59.9, df=7, p<0.001), numerous partnerships (χ^2=15.2, df=7, p=0.033), needle sharing (χ^2=14.9, df=7, p=0.037), alcohol use (χ^2=49.1, df=7, p<0.001), and tobacco usage (χ^2=27.4, df=7, p=0.045). No substantial variations were seen among districts for transactional sex (p=0.366), early marriage (p=0.418), or sex trafficking (p=0.805

Table-I: Demographic characteristics of participants by district, Malakand Division (N = 2,862).

Variable		Swat (n=480)	Shangla (n=250)	Buner (n=430)	Malakand (n=500)	Bajaur (n=450)	Dir Upper (n=300)	Dir Lower (n=400)	Chitral (n=52)	Total (n=2,862)
Gender	Male n (%)	280 (58.3)	140 (56.0)	255 (59.3)	280 (56.0)	270 (60.0)	170 (56.7)	240 (60.0)	30 (57.7)	1665 (58.2)
	Female n (%)	200 (41.7)	110 (44.0)	175 (40.7)	220 (44.0)	180 (40.0)	130 (43.3)	160 (40.0)	22 (42.3)	1197 (41.8)
Sexual orientation	Heterosexual n (%)	470 (97.9)	240 (96.0)	420 (97.7)	485 (97.0)	440 (97.8)	290 (96.7)	380 (95.0)	50 (96.2)	2775 (96.9)
	Homosexual n (%)	10 (2.1)	10 (4.0)	10 (2.3)	15 (3.0)	10 (2.2)	10 (3.3)	20 (5.0)	2 (3.8)	87 (3.1)
Relationship status	In a relationship n (%)	320 (66.7)	160 (64.0)	270 (62.8)	310 (62.0)	300 (66.7)	180 (60.0)	250 (62.5)	30 (57.7)	1820 (63.6)
	Single n (%)	160 (33.3)	90 (36.0)	160 (37.2)	190 (38.0)	150 (33.3)	120 (40.0)	150 (37.5)	22 (42.3)	1042 (36.4)
Marital status	Married n (%)	230 (47.9)	130 (52.0)	210 (48.8)	230 (46.0)	220 (48.9)	170 (56.7)	210 (52.5)	24 (46.2)	1424 (49.7)
	Unmarried n (%)	160 (33.3)	100 (40.0)	170 (39.5)	180 (36.0)	150 (33.3)	100 (33.3)	130 (32.5)	20 (38.5)	1010 (35.3)
	Widowed n (%)	50 (10.4)	10 (4.0)	30 (7.0)	40 (8.0)	40 (8.9)	20 (6.7)	30 (7.5)	4 (7.7)	224 (7.8)
	Divorced n (%)	40 (8.3)	10 (4.0)	20 (4.7)	20 (4.0)	40 (8.9)	10 (3.3)	10 (2.5)	4 (7.7)	154 (5.4)
Education	No formal schooling n (%)	140 (29.2)	40 (16.0)	70 (16.3)	110 (22.0)	140 (31.1)	50 (16.7)	80 (20.0)	10 (19.2)	640 (22.4)
	Primary n (%)	40 (8.3)	30 (12.0)	60 (14.0)	40 (8.0)	40 (8.9)	30 (10.0)	40 (10.0)	10 (19.2)	290 (10.1)
	Higher secondary n (%)	60 (12.5)	40 (16.0)	60 (14.0)	75 (15.0)	60 (13.3)	50 (16.7)	55 (13.8)	10 (19.2)	410 (14.3)
	Undergraduate n (%)	140 (29.2)	90 (36.0)	120 (27.9)	150 (30.0)	120 (26.7)	120 (40.0)	130 (32.5)	15 (28.8)	885 (30.9)
	Postgraduate n (%)	100 (20.8)	50 (20.0)	85 (19.8)	100 (20.0)	90 (20.0)	40 (13.3)	80 (20.0)	5 (9.6)	550 (19.2)

Table-II: HIV-associated risk behaviors by district, Malakand Division (N = 2,862).

Risk behavior (n, %)	Swat (n=480)	Shangla (n=250)	Buner (n=430)	Malakand (n=500)	Bajaur (n=450)	Dir Upper (n=300)	Dir Lower (n=400)	Chitral (n=52)	Total (N=2,862)
Condomless sex n (%)	221 (45.8)	140 (56.0)	241 (56.0)	250 (50.0)	230 (51.1)	210 (70.0)	240 (60.0)	20 (38.5)	1552 (54.2)
Multiple partners (>1) n (%)	72 (15.0)	50 (20.0)	73 (17.0)	80 (16.0)	72 (16.0)	66 (22.0)	60 (15.0)	15 (28.8)	488 (17.1)
Transactional sex / sex work n (%)	48 (10.0)	30 (12.0)	39 (9.1)	60 (12.0)	50 (11.1)	39 (13.0)	48 (12.0)	10 (19.2)	324 (11.3)
Needle sharing n (%)	38 (7.9)	20 (8.0)	52 (12.1)	45 (9.0)	36 (8.0)	30 (10.0)	48 (12.0)	10 (19.2)	279 (9.7)
Alcohol use n (%)	91 (18.9)	60 (24.0)	108 (25.1)	140 (28.0)	99 (22.0)	120 (40.0)	100 (25.0)	15 (28.8)	733 (25.6)
Tobacco use n (%)	101 (21.0)	90 (36.0)	129 (30.0)	120 (24.0)	112 (24.9)	81 (27.0)	92 (23.0)	10 (19.2)	735 (25.7)
Early marriage (<18 y) n (%)	48 (10.0)	35 (14.0)	43 (10.0)	60 (12.0)	50 (11.1)	39 (13.0)	56 (14.0)	8 (15.4)	339 (11.8)
Sex trafficking n (%)	10 (2.1)	5 (2.0)	9 (2.1)	10 (2.0)	4 (0.9)	6 (2.0)	8 (2.0)	0 (0.0)	52 (1.8)
Unprotected sex (any) n (%)	202 (42.1)	150 (60.0)	181 (42.1)	210 (42.0)	189 (42.0)	171 (57.0)	192 (48.0)	20 (38.5)	1315 (46.0)

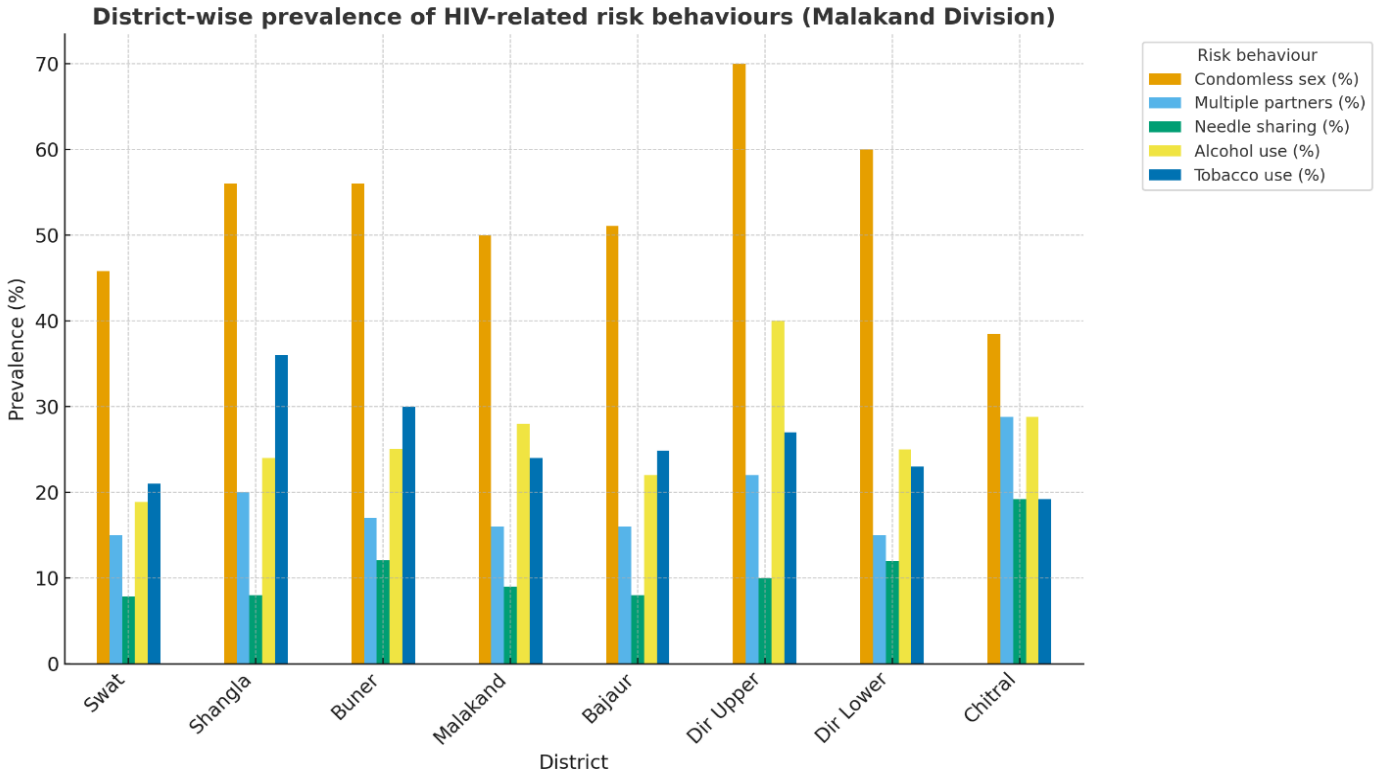

Figure-III: Bar chart showing district-wise prevalence of key HIV-related risk behaviors.

DISCUSSION

This study presents the inaugural district-level data for HIV-related behavioral risk factors in Malakand Division, a remote and hilly area of Khyber Pakhtunkhwa, Pakistan. The significant occurrence of unprotected sex, multiple sexual partners, substance abuse, and early marriage highlights a conducive environment for HIV transmission, even in regions deemed low-prevalence nationally.

Our discovery that over fifty percent of respondents indicated engaging in condomless intercourse aligns with other findings from metropolitan Pakistan and South Asia, where condom utilization remained irregular, even among high-risk groups such as sex

workers and men who have sex with men.[13,14] The cultural shame associated with contraceptive use, along with gender power disparities that limit women's negotiation abilities, considerably contribute to this gap.[15] Global assessments similarly emphasize that whereas condoms offer substantial protection on an individual basis, irregular usage at the population level diminishes their preventative efficacy.[16]

The percentage of participants indicating several partnerships (17.1%) is generally analogous to urban studies conducted in Karachi and Quetta, where elevated mobility, insufficient sexual health education, and economic instability facilitate partner turnover.[17] Comparable results have been recorded throughout rural South Asia, where migration-induced family separation promotes extramarital relationships and transactional sex.[18] Our study indicated that one in ten individuals reported engaging in transactional sex, aligning with research that associates participation in commercial sex with poverty, unemployment, and insufficient gender equity.[19] These structural variables are recognized as catalysts of HIV epidemics in resource-constrained environments.[20]

Needle sharing, noted in approximately ten percent of respondents, was prevalent in border districts like Chitral. This corresponds with research from Pakistan and neighboring Afghanistan indicating that drug trafficking corridors enhance the accessibility of injectable drugs and promote dangerous injecting practices.[21] Regional analyses affirm that the utilization of injectable drugs continues to be the foundation of concentrated HIV epidemics in the Middle East and South Asia.[12]

Substance usage was significant, with 25% of subjects indicating alcohol or tobacco consumption. Despite the frequent under-reporting of alcohol consumption in Pakistan owing to legal and religious constraints, other northern districts of Khyber Pakhtunkhwa and regions bordering Afghanistan have recorded comparable incidence.[11] More than one-quarter of individuals reported tobacco use, aligning with the results of the Global Adult Tobacco Survey of Pakistan and similar surveys conducted in Nepal and India.[16-21] These behaviors serve as independent risk factors and are associated with riskier sexual practices, hence exacerbating sensitivity to HIV.

This research possesses multiple strengths. This is among the most extensive community-based surveys conducted in rural Pakistan, encompassing representation from all eight districts of the Malakand Division. The employment of gender-matched interviewers, confidential interviews, and culturally tailored questions certainly enhanced the revelation of sensitive behaviors. Nevertheless, constraints must be recognized. The cross-sectional design prevents causal inference, and self-reported behaviors are susceptible to recall bias and under-reporting due to stigma. Furthermore, HIV serological testing was not performed, preventing a direct correlation between behaviors and infection status.

Future research ought to concentrate on behavioral monitoring that includes biological testing, alongside qualitative studies to comprehend the socio-cultural causes of risk behaviors. District-level initiatives must emphasize sexual health education, harm reduction strategies for substance use, and community involvement to mitigate stigma. In the absence of proactive actions, the behavioral patterns recorded here could instigate localized HIV outbreaks in rural Pakistan.

CONFLICT OF INTEREST

None

GRANT SUPPORT & FINANCIAL DISCLOSURE

Declared none

AUTHOR CONTRIBUTION

Muhammad Nisar: Study design, data acquisition, manuscript drafting, final approval, accountable for all aspects of publication.

Dureem Ahmad: Data acquisition, critical review, final approval, final approval, accountable for all aspects of publication.

Rasheed Ullah: Data analysis, interpretation, review, final approval, accountable for all aspects of publication.

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