

# Risk Perception, Risk Practices and Vaccine Hesitancy Regarding Mpox: Exploring Men Having Sex with Men, The High Risk Stratum in Pakistan

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## Abstract

**Background** The 2022 and 2024 Public Health Emergencies of International Concern declared by the World Health Organization for Mpox have underscored men who have sex with men (MSM) as a stratum at disproportionate risk of Mpox infection. The lack of locally generated data on Mpox-related perceptions and preventive practices among Pakistani MSM limits effective preparedness and response planning.

**Objective** To assess perception and practices regarding Mpox among men who have sex with men (MSM).

**Methods** A cross sectional survey was carried out in a period of 2 months to identify 109 men who reported having sex with at least one male partner in the past 12 months. A pretested structured questionnaire was administered to assess demographic characteristics, awareness of Mpox, sexual behavior, perceptions, and condom use.

**Results** The predominant age group was 30-39 years (56.8%). Multiple sexual partners were reported by 81.7% and bisexual concurrency by 67.8%. Although 65.7% had heard of Mpox, only 44.9% recognized it as a skin disease, 33.0% identified physical contact as a transmission route, and only 19.3% were aware of sexual transmission between men. Always condom use was documented by only 26.6%, while 43.1% had never used condoms. Consistent condom use was significantly associated with urban residence ( $P=.023$ ), higher educational attainment ( $P=.0031$ ), and reporting multiple sexual partners ( $P=.001$ ).

**Conclusion** Pakistani MSM demonstrate limited practical knowledge of its transmission and prevention, alongside prevalent high-risk sexual behaviors and inconsistent protective practices, highlighting the need for culturally appropriate, peer-led interventions integrated into existing HIV/STI services and for larger representative studies to inform evidence-based strategies.

**Keywords** Mpox; Monkeypox; Men's sex with men; Perceptions; Practices; Condom use; Public health.

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## Introduction

The Mpox (MPX), formerly known as monkeypox, is a rare double-stranded DNA viral Zoonosis with two distinct genetic clades confined to forested areas of West and Central Africa for several decades, with first human case of the virus identified in 1970 from

the Democratic Republic of the Congo, with most subsequent infections linked to household exposure,

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direct contact with sick animals, or restricted human-to-human transmission.<sup>1-3</sup> In May 2022, UK Health Security Agency reported a cluster of cases with no travel links to endemic regions. World Health Organization designated the epidemic as a Public Health Emergency of International Concern in July 2022 when sustained human-to-human transmission was observed within weeks across multiple non-endemic regions including Europe, the Americas, and Australia. By June 2023, more than 87,000 confirmed cases had been reported across 122 countries, marking an unprecedented outbreak in terms of both its global spread and affected population characteristics.<sup>4-6</sup>

In contrast to earlier outbreaks, gay, bisexual, and other men who have sex with men (MSM) were disproportionately impacted by the 2022 pandemic, with Thornhill and colleagues' a ground-breaking study of 528 cases in 16 countries reporting 98% of patients identified as gay or bisexual men, 41% had HIV, and 95% of cases were thought to have been transmitted through sexual contact and clinical presentation commonly included anogenital and mucosal lesions accompanied by inguinal lymphadenopathy contrary to the centrifugal rash reported in earlier African case series.<sup>7-9</sup>

The rapid global emergence of Mpox in 2022 has been associated by modelling studies with transmission within heavy-tailed sexual contact networks, where a small subset of highly connected individuals account for a disproportionate share of onward spread, a pattern also observed in HIV and syphilis.<sup>10-12</sup> The subsequent decline of the outbreak in several high-income settings has been attributed to a combination of vaccination with the modified vaccinia Ankara vaccine, voluntary reductions in casual sexual partnerships, and increased condom use among MSM communities, highlighting the importance of behavioural modification in outbreak control.<sup>13-15</sup>

Pakistan reported its first laboratory-confirmed case of Mpox in a traveller returning from Saudi Arabia in 2023 followed by several additional travel-

associated cases, including one fatality, the nation remains vulnerable due to a fragile health system, limited diagnostic capacity outside of the National Institute of Health and provincial laboratories, and a substantial but undocumented population of men engaging in same-sex behaviour, even though community transmission has not been conclusively established.<sup>16-18</sup>

Because same-sex behaviour is illegal and a social taboo, individuals are reluctant to disclose their sexual orientation, using services, or carrying condoms in public due to stigma, discrimination, the fear of social exclusion and family rejection hence, HIV prevalence among MSM and male sex worker subpopulations is estimated to be significantly higher than the overall adult prevalence in Pakistan, with low and inconsistent condom use, frequent partner concurrency, and overlap with female partners creating potential bridging pathways for transmission, consequently MSM in Pakistan are at a high risk of contracting any sexually transmitted infection, including Mpox potentiated by limited availability of local data on their knowledge, attitudes, and preventive practices.<sup>19-21</sup>

International cross-sectional studies conducted in countries such as the United Kingdom, Australia, China, Brazil, and Nigeria indicate that knowledge of Mpox transmission among MSM is often variable and insufficient and willingness to change sexual behavior and accept vaccination is largely driven by perceived risk and that focused educational interventions can significantly augment awareness.<sup>22-24</sup>

In this context, the current study was conducted to investigate the attitudes and behaviours of men who have sex with men in local setting, with an emphasis on identifying sexual risk patterns, information gaps, vaccine hesitancy and associated factors related to Mpox. In anticipation of any future Mpox activity in Pakistan and the neighbouring area, characterizing this high-risk group is intended to inform locally tailored health education, peer-led interventions, and targeted preventive strategies.

## Methods

Ethical Approval was obtained from the Institutional Ethical Review Committee, Institute of Public Health, Lahore no. 110/ERC/IPH. Dated 28.09.2024 prior to the commencement of the study. A cross sectional descriptive survey was conducted over a period of 2 months to assess perceptions and practices regarding Mpox among men who have sex with men (MSM) where participants' perception of Mpox was operationally defined as their views and attitudes regarding the severity, susceptibility, transmission, prevention, and control of Mpox, measured through questionnaire-based responses in the study whereas Risk perception was defined as the participant's perceived likelihood of acquiring Mpox and their perceived severity of the disease, as measured through responses to the study questionnaire and risk practices were operationally defined as behaviors that may increase or decrease the likelihood of Mpox transmission, including condom use, number of sexual partners, and other preventive practices, as assessed through participants' responses to the study questionnaire.

Participants were recruited in the study through snowball sampling. Few initial participants were identified through social media, who were included in study after informed consent and then they were further asked to recommend other participants in the acquaintance who fulfilled inclusion criteria and then those participants after taking informed consent, were included in the study and this practice was again performed. Rejection to be part of the study was high and almost 50% eligible candidates refused to participate. Till the writing of manuscript 109 consenting participants were successfully interviewed. This being hidden population was difficult to access with high rejection rate. Although the sample may not be fully representative of the broader MSM population, it was considered adequate for obtaining preliminary descriptive data regarding perceptions and practices related to Mpox and for exploring associations between selected demographic and behavioural variables and condom

use practices. Eligibility criteria included a self-reported male sex at birth, being 18 years of age or older, and having had sex with at least one male partner in the 12 months preceding the enrolment. Each engaged participant was requested to recommend additional qualified peers, and the initial seed participants were contacted via trusted peer networks and community gatekeepers. Verbal informed consent was obtained by each participant after explaining study objectives, the voluntariness of participation, the confidentiality of their responses, and their ability to withdraw at any time. Information was gathered using a pretested questionnaire Demographic information (age, education, place of residence), sexual behaviour (number and kind of sexual partners, sexual orientation), awareness and knowledge of Mpox (whether participants had heard of the disease, recognition of skin lesions and pustules, modes of transmission, and the link with male-to-male sexual contact), perceptions (whether sex between men can lead to disease, desire for access to information about sexually transmitted infections, belief in condom efficacy), and practices (frequency of condom use classified as always, seldom, or never). Data were entered and analyzed using SPSS version 20 statistical software. Frequencies and percentages were calculated for categorical variables and means with standard deviations for continuous variables. The chi square test was applied to determine associations between selected demographic and behavioural variables and consistent condom use. A *P* value <.05 was set to be considered significant statistically.

## Result

A total of 109 men who have sex with men were enrolled. Detailed demographic and behavioural characteristics of the study population are presented in **Table 1**. 76 individuals (69.7%) reported having regular sexual partners, whereas 91 participants (81.7%) reported having several sexual partners. 74 people (67.8%) reported being bisexual. Although 71 participants (65.7%) had heard of Mpox, their

**Table 1** Demographic characteristics of men who have sex with men (n= 109).

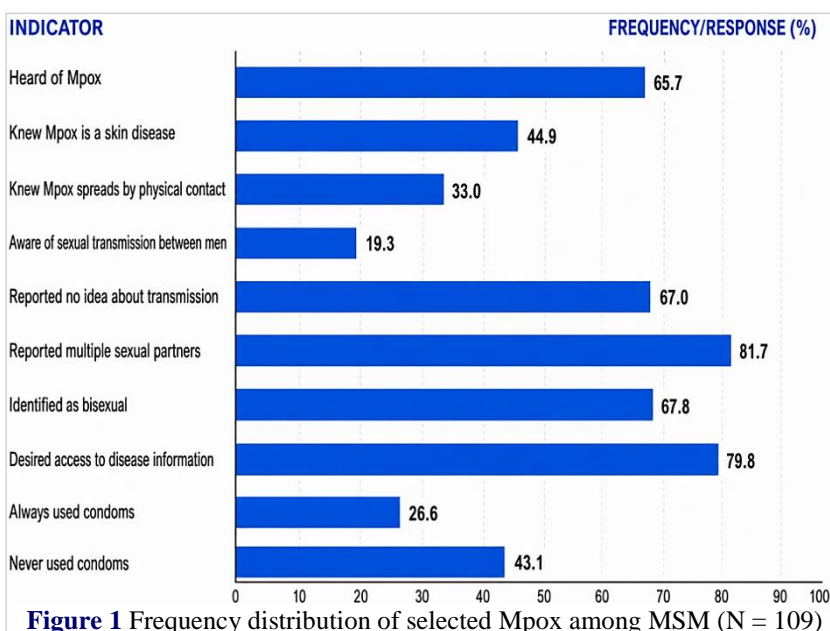
Demographic characteristics	Frequency (n)	Percentage (%)
<b>Age</b>		
18-25years	22	20.1
26-29years	7	6.4
30 to 39 years	62	56.8
40-49	13	11.9
Older than 50	5	4.5
<b>Monthly Income</b>		
<30000	37	33.9
31000-70000	41	37.6
>70000	31	28.4
<b>Education</b>		
Illiterate	31	28.4
Primary	22	20.1
Secondary/ higher secondary	42	38.5
University level	14	12.8
<b>Residence</b>		
Urban	73	67.0
Rural	36	33
<b>Marital status</b>		
Married	67	61.4
Unmarried	36	109
<b>Occupation</b>		
Not working	29	26.6
Education	23	21.1
Agriculture/cattle	14	12.8
Own Business	37	33.9
Office work	6	5.5
<b>Social media usage</b>		
Yes	71	65.1
No	38	34.8

overall understanding was limited. Just 49 people (44.9%) identified Mpox as a skin condition, and only 4 people (3.7%) were aware that the illness typically manifests as rashes and pustules. While 73 people (67.0%) said they had no idea how the disease is transmitted, 36 people (33.0%) were aware that Mpox is spread by physical contact. Awareness of sexual transmission was particularly low, with only 21 participants (19.3%) acknowledging male-to-male sexual contact as a route, and just 17 (15.5%) reporting concern about acquiring Mpox through sex with another man.

87 participants (79.8%) expressed a need for more information on sexually transmitted infections, and all respondents (100%) agreed that condom use can prevent sexually transmitted infections. However, actual practice was inconsistent, with only 29 (26.6%) reporting consistent condom use, 33 (30.3%) occasional use, and 47 (43.1%) never using condoms. 87 (79.8%) clearly wanted more information about STDs. The strong baseline acceptance of condoms as a preventive measure is demonstrated by the fact that all 109 participants (100%) thought that using them may prevent diseases spread through intercourse.

Condoms were widely accepted as protective, but regular use was rare. Only 29 (26.6%) said they always used condoms, 33 (30.3%) said they used them infrequently, and 47 (43.1%) said they had never used one. 86 (78%) participants showed hesitancy for vaccination against Mpox with safety concerns 66 (76%) and affordability 9 (10%) were documented as main concerns. **Figure 1** provides a graphic summary of the distribution of specific knowledge, behavioural, and practice indicators.

Three factors were shown to be substantially correlated with always using condoms using bivariate chi square testing. Consistent condom use was substantially correlated with both urban



**Figure 1** Frequency distribution of selected Mpox among MSM (N = 109)

residence ( $P=.023$ ) and greater educational achievement (secondary and above) ( $P=.0031$ ) reporting multiple sexual partners was also significantly associated with consistent condom use ( $P=.001$ ). Vaccine hesitancy was significantly associated with rural residence ( $P=.001$ ) and lower educational achievement ( $P=.05$ ) however no significant association was found with income of occupation. Threat perception had significant association with social media usage ( $P=.027$ ) education ( $P=.031$ ) and multiple sexual partners ( $P=.001$ ).

## Discussion

This cross-sectional survey of 109 men who have sex with men, recruited through snowball sampling, represents one of the first assessments of Mpox-related attitudes and behaviors in a hidden and high-risk population in this setting. The participants' mean age was 37 years, with majority of population concentrated in 30 to 39 years age group. This profile closely mirrors the demographic characteristics of Mpox cases reported internationally, where the median age has continuously clustered between 35 and 38 years.<sup>7,25</sup> The findings have external relevance because the local MSM population examined here falls in the similar age strata most highly affected globally.

Despite the fact that 76 out of 109 individuals said they had heard about Mpox, there was remarkably little in-depth information. These numbers are in contrast to surveys of MSM in higher-income environments, where the median knowledge score is typically much higher. For instance, a cross-sectional study conducted in Australia found that 97.8% of MSM had heard of Mpox, and the median number of correct answers on a twelve-item knowledge test was ten.<sup>25,26</sup> This gap highlights that general awareness does not equate to adequate operational knowledge for effective self-protection and aligns with UK-based evidence showing incomplete understanding of transmission routes even among informed populations.<sup>22,23</sup>

A high-risk stratum is reflected in the participants' behavioral profile. 74 identified as bisexual, 79 had regular sex partners, and 91 reported having several sexual partners. The presence of bisexual concurrency is particularly concerning, as it may facilitate transmission between MSM networks, female partners, and the wider community. Similar patterns have been documented in previous behavioral studies from Pakistan as well as regional research in the Middle East and North Africa.<sup>19-21</sup> Despite the prevalent stigma, 21 people thought that having sex with males could result in illness, and 87 said they would like more in depth of knowledge about sexually transmitted diseases. These findings show that participants are open to educational initiatives.

Condom use was suboptimal in this cohort. Of the participants, only 29 said they always used condoms, 33 said they used them occasionally, and 47 said they had never used them. A significant disparity between knowledge and practice was revealed when all 109 agreed that condoms can stop the spread of disease. Comparable inconsistencies between awareness and behavior have been reported in HIV behavioral studies among MSM in Pakistan.<sup>19,20</sup> In contrast, international evidence indicates that approximately one-quarter of MSM in affected high-income countries increased condom use for anal sex during the 2022 Mpox.<sup>26,27</sup>

Three factors were shown to be substantially correlated with always using condoms using bivariate chi square testing. Consistent condom use was substantially correlated with both urban residence ( $P=.023$ ) and greater educational achievement (secondary and above) ( $P=.0031$ ) reporting multiple sexual partners was also significantly associated with consistent condom use ( $P=.001$ ).

The urban gradient is in line with more general health behavior evidence from Pakistan, which indicates that urban men are more likely to be exposed to peer networks, the media, and sexual

health services. Educational advancement is associated with better risk perception and increased self-efficacy for protective behavior, which is consistent with global behavior change literature.<sup>28,29</sup>

Vaccine hesitancy was significantly associated with rural residence ( $P=.001$ ) and lower educational achievement ( $P=.05$ ) however no significant association was found with income of occupation which is largely in compliance with global studies, as international research has similarly shown that Mpox vaccine hesitancy is strongly associated with misinformation, low disease knowledge, limited trust in official health information sources, and low perceived personal risk.<sup>30</sup> Threat perception had significant association with social media usage ( $P=.027$ ) education ( $P=.031$ ) and multiple sexual partners ( $P=.001$ ). Previous studies reported that despite high perceived severity of Mpox, low perceived susceptibility and stigma-related psychosocial factors contributed to inadequate preventive behaviors, highlighting the need for targeted and non-stigmatizing risk communication.<sup>31</sup>

These findings have several implications for public health practice. First, Mpox preparedness in Pakistan should extend beyond border screening of travelers, although this has so far successfully detected imported cases and include sustained community-level engagement with high-risk populations most likely to contribute to onward transmission.<sup>16,17</sup> Secondly, the observed willingness among participants to seek information suggests that culturally appropriate, peer-led, and digitally delivered interventions, including outreach via social platforms and community organizations, are both feasible and potentially effective, as demonstrated during behavioral shifts observed in the 2022 outbreak in Europe and North America.<sup>12,27</sup>

Third, there is a compelling case for integrated service delivery in which Mpox awareness, HIV testing, and sexually transmitted infection screening are provided through the same channels due to the well-documented overlap between Mpox and HIV,

with HIV co-infection reported in 35-41% of Mpox cases in international series and linked to more severe disease in those with uncontrolled infection.<sup>8,32,33</sup>

## Conclusion

Although awareness of Mpox was observed among participants, this cross-sectional snowball sampling study highlights the presence of a potentially vulnerable subgroup among men who have sex with men in the local setting. Given the recurrent global public health concern surrounding Mpox and the reporting of imported cases in Pakistan, there is a need for increased attention toward targeted and culturally sensitive preventive strategies. Strengthening sexual health education and incorporating Mpox-related awareness into existing HIV and STD services may represent practical and achievable public health measures. However, the findings should be interpreted with caution due to the non-probability sampling technique and limited generalizability of the study population. Further large-scale and representative studies are recommended to better understand risk patterns and guide evidence-based interventions.

**Declaration of patient consent** Authors certify that they have obtained all appropriate patient consent.

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**Conflict of interest** No conflict of interest.

## Author's contribution

**SRHZ:** Substantial contribution to conceptualization and design of the study and manuscript writing.

**TM:** Substantial contribution to acquisition of data and manuscript writing.

**AFN, MZ:** Substantial contribution in study design and critical review of the manuscript.

**MA, JH:** Substantial contribution to conceptualization and critical review of the manuscript.

Every author has given final approval of the manuscript version to be published and agreed to be accountable for all aspects of the work.

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