

Monkeypox preparedness in Pakistani Healthcare Workforce and reluctance against its vaccination: Assessing the gaps

Syed Razi Haider Zaidi¹, Tahir Mahmud², Muhammad Nauman Ali³, Mughees Ahmad³, Atika Tahir³, Muhammad Faizan Shafi Khan³

¹Department of Community Medicine, King Edward Medical University, Lahore.

²Department of Community Medicine, Shalamar Institute of Medical & Dental College, Lahore.

³3rd year MBBS students, Services Institute of Medical Sciences, Lahore.

Abstract

Background The 2022-2025 global Monkeypox (Mpox) outbreak highlighted critical gaps in healthcare providers' preparedness worldwide. Prior studies in Africa, the Middle East, Europe, and Asia have reported that only one-quarter to one-half of clinicians retained adequate knowledge and confidence in the diagnosis and management of Mpox. This study evaluates Mpox awareness, attitudes, confidence, and availability of information sources among healthcare workers in Pakistan.

Objective To assess the level of knowledge related to Mpox, self-reported diagnostic and management confidence, perceived barriers, and the association of these factors with demographic and professional characteristics among healthcare providers in Pakistan.

Methods A cross-sectional, web-based survey was administered to 81 healthcare providers (96.3% physicians; 3.7% nurses/ others). Participants reported their familiarity with monkeypox sources of information, symptom recognition, and confidence in diagnosis and case management, guideline awareness, perceived barriers, and concerns about infection. Chi-square analysis examined the relationship between years of clinical experience and confidence levels.

Results While 95.0% of respondents were at least somewhat familiar with Mpox, only 16.3% felt very confident in diagnosing cases and 15.2% in managing them. Awareness of national/ international guidelines stood at 42.5%. Key barriers included lack of training (55.0%) and availability of resources (36.2%). Concern about personal infection was high (90.0% reporting at least some concern). More experienced providers reported significantly greater confidence ($p=0.010$).

Conclusion Pakistani healthcare workers demonstrate moderate Mpox awareness but suboptimal confidence and guideline familiarity. Targeted educational programs, incorporation of Mpox modules into medical and nursing curricula, and resource allocation for training are urgently needed to bolster outbreak preparedness in Pakistan.

Keywords Monkey pox; Preparedness; Healthcare personnel.

Citation: Zaidi SRH, Mahmud T, Ali MN, Ahmad M, Tahir A, Khan MFS. Monkeypox preparedness in Pakistani Healthcare Workforce and reluctance against its vaccination: Assessing the gaps. *J Pak Assoc Dermatol.* 2026;36(1):24-29. **Doi-** <https://doi.org/10.66344/jpad.v36i1.3332>

Introduction

Monkeypox (Mpox) is a rare contagious disease

Address for correspondence

Dr. Syed Razi Haider Zaidi,
Professor of Community Medicine,
King Edward Medical University, Lahore.
Ph: +923227940381; Email: razizaidi164@gmail.com

caused by the monkeypox virus (MPXV). The earlier outbreaks occurred in Central and West Africa, generally known as “monkey smallpox” but the 2022 global outbreak of Mpox has stressed the need for preparedness within healthcare systems worldwide.¹

Several cross-sectional studies have shown

extensively varying situations of knowledge, and readiness among healthcare professionals. In Saudi Arabia, a good level of knowledge about Mpox was observed among 16.9% of the nurses only.² Another study in Saudi Arabia showed that most of the healthcare workers HCWs (86.7%) indicated having heard about monkeypox before the study.³

In Egypt, among 1,034 responders [HCWs and scholars], only 55.3 had acceptable knowledge about Mpox.⁴ In Ethiopia, Among the 200 healthcare workers who participated, only 38.5% had good knowledge about Mpox.⁵ According to a systematic review published in 2024, the combined frequency of people having good knowledge about Mpox was just 33%.⁶ Other studies in Nigeria, Jordan, Iraq, Lebanon and Iran showed analogous gaps in knowledge, mindfulness, and readiness to manage the complaint.⁷⁻¹²

Further exploration highlights indigenous differences. In India, 64.9% had good knowledge and 35.1% health care professionals had poor knowledge.¹³ Likewise, the HCW with 6-10 years of work experience was more likely to have bettered knowledge scores.¹³ A Brazilian check noted that LGBTQIA individuals are being discerned against and stigmatized due to stigma associated with homosexuality, thus preventing them from accessing knowledge about the disease from peer or healthcare personnel from the fear of getting identified as LGBTQIA.¹⁴ In the United States, a CDC-led assessment set up that 65 of the emergency department staff were knowledgeable of Mpox guidelines.¹⁵

A cross-sectional check in China showed that factors like age, knowledge about Mpox, education position, exposure to HIV or Mpox information through online media had effect on the mindfulness about Mpox among the public.¹⁶ Another study conducted in Saudi Arabia showed that 55% of the surveyed HCWs had good knowledge of Mpox.¹⁷

European studies also reflect mixed preparedness. In Italy, a study demonstrated that HCWs had a

inadequate knowledge toward management of Mpox.¹⁸ Also, in Nigeria, a strong influence of academic qualification and years of experience on monkeypox knowledge were reported.⁷ A meta-analysis regarding the effect of work experience on the knowledge about Mpox showed similar results.¹⁹ A study in France and Belgium suggested that there's low acceptance of the MPVX vaccine among HCWs.²⁰

These findings indicate that only about one-quarter to half of healthcare providers across different regions of world retain good Mpox knowledge. Furthermore, smaller proportion exhibit positive confidence, especially concerning vaccines and treatment vacuity. Given their essential part in relating, treating, and precluding outbreaks, perfecting the knowledge and confidence of healthcare providers is pivotal to outbreak preparedness.^{17,18}

This study aims to evaluate awareness, attitudes, and intention to educate about Mpox among healthcare providers in Pakistan, identifying demographic and professional factors associated with knowledge and attitudes and the capacity holding of HCW in this context.

Methods

A descriptive cross-sectional study was conducted in healthcare facilities across Lahore, Pakistan, from April to July 2025, to assess the awareness and perception of monkeypox among healthcare professionals. A total of 81 participants, mostly doctors, completed a structured, self-administered questionnaire based on WHO guidelines. The tool included items on demographics, symptom awareness, and confidence in diagnosis and management. Participants were selected through convenience sampling and completed the survey voluntarily with written consent. Data were analyzed using SPSS software 22, applying descriptive statistics and inferential tests such as chi-square and Spearman's correlation. The study was ethically approved by the Institutional Review Board under

approval number: 110/ERC/IPH dated 28.09.2024 Institute of Public Health, Lahore. Participant confidentiality was maintained throughout the research.

Result

Mean age of the respondents was 42±4 years. 47(59%) were male while 33 (41%) were females. Among 81 Healthcare providers who participated in the survey, mostly doctors 78 (96.3%) and a few nurses and others 3 (3.7%). The distribution of experience and type of facility is given in **Table 1**.

When asked about Mpox awareness, 21 (25.9%) were very familiar, 56 (69.1%) somewhat familiar, and remaining 5 (6.2%) were not familiar. Online sources were the primary source of awareness 65 (80.2%), followed by journals 21 (25.9%), peers 18 (22.2%), training 16 (19.8%), and others 2 (2.5%). Rash and fever were the most chosen symptoms, while swollen lymph nodes and headaches were less noted.

Only 13 (16.3%) of participants felt very confident in diagnosing monkeypox, 41 (50.0%) somewhat confident, and 27 (33.8%) not confident. Regarding awareness of guidelines, only 34 (42.5%) were aware. Confidence in case management showed a similar pattern: 12(15.2%) were very confident, 43 (53.2%) somewhat, and 25 (30.4%) were not confident.

Table 1 Demographics and professional characteristics of healthcare providers (n=81).

Healthcare providers	n	Percentage
Profession		
Doctor	78	96.3
Nurses & Others	3	3.7
Years of experience in healthcare		
0–5 years	54	66.7
6–10years	14	17.3
11–15 ears	7	8.6
>15 years	6	7.4
Type of healthcare facility		
Hospital	71	87.7
Clinic	9	11.1
Community Health Centre	1	1.2
Other	7	8.6

Table 2 Assessment of knowledge, management practices, and threat perception of monkeypox among participants.

Assessment	n	Percentage
Familiarity with monkeypox		
Very familiar	21	25.9
Somewhat familiar	56	69.1
Not familiar	5	6.2
Source of information		
Online sources	65	80.2
Medical journals	21	25.9
Colleagues	18	22.2
Training	16	19.8
Others	2	2.5
Known symptoms		
Rash	78	96.2
Fever	76	93.8
Swollen nodes	58	71
Headache	46	56.7
Others	3	3.7
Confidence to diagnose		
Very confident	13	16.3
Somewhat confident	41	50.0
Not confident	27	33.8
Awareness of management guidelines		
Yes	34	42.5
No	47	58.02
Confidence in managing cases		
Very confident	12	15.2
Somewhat confident	43	53.2
Not confident	25	30.4
Perceived barriers		
Lack of training	78	96.2
Insufficient resources	46	56.7
Limited management support	19	23.4
Others	4	4.9
Concern about contracting monkeypox		
Very concerned	38	46.9
Somewhat concerned	34	41.9
Not concerned	9	1.11
Effective prevention measures		
Isolation	81	100
PPE	76	93.8
Vaccination	54	66.7
Training	32	39.5
Others	13	16
Workplace provides adequate protection		
No	59	72.8
Yes	15	18.5
Unsure	7	8.6
Vaccine willingness		
Yes	30	37
No	51	63
Reasons for vaccine hesitancy		
Not sure about Mpox affects	22	43
Safety concerns	19	37
Never hesitate about it	10	12

Key barriers mentioned by participants were lack of training (55.0%) and resources (36.2%). Concern about infection was high, 38 (47.5%) were very concerned, while 34 (42.5%) were somewhat concerned. Isolation and PPE were considered effective by 81 (100%) and 76 (93.8%) respectively, but only 15 (18.5%) believed their workplace was well-equipped.

30 (37%) HCW were willing to get vaccinated against Mpox while 51 (63%) were unwilling, out of which 22 (43%), 19 (37%) were concerned about safety, 10 (19%) had never heard about the vaccine.

A statistically significant positive association was observed between years of experience and self-reported confidence in managing monkeypox. Chi-Square test yielded; $P=0.010$, indicating that more experienced practitioners reported greater confidence.

Discussion

Mpox has been declared an emerging threat by WHO and preparedness of healthcare workforce is of paramount importance in reducing morbidity and mortality of the disease. A previous study conducted among the general population of Pakistan suggests poor knowledge about MPXV in Pakistan's public.² The overall knowledge of monkeypox was average in most respondents, with considerable knowledge gaps in most aspects.²¹ However, not many studies have previously evaluated the awareness about monkeypox in healthcare providers.

Our findings show that only 16.3% of the professionals felt very confident about diagnosing monkeypox, while awareness about management protocol stood at 42.5% among healthcare providers, including doctors, nurses, and medical assistants. This level of knowledge is better than that reported previously among nurses of Jeddah in Saudi Arabia, where only 16.9% were confident about their knowledge of monkeypox.^{2,3} However, it is lower than the levels reported in Egypt (55.3%) and Ethiopia (38.5%).^{4,5} In India, knowledge was good,

reporting 64.9%.¹³ Other studies in Nigeria, Jordan, Iraq, Lebanon and Iran showed analogous gaps in knowledge, mindfulness, and readiness to manage the disease.⁷⁻¹²

These findings highlight a greater need to organize educational programs on this disease among healthcare workers, especially those in primary healthcare settings, to improve monkeypox prevention and control. Training programs should be introduced for nursing staff for a better understanding of the prevention of the disease. To increase awareness and knowledge of epidemic diseases among new medical graduates, study programs on this topic should be included in university subjects as well. Additionally, further research studies including other healthcare sectors from different disciplines are needed to assess knowledge and attitude toward the disease among our healthcare professionals to facilitate future preventive measures. Small sample size is a limitation of study. A larger size study should be done in future to get a better picture of prevailing scenario about the understanding of Mpox.

Conclusion

Healthcare professionals in Pakistan generally have a good understanding of Mpox, but many still lack confidence in diagnosing and treating the disease, and are unfamiliar with management protocol. Those with more years of clinical experience tend to feel more confident, highlighting the importance of mentorship and learning from peers. To improve these gaps, it is important for stakeholders to introduce mandatory medical education workshops focused on Mpox recognition and management. Including Mpox-related content in both undergraduate and postgraduate health programs can also help. Additionally, creating easy-to-access online platforms and mobile apps that provide updated guidelines and case information will support healthcare workers. Resources should be directed toward hands-on training, such as PPE drills and mock outbreak scenarios. Finally, conducting follow-up studies in various healthcare settings will

help assess the effectiveness of these efforts and guide future improvements. Together, these steps can help Pakistan's healthcare system become better prepared to handle Mpox and other emerging infectious diseases.

Declaration of patient consent The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship None.

Conflict of interest Authors declared no conflict of interest.

Author's contribution

SRHZ, TM: Substantial contribution to study design, acquisition of data, manuscript writing.

MNA, MA, AT, MF, SK: Substantial contribution to acquisition of data, manuscript writing.

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

References

1. Gong Q, Wang C, Chuai X, Chiu S. Monkeypox virus: a re-emergent threat to humans. *Virol Sin*. 2022;**37**(4):477-82. Available from: <https://pubmed.ncbi.nlm.nih.gov/35820590/>
2. Theban AA, Samman AA, Jayash KM, Jayash EM. Knowledge and attitude regarding monkeypox among Saudi MOH primary healthcare nurses in Jeddah: A cross-sectional study. *J Family Med Prim Care*. 2024;**131**:175-81.
3. Sobaikhi NH, Alshahrani NZ, Hazazi RS, Al-Musawa HI, Jarram RE, Alabah AE, *et al*. Health Workers' Knowledge and Attitude towards Monkeypox in Southwestern Saudi Arabia: A Cross-Sectional Study. *Diseases*. 2023 Jun 2;**11**(2):81.
4. Amer FA, Nofal HA, Gebriel MG, Bedawy AM, Allam AA, Khalil HES, *et al*. Grasping knowledge, attitude, and perception towards monkeypox among healthcare workers and medical students: an Egyptian cross-sectional study. *Front Cell Infect Microbiol*. 2024 Feb 12;**14**:1339352.
5. Aynalem ZB, Abate MD, Meseret F, Muhamed AN, Abebe GK, Adal AB, *et al*. Knowledge, Attitude and Associated Factors of Monkeypox Infection Among Healthcare Workers in Injibara General Hospital, Northwest Ethiopia. *J Multidiscip Healthc* [Internet]. 2024;**17**:1159-73.
6. León-Figueroa DA, Barboza JJ, Siddiq A, Sah R, Valladares-Garrido MJ, Rodriguez-Morales AJ. Knowledge and attitude towards mpox: Systematic review and meta-analysis. *PLoS One*. 2024 Aug 9;**19**(8):e0308478. doi: 10.1371/journal.pone.0308478.
7. Eze U, Okafor N, Ozota G, Nworie K, Asogwa C, Richard I, *et al*. Assessment of the knowledge of healthcare workers on monkeypox in Nigeria. *GMS Hyg Infect Control* [Internet]. 2024 [cited 2025 Nov 13];**19**:Doc38. Available from: <https://pubmed.ncbi.nlm.nih.gov/39224502/>
8. Aljabali A, Alawajneh M, Alzamer Y, Altal M, Swed S, Alnawaiseh N, *et al*. The Awareness of Clinical Doctors and Medical Students Toward Monkeypox in Jordan: A National Cross-Sectional Study. *Int J Med Stud* [Internet]. 2023 Jan. 2 [cited 2026 Feb. 25];**10**:S163. Available from: <https://ijms.info/IJMS/article/view/1815>
9. Ahmed SK, Abdulqadir SO, Omar RM, Hussein S, Qurbani K, Mohamed MG, *et al*. Knowledge, Attitudes, and Willingness of Healthcare Workers in Iraq's Kurdistan Region to Vaccinate against Human Monkeypox: A Nationwide Cross-Sectional Study. *Vaccines* (Basel) [Internet]. 2023 Dec 1 [cited 2025 Nov 13];**11**:1734. Available from: <https://pmc.ncbi.nlm.nih.gov/articles/PMC10747727/>
10. Al Meslamani AZ, Abu-Naser D, Al-Rifai RH. Readiness, knowledge, and attitudes of healthcare professionals in Jordan toward Monkeypox: a cross-sectional survey. *Sci Rep*. 2025;**15**:1 [Internet]. 2025 May 25 [cited 2025 Nov 13];**15**:1–12. Available from: <https://www.nature.com/articles/s41598-025-03051-2>
11. Alimohamadi Y, Sepandi M, Marhamati T. Knowledge and attitude of human monkeypox among university students and staff in Tehran, Iran. *Front Public Health* [Internet]. 2025 [cited 2025 Nov 13];**13**:13. Available from: <https://pubmed.ncbi.nlm.nih.gov/40276350/>
12. Malaeb D, Sallam M, Salim NA, Dabbous M, Younes S, Nasrallah Y, *et al*. Knowledge, Attitude and Conspiracy Beliefs of Healthcare Workers in Lebanon towards Monkeypox. *Trop Med Infect Dis* [Internet]. 2023 Feb 1 [cited 2025 Nov 13];**8**(2):81. Available from: <https://pubmed.ncbi.nlm.nih.gov/36828497/>
13. Betsy J, George S, George N, KV B, Sukumaran A. Perceptions of Indian Healthcare Practitioners Regarding the 2022 Outbreak of Monkeypox Disease. *Cureus* [Internet]. 2023 Feb 19 [cited 2025 Nov 13];**15**:2. Available from: <https://pubmed.ncbi.nlm.nih.gov/36950001/>

14. Torres TS, Silva MST, Coutinho C, Hoagland B, Jalil EM, Cardoso SW, *et al*. Evaluation of Mpox Knowledge, Stigma, and Willingness to Vaccinate for Mpox: Cross-Sectional Web-Based Survey Among Sexual and Gender Minorities. *JMIR Public Health Surveill* [Internet]. 2023 [cited 2025 Nov 13];**9**. Available from: <https://pubmed.ncbi.nlm.nih.gov/37459174/>
15. McQuiston JH, Braden CR, Bowen MD, McCollum AM, McDonald R, Carnes N, *et al*. The CDC Domestic Mpox Response - United States, 2022-2023. *MMWR Morb Mortal Wkly Rep*. 2023 May 19;**72**(20):547-52. Available from: <https://pubmed.ncbi.nlm.nih.gov/37200231/>
16. Fu Y, Chen W, Yuan R, Wang X, Yang Z. Factors associated with mpox awareness among men who have sex with men recruited through the internet: a cross-sectional survey in China. *Front Public Health* [Internet]. 2025;**13**: 1594225 doi: 10.3389/fpubh.2025.1594225
17. Alshahrani NZ, Algethami MR, Alarifi AM, Alzahrani F, Alshehri EA, Alshehri AM, *et al*. Knowledge and Attitude Regarding Monkeypox Virus among Physicians in Saudi Arabia: A Cross-Sectional Study. *Vaccines (Basel)*. 2022 Dec 8;**10**(12):2099. doi: 10.3390/vaccines10122099.
18. Miraglia Del Giudice G, Della Polla G, Folcarelli L, Napoli A, Angelillo IF; Collaborative Working Group. Knowledge and attitudes of health care workers about monkeypox virus infection in Southern Italy. *Front Public Health*. 2023 Feb 27;**11**:1091267. doi: 10.3389/fpubh.2023.1091267.
19. Jahromi AS, Jokar M, Sharifi N, Kashkooli S, Rahmanian K, Rahmanian V. Global knowledge and attitudes towards mpox (monkeypox) among healthcare workers: a systematic review and meta-analysis. *Int Health* [Internet]. 2024 Sep 1 [cited 2025 Nov 13];**165**:487-98. Available from: <https://pubmed.ncbi.nlm.nih.gov/37861417/>
20. Gagneux-Brunon A, Dauby N, Launay O, Botelho-Nevers E. Attitudes towards monkeypox vaccination among healthcare workers in France and Belgium: an element of complacency? *J Hosp Infect*. 2022 Dec;**130**:144-5. doi: 10.1016/j.jhin.2022.09.010. Epub 2022 Sep 26. PMID: 36174773; PMCID: PMC9534062.
21. Kumar N, Ahmed F, Raza MS, Rajpoot PL, Rehman W, Khatri SA, Mohammed M, Muhammad S, Ahmad R. Monkeypox cross-sectional survey of knowledge, attitudes, practices, and willingness to vaccinate among university students in Pakistan. *Vaccines*. 2022 Dec 31;**111**:97.