Research Article

Knowledge, Perception, and Willingness of Using Telemedicine Among the Medical Students of King Edward Medical University, Lahore, Pakistan in 2024: A Cross-Sectional Survey

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Abstract

Background: Telemedicine is the delivery of health-related services using electronic means. Given the immense strain on Pakistan's health care system, there is a need for telemedicine.

Objectives: To determine the knowledge, perception, and willingness of using telemedicine among medical students of a public medical university and if they are associated with age, gender, year of education, urban-rural background, and one another.

Methods: A cross-sectional survey with a population size of 189 students and non-probability convenience sampling technique was conducted among the MBBS students of a public medical university. An online questionnaire was used to collect data, and SPSS version 29 was used for analysis.

Results: The responses were used to calculate knowledge, perception, and willingness scores for each participant. Independent two-sample t-test revealed association between Perception and gender (higher in females; P=0.002), and background (higher in urban; P<0.001), Willingness and gender (higher in females; P=0,021), and Willingness and background (higher in urban; P=0.018). One-way ANOVA revealed association between knowledge and education (highest in 4th year; P=0.007) and Perception and education (highest in 4th year; P=0.014). Pearson correlation coefficient was significant and positive between Perception and knowledge (rho=0.178; P=0.015), as well as Willingness and Perception (rho=0.492; P<0.001).

Conclusion: Most students had an average knowledge but good perception and willingness of using telemedicine. Knowledge and perception were associated with the 4th year of MBBS. Perception and willingness were associated with the female gender and urban background. Willingness correlated positively with perception, which correlated positively with knowledge.

Keywords | telemedicine, digital health, knowledge, perception, adoption

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Introduction

Telemedicine is the delivery of health-related services over long distances using electronic means.[1] As an adjunct to the conventional health infrastructure, it can contribute to the sustainable development goals,[2] especially in developing countries where the penetration of physical healthcare in rural peripheries is limited.[3] It enables real-time communication between health providers and patients and can help provide widespread primary healthcare services for diabetes, hypertension, infections, immunization, and mother-child health via smartphones.[4–7] This makes it easier to monitor the status of chronically ill patients and arrange consultations and treatments.[8] Furthermore, telemedicine can establish collaborative channels among providers for referrals, education, epidemic prevention, and better interventions.[9]

As Pakistan's population surpassed 240 million in 2023 according to Population Census 2023, the enormous burden on the health system became increasingly clear.[10] Although life expectancy has improved over the years, manageable diseases still are the major contributor to mortality in Pakistan.[11]

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This situation has created a demand for the expansion, expedition, and accessibility of medical services and has prompted health authorities to come up with new, economically feasible options, one of which is telemedicine.

Telemedicine and digital health are a growing industry estimated to reach a value of US $504.4 billion by the end of 2025.[12] However, such systems have been in place worldwide for some time now. India used e Compliance to monitor tuberculosis patients and ensure compliance.[13] Bangladesh uses District Health Information Software 2 for data collec- tion, monitoring, and decisions of budget distribution.[14] Telemedicine services are available in 61% of the health institutions in the US.[15] Africa used SMS texts to manage stocks of antimalarial drugs.[16] The telemedicine network in Pakistan is still a work in progress. Individual health centers run independent programs, and there is little centra- lization.

The WHO telemedicine survey 2016 showed that Pakistani law is lacking in terms of telemedicine regulation policy.[17] Since policy is often a reflection of societal attitudes, studying the trends in the knowledge and perception of telemedicine is important, but literature on this aspect is limited on both global and national levels. Based on the few studies available, around 54.3% of the general Pakistani population has a good understanding of what telemedicine is, and 60% of medical students have good knowledge about telemedicine.[18-19]

Although a study found that 64.8% clinicians in Karachi had at least a basic understanding of telemedicine, such data on doctors and medical students in other major cities is lacking.[20] Specifically, when it comes to students in Punjab, the most populous province of Pakistan, the medical students' awareness and opinions on telemedicine have not been assessed sufficiently. King Edward Medical University (KEMU) is affiliated with Mayo Hospital, one of the largest tertiary care hospitals in Punjab. Since KEMU enrolls students from all over the province, we believe that it is a good setting for conducting a study to gauge the knowledge and views of Punjab medical students on telemedicine.

The study was conducted to determine the knowledge, perception, and willingness of using telemedicine in the medical students of King Edward Medical University and if these three measures were associated with age, gender, year of education, urban-rural background, and one another.

Methods

A cross-sectional survey was conducted among the Bachelor of Medicine, Bachelor of Surgery (MBBS) students of KEMU. This study was approved by the institutional review board (IRB) of KEMU. A sample size of 189 students was estimated by using a confidence interval of 95% (Z=1.96), absolute precision (α)=7%, and population proportion (p)=60% derived from a previous study reporting the prevalence of good knowledge about telemedicine in Indian medical students, using Cochran's sample size formula given below. [21]

$$n = \frac{(Z^2 . p . q)}{\alpha^2}$$

A non-probability convenience sampling technique was used. The students meeting all of the following inclusion criteria were included: (1) Medical students enrolled in the MBBS program; (2) Students with a Pakistani background; and
(3) Students who could comprehend and answer the English questionnaire. The students meeting at least one of the following exclusion criteria were excluded: (1) Students not res- ponding to the online questionnaire within the data collection period; (2) Students who did not complete all parts of the questionnaire; and (3) Students who asked for their questionnaire to be withdrawn. After approval from the IRB, online questionnaires were distributed among 189 participants using Google Forms. The questionnaire, which had been verified and used by a previous study, consisted of four parts that defined and/or measured sociodemographic variables, know- ledge, perception, and willingness of using telemedicine, respectively. [21] Sociodemographic data included age, gender, education, and urban-rural background. Knowledge domain had 5 items: Each item carried a score of 5. It was to be rated on a Likert scale as "very low", "low", "neutral", "high", and "very high", with scores of 1, 2, 3, 4, and 5 for each option, respectively. For each item, "very low" and "low" were considered insufficient knowledge, "neutral" was considered average knowledge, and "high" and "very high" were considered sufficient knowledge. Knowledge score (KS) was the sum of the scores of all items (Range:5-25). KS of <10, 10-20, and >20 was considered low, neutral, and high, respectively. Perception domain had 5 items: Each item carried a score of 1. It was measured dichotomously as "agree" or "disagree", with scores of 1 and 0, respectively. Perception score (PS) was the sum of the scores of all items (Range:0-5). PS of
<2, 2-4, and >4 was considered low, neutral, and high, respectively. Willingness domain had 6 items: Each item carried a score of 1. It was also measured dichotomously as "agree" or "disagree", with scores of 1 and 0, respectively. Willing- ness score (WS) was the sum of the scores of all items (Range: 0-6). WS of <2, 2-5, and >5 was considered low, neutral, and high, respectively. Informed consent was taken alongside the questionnaire using a standard consent form.

The collected data were analyzed with SPSS version 29.

Appropriate descriptive statistics were used for all data, i.e., frequency and percentage for categorical, and mean and standard deviation for quantitative data. For checking association between quantitative and categorical variables, inde-pendent two-sample t-test and one-way ANOVA were used. For checking association between quantitative variables, Pearson's correlation coefficient was used.

Results

A total of 189 students meeting the eligibility criteria were included as participants. The sociodemographic characteristics of these participants are given in Table 1. The age distribution is given in Figure 1. The mean (M) age was 21.54 years. There were more female students than male students. Most of them were in the 4th year of MBBS, then 3rd year, 2nd year, 5th year, and 1st year. The majority were from urban areas.

In the knowledge domain, most (41.2%) participants had sufficient knowledge of what was telemedicine. However, for 54.0% and 55.1% of the participants, their knowledge about its applications and use abroad, respectively, was insufficient. Their familiarity with recent guidelines and participation in conferences and webinars related to telemedicine were also insufficient in most (70.4%) cases. In the perception domain, most participants agreed that it was viable for comprehensive healthcare (87.3%), enabled technology adoption (96.3%), saved time and effort (92.6%), and reduced costs (91.0%), and that there were existing, easily adoptable telemedicine applications in the country (74.6%). In the willingness domain, most of the participants again agreed that they were willing to use it for consultation (87.3%), refer and advice it to others (83.1%), include it in their practice (85.7%), pay for telemedicine services (69.8%), consult colleagues through video conferences (90.5%), and integrate it into existing system (90.5%).

Table 1: *Sociodemographic characteristics of participants*

Characteristic	Value
Age (years)	**Mean (SD)**
	21.54 (1.358)
Gender	**n (%)**
Male	69 (36.5)
Female	129 (63.5)
Year of Education	**n (%)**
1st Year	8 (4.2)
2nd Year	20 (10.6)
3rd Year	41 (21.7)
4th Year	104 (55.0)
5th Year	16 (8.5)
Urban-Rural Background	**n (%)**
Urban	178 (94.2)
Rural	11 (5.8)

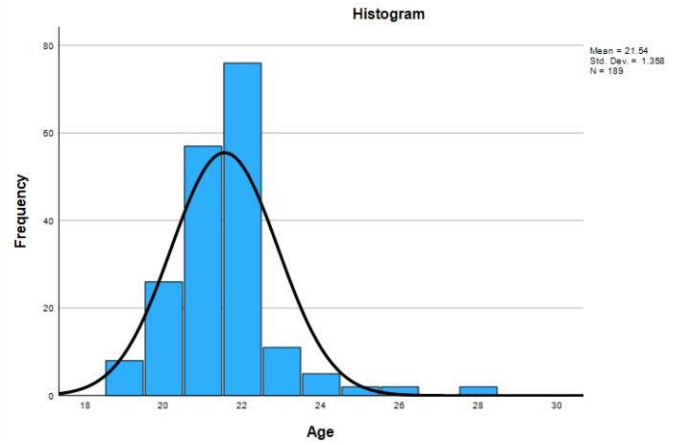

Figure 1: *Histogram showing the distribution of participants across age. The age ranges from 19 to 28 years. The mode is 22 years.*

The mean knowledge score (KS), perception score (PS), and willingness score (WS) were neutral (M=12.71), high (M=4.42), and high (M=5.07), respectively. The independent two-sample t-test revealed statistically significant associations between PS and gender (higher in females; P=0.002), PS and location (higher in urban; P<0.001), WS and gender (higher in females; P=0,021), and WS and location (higher in urban; P=0.018), which are given in Table 2. The one-way ANOVA revealed statistically significant association between KS and education (highest in 4th year; P=0.007) and PS and education (highest in 4th year; P=0.014), which are also given in Table 2.

Pearson correlation coefficient was statistically significant between PS and KS, as well as WS and PS, as given in Table 3. PS increases with KS (rho=0.178; P=0.015), and WS increases with PS (rho=0.492; P<0.001).

Table 2: *Association of KS, PS, and WS with gender, education, urban-rural background, and age. Statistically significant P values (<0.05) are given in bold.*

Domain	Gender		Education	Background		Age	
	One-tail P value	Two-tail P value	P value	One-tail P value	Two-tail P value	Pearson correlation coefficient	P value
KS	0.351	0.702	**0.007**	0.112	0.225	0.139	0.057
PS	**0.001**	**0.002**	**0.014**	**<0.001**	**<0.001**	-0.021	0.771
WS	**0.010**	**0.021**	0.057	**0.009**	**0.018**	0.035	0.632

Table 3: *Association of PS and WS with. KS and PS. Statistically significant P values (<0.05) are given in bold.*

Domain	KS		PS	
	Pearson correlation coefficient	P value	Pearson correlation coefficient	P value
PS	0.178	**0.015**		
WS	0.133	0.068	0.492	**<0.001**

Discussion

About 41.2% of the participants had sufficient knowledge of what telemedicine was. Furthermore, most people had insufficient knowledge of telemedicine apps and platforms (54.0%) and its use outside the country (55.1%). Even more participants had insufficient knowledge about telemedicine guidelines (70.4%), and conferences and webinars (70.4%). The mean overall KS was almost at the midpoint of the range (M=12.71; SD=4.292; Range:5-25).

The prevalence of sufficient knowledge of what telemedicine is in KEMU students is nearly half (41.2%) that reported for doctors in Karachi,[22] which is probably because this study included MBBS students who are generally less informed on the various health programs available in the country as compared to practicing doctors. This is further evident from the fact that the prevalence of sufficient knowledge calculated by studies focusing on students of Indian institutions[21,23] is similar to the one calculated in this study. The number of people with insufficient knowledge of apps and platforms and use outside the country is also comparable to those reported for Indian students.[23,24] A majority of students having insufficient knowledge about telemedicine guidelines and conferences and webinars was quite expected as undergraduate medical students are usually not well-informed about clinical guidelines and most clinician-focused events in general.

The mean KS (M=12.71) revealed an intermediate degree of knowledge. There was an association with year of education, with KS being highest for 4th year (P=0.007), likely because senior medical students attend more hospital wards where they gain greater awareness of the various health services, including telemedicine, available in the country. This study found no association between KS and gender, which is contrary to the findings of previous studies that suggested better knowledge in females in India and Libya.[21,25] Also, there was no association with urban-rural background. Both of these can be attributed to the limited sample size of this study. The study found no association of KS with age, probably because of the narrow range of age distribution (range 19-29 years) of the participants, which would necessitate a larger sample to detect a potential difference.

The vast majority of people (>74%) agreed with every item in the perception domain, acknowledging telemedicine's viability for comprehensive healthcare, conduciveness to tech adoption, time-saving and workload reduction, cost reduction, and ease of adoption of existing telemedicine applications. This is in stark contrast to the perceived effectiveness of telemedicine observed in doctors of Karachi,[22] where only 28.1% believed it provided faster healthcare. Since it has already been established that medical students are less knowledgeable about telemedicine than doctors, the better perception of the former is probably due to naïve optimism: The students are too ignorant to identify the drawbacks or limitations of telemedicine, and, thus, are overly optimistic about it. This is evident from the fact that an even higher prevalence of positive perception (90.9%) has been reported for Indian medical students.[21] A similar high prevalence has also been observed in Indonesia.[26]

Predictably, the mean overall PS was also very high (M= 4.42; SD=0.928; Range=0-5). Women in conservative Pakistan are allowed less outdoor freedom than men, thus cultivating a greater acceptance of online, at-home services in the former.[27] This is evident from the fact that PS was higher in females than males (M=4.58 vs. M=4.14; P=0.002). Also, PS was higher in 4th year (P=0.014) students. Since these students started medical school during the peak of the COVID-19 pandemic, they observed greater reliance on and promotion of telemedicine services in the university at that time, which could have inculcated a greater optimism toward these ser- vices. PS was higher in students with urban as compared to rural background (M=4.50 vs. M=3.00; P<0.001), probably because the former enjoy better telecom and internet facilities, which make access to all digital services reliable and conve- nient. This could lead them to develop a positive perception of digital services in general. This is not the case for rural areas where such services are not reliable due to poor signal strength, lack of infrastructure, and internet penetration standing at 7%.[28] No association was found with age likely because of the narrow range of distribution.

Avast majority of people (>83%) also agreed to use telemedicine applications for consultation, refer telemedicine interventions to peers, and include them in their practice, and even more (>90%) agreed to consult colleagues through video conferencing and integrate telemedicine into existing systems. This is comparable to the previously reported percentage of Indian medical students (96.4%) willing to adopt telemedicine in their careers, and the 89.9% of Indonesian students who had never used telemedicine but were willing to try it.[21,26] Similarly, in Libya, Egypt, and Saudi Arabia, the attitude toward telemedicine was generally favorable among healthcare workers.[25,29,30] This study also found that a slightly lower, but still high, percentage (69.8%) also

agreed to pay for telemedicine applications. The slight decrease was expected because pay-walled services tend to lose popu- larity, especially in underprivileged populations of developing countries, such as Pakistan.

The mean overall WS was also high (M=5.07; SD=1.55; Range=0-6). It was higher in females than males (M=5.27 vs. M=4.72; P=0.021), and students with urban than those with rural background (M=5.13 vs. M=4.00; P=0.018) likely due to the better perception of telemedicine among the former in both comparisons as explained earlier. However, this gender disparity contradicts the results of an Indonesian study, which found no association between willingness and gender, likely due to the less conservative nature of Indonesian society, where women enjoy greater outdoor freedom as compared to Pakistan.[26] So, the perception and willingness to use online services do not differ much between the genders. No association was found with the year of education and age, probably not only because the range of distribution is too narrow, but also because non-practicing students are generally too ill-informed (because of their limited clinical exposure until house job or post-graduate training) to develop any specific inclination for or against certain clinical practices, such as using telemedicine or choosing alternative treatments.

The relationship between the scores was predictably straightforward. There was a positive correlation between PS and KS (r=0.178; P=0.015) suggesting that the students with better knowledge also had better perception of telemedicine. There was also a positive correlation between WS and PS (r=0.492; P<0.001), suggesting that those with better perception were more willing to use or adopt telemedicine services. Surprisingly, despite these correlations, there was no correlation between WS and KS, which suggested that perception is also greatly influenced by factors other than knowledge, willingness is also greatly influenced by factors other than perception, or both.

The strengths of this study included (1) its ability to simultaneously measure the three basic factors that influence the adoptability of telemedicine, (2) the somewhat representativeness of the sample given the limited resources available to conduct the study, and (3) the assessment of differences within subgroups of the sample. This study had the following limitations. First, this study had too small a sample size to check the association of the measured variables with the narrow range of age (R:19-28 years). This could have contributed to the lack of statistical significance in age-related analyses. Second, a convenience non-probability sampling technique was used to enroll only MBBS students, which resulted in most of participants being 4th year MBBS students. This could affect the generalizability of the results for the general student population of the university. Third, the study was limited to the MBBS students of KEMU because of a lack of financial assistance to conduct it. Although the student population of KEMU is diverse in terms of gender, ethnicity, and urban-rural background, the distribution of these socio-demographic factors likely does not match those in other institutions. So, the results might not be representative of the medical students in different universities across Pakistan. Fourth, although a questionnaire validated by a previously published study was used, its simplicity failed to capture many factors, such as financial status, ethnic background, and clinical exposure, that could potentially affect the outcome variables. Fifth, although the superficial aspects of knowledge, perception, and willingness to use telemedicine were assessed, this study does not go into details. For example, for the students who answered that they had high participation in telemedicine-related webinars and conferences (K5), no data was collected on the specific ones attended.

Overall, the results of this study point toward a few key applications. First, there is a need to strengthen education on the growing telemedicine industry in Pakistani institutions. Since most students already perceive the field positively, programs and seminars for such education would be welcomed. Second, instead of simply highlighting the general principles and benefits of telemedicine, educators should focus specifically on the various Pakistani tele- and digital health services, how to use them, their scope, and economic aspects. Future research could focus on the (1) socio-cultural factors affecting attitudes toward telemedicine, such as financial status, class disparity, and profession, (2) use of specific available telemedicine services in different strata of society, (3) trends in the use of telemedicine services over the years and across the months each year and assessment of the factors associated with a change in trend, and (4) prevalence of different reasons or health issues people use telemedicine services for.

Conclusion

Although most students had an average level of knowledge of telemedicine, they had good perception and were highly willing to use it. Both knowledge and perception were associated with the year of education: Highest among 4th year students. Both perception and willingness were associated with the female gender and urban background. Willingness correlated positively with perception, which in turn correlated positively with knowledge.

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Ethical Approval: was obtained from IRB of King Edward Medical University, Lahore

Author's Contribution: NU involved in conceptualization of study. MM, SAH and SMZ involved in manuscript writing and data collection. SK, QI and RHA involved in data analysis

References

1. World Health Organization. Consolidated telemedicine implementation guide [Internet]. Geneva: WHO; 2022 [cited 2024 Oct 28]. Available from: https://www.who.int/publications/i/ item/ 9789240059184 World Health Organization. Seventy-first world health assembly: digital health [Internet]. Geneva: WHO; 2018 [cited 2024 Oct 28]. Available from: https://www.who.int/ publications/i/item/10665-279505.
2. Laouyane A. Telemedicine and developing countries. J Telemed Telecare 1998;4(2_suppl):1–88. DOI: 10.1258/135763398 1932064
3. Ayatollahi H, Sarabi FZP, Langarizadeh M. Clinicians' Knowledge and Perception of Telemedicine Technology. Perspect Health Inf Manag 2015;12(Fall):1c.
4. Wu B. Patient Continued Use of Online Health Care Communities: Web Mining of Patient-Doctor Communication. J Med Internet Res 2018;20(4): e126. DOI: 10.2196/ jmir.9127
5. Labrique AB, Wadhwani C, Williams KA, Lamptey P, Hesp C, Luk R, et al. Best practices in scaling digital health in low and middle income countries. Global Health 2018;14(1): 103. DOI: 10.1186/s12992-018-0424-z
6. Monaghesh E, Hajizadeh A. The role of telehealth during COVID-19 outbreak: a systematic review based on current evidence. BMC Public Health 2020;20(1):1193. DOI: 10. 1186/s12889-020-09301-4
7. Daniel H, Sulmasy LS, Health and Public Policy Committee of the American College of Physicians. Policy recommendations to guide the use of telemedicine in primary care settings: an American College of Physicians position paper. Ann Intern Med 2015;163(10):787–9. DOI: 10.7326/M15-0498
8. Armfield NR, Coulthard MG, Slater A, McEniery J, Elcock M, Ware RS, et al. The effectiveness of telemedicine for paediatric retrieval consultations: rationale and study design for a pragmatic multicentre randomised controlled trial. BMC Health Serv Res 2014;14(1):546. DOI: 10.1186/s12913-014-0546-9
9. Pakistan Bureau of Statistics. Announcement of Results of 7th Population and Housing Census-2023 "The Digital Census" [Internet]. Islamabad: Pakistan Bureau of Statistics; 2023 [cited 2024 Oct 28]. Available from: https://www. pbs. gov.pk/content/announcement-results-7th-population-and-housing-census-2023-digital-census .
10. Hafeez A, Dangel WJ, Ostroff SM, Kiani AG, Glenn SD, Abbas J, et al. The state of health in Pakistan and its provinces and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. The Lancet Global Health 2023;11(2):e229–43. DOI: 10.1016/S2214-109X (22)00497-1
11. Global Market Insights. Digital Health Market Share Trends 2020-2026 Growth Report [Internet]. Selbyville: Global Market Insights; 2023 [cited 2024 Oct 28]. Available from: https://www.gminsights.com/industry-analysis/digital-health-market.
12. Pai M, Yadav P, Anupindi R. Tuberculosis control needs a complete and patient-centric solution. The Lancet Global Health 2014;2(4):e189–90. DOI: 10.1016/S2214-109X(14) 70198-6 Khan MH, Cruz VO, Azad A. Bangladesh's digital health journey: reflections on a decade of quiet revolution. WHO South-East Asia J Public Health 2019;8(2):71. DOI: 10.4103/ 2224-3151.264849
13. American Hospital Association. Fact Sheet: Telehealth [Internet]. Chicago: American Hospital Association; 2019 [cited 2024 Oct 28]. Available from: https://www.aha.org/ factsheet/telehealth.
14. Githinji S, Kigen S, Memusi D, Nyandigisi A, Mbithi AM, Wamari A, et al. Reducing Stock-Outs of Life Saving Malaria Commodities Using Mobile Phone Text-Messaging: SMS for Life Study in Kenya. PLoS ONE 2013;8(1):e54066. DOI: 10.1371/journal.pone.0054066
15. Ahmed A, Ahmed M. The Telemedicine Landscape in Pakistan- Why are we falling behind? J Pak Med Assoc 2018; 68(12): 1820–2.
16. Tariq W, Asar MAT, Tahir MJ, Ullah I, Ahmad Q, Raza A, et al. Impact of the COVID-19 pandemic on knowledge, perceptions, and effects of telemedicine among the general population of Pakistan: A national survey. Front Public Health 2023;10:1036800.DOI:10.3389/ pubh. 022. 036800
17. Kazmi S, Yasmin F, Siddiqui SA, Shah M, Tariq R, Nauman H, et al. Nationwide Assessment of Knowledge and Perception in Reinforcing Telemedicine in the Age of COVID-19 Among Medical Students From Pakistan. Front Public Health 2022;10:845415. DOI: 10.3389/fpubh.2022.845415
18. Karim M, Saeed Khurram S, Aga IZ, Muzzamil M, Hashmi S, Saeed M, et al. Analysis of telemedicine service delivery in Karachi, Pakistan: A cross-sectional survey examining practices and perspectives of healthcare providers. Clinical Epidemiology and Global Health 2024;27:101607. DOI: 10.1016/j.cegh.2024.101607
19. Malhotra P, Ramachandran A, Chauhan R, Soni D, Garg N. Assessment of Knowledge, Perception, and Willingness of using Telemedicine among Medical and Allied Healthcare Students Studying in Private Institutions. TMT 2020; 5(4): 228. DOI: 10.30953/tmt.v5.228
20. Ashfaq A, Memon SF, Zehra A, Barry S, Jawed H, Akhtar M, et al. Knowledge and Attitude Regarding Telemedicine Among Doctors in Karachi. Cureus 2020;12(2):e6927. DOI: 10.7759/cureus.6927
21. Zayapragassarazan Z. Awareness, Knowledge, Attitude and Skills of Telemedicine among Health Professional Faculty Working in Teaching Hospitals. JCDR 2016;10(3): JC01-4. DOI: 10.7860/JCDR/2016/19080.7431
22. Malhotra RK, Ojha MK, Gupta S. A study of assessment of knowledge, perception and attitude of using tele health

services among college going students of Uttarakhand. JMPAS 2021;10(S2):113-116. DOI:10.22270/jmpas.2021. V10S2. 2020

23. Elhadi M, Elhadi A, Bouhuwaish A, Bin Alshiteewi F, Elmabrouk A, Alsuyihili A, et al. Telemedicine Awareness, Knowledge, Attitude, and Skills of Health Care Workers in a Low-Resource Country During the COVID-19 Pandemic: Cross-sectional Study. J Med Internet Res 2021; 23(2): e20812. DOI: 10.2196/20812 Tjiptoatmadja NN, Alfian SD. Knowledge, Perception, and Willingness to Use Telepharmacy Among the General Population in Indonesia. Front Public Health 2022;10: 825554. DOI: 10.3389/fpubh.2022.825554
24. Mumtaz Z, Salway S. 'I never go anywhere': extricating the links between women's mobility and uptake of reproductive health services in Pakistan. Social Science & Medicine 2005;60(8):1751–65. DOI:10.1016/j.socscimed.2004. 08. 019
25. Ibrar I, Kim SK, Lee J, Rho JJ. Analytic Hierarchy Process Model for the Selection of Optimal Internet Access Techno- logies in Rural Pakistan. IJAHP 2020;12(2):712. DOI:10. 13033/ ijahp.v12i1.712 Fouad AA, Osman MA, Abdelmonaem YMM, Karim NAHA. Awareness, knowledge, attitude, and skills of telemedicine among mental healthcare providers. Middle East Curr Psychiatry 2023;30(1):5. DOI: 10.1186/s43045-022-00272-3
26. Bashir MS, Lalithabai DS, AlOtaiby S, Abu-Shaheen A. Health care professionals' knowledge and attitudes toward telemedicine. Front Public Health 2023;11:957681. DOI: 10. 3389/fpubh.2023.957681