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Acceptance of Telemedicine in healthcare customers of District Karachi, Pakistan: a cross-sectional analysis

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ABSTRACT

Background and Objectives: The global healthcare industry faced significant revenue and volume losses following the emergence of COVID-19 in December 2019. Telemedicine emerged as a potential solution to mitigate these challenges. The primary objectives were to determine the influence of internet browsing and immunosuppression on telemedicine acceptance and to evaluate the mediating role of fear of acquiring hospital-induced infections (HAI) in this relationship.

METHODOLOGY: A quantitative, cross-sectional study was conducted from April to September 2021. Data were collected using a validated online questionnaire distributed to patients, physicians, and health insurance providers in Karachi. The data were analyzed using SPSS version 24, employing correlation, regression, and mediation analysis. A p-value < 0.05 was considered statistically significant.

RESULTS: The study found that internet browsing significantly influenced telemedicine acceptance ($p < 0.01$), while immunosuppression did not ($p = 0.39$). The mediating role of fear of HAI was partially supported. The model's explanatory power was weak, with an R value of 0.29, indicating limited predictive capability.

CONCLUSION: The findings suggest limited acceptance of telemedicine among Karachi's population, highlighting the need for targeted awareness campaigns and policy adjustments. While internet browsing positively influenced telemedicine acceptance, immunosuppression did not. The study underscores the importance of addressing technological and health-related barriers to improve telemedicine adoption.

KEYWORDS: COVID-19, telemedicine, immunosuppression, internet browsing, healthcare acceptance.

INTRODUCTION

The emergence of Covid-19 On December 1, 2019 cases resulted in a decrease in healthcare revenue and volume globally. Numerous systems have profited from the increased use of "telehealth," synonymous with "telemedicine." Telemedicine is the quick electronic communication of medical information between clinical practice locations for treatment and education [1]. The pandemic encouraged a shift from in-person consultations to telehealth services in Karachi, Pakistan, and other regions to reduce virus transmission risks. This shift has shown the potential of telemedicine to improve healthcare access but also raised questions about customer acceptance [2].

In addition, studies reveal that the perception of telemedicine has predominantly been favorable, with several patients reporting satisfaction with their telehealth experiences during the pandemic [3,4]. Factors affecting its acceptability encompass perceived advantages, usability, and the immediacy of healthcare need throughout the crisis [5]. Comprehending the dynamics of telemedicine adoption in Karachi is essential for guiding future healthcare policies and practices, especially as the healthcare environment evolves in the post-pandemic era [6].

The biggest problems in the health care system are creating telemedicine policies, licensing and accredit-

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ing doctors who practice telehealth, strengthening the information system, ensuring patients can access and understand technology, being at ease with it, and having a good relationship with their provider and the doctors that practice remote healthcare services struggle with time management, team building, professional health, and medical education [7]. The majority of studies examine social influence, effort expectancy, and enabling situations, with perceived usefulness (PU) and PEU mediating [8].

The study is grounded in the Technology. Internet browsing was chosen as a determinant due to its role in facilitating access to telemedicine services, while immunosuppression was selected to explore the impact of health vulnerabilities on telemedicine acceptance.

Thereby, this study aims to fill this gap by examining the impact of these variables on telemedicine acceptance among healthcare customers in Karachi, Pakistan. These findings can assist both public and private healthcare organizations in Pakistan in making informed decisions about the implementation of telemedicine projects. This, in turn, can inform health policymakers about the role of telemedicine as an initiative to enhance the country's healthcare sector.

The present study evaluates the dependent variable, acceptance of telemedicine, against the independent variables: internet browsing and immunosuppression. We also identified the impact of the mediating variable, fear of acquiring HAI, on the relationship between immunosuppression and acceptance of telemedicine.

METHODOLOGY

This study employed a quantitative, cross-sectional design with a deductive approach. The target population included patients, physicians, and health insurance providers in Karachi, with a sample size of 384 respondents. The sample size was determined using a 95% confidence level and a 5% margin of error, based on the population of Karachi (16,459,000). Convenience sampling was used due to time constraints and accessibility.

Data were collected using an online questionnaire adapted from validated instruments, including the COVID-19 Fear Scale, the Prevalence of Immunosuppression Scale, and the Telemedicine Acceptance Scale. The questionnaire was distributed via Google Forms, and responses were recorded in Excel before being imported into SPSS for analysis. The data were analyzed using SPSS version 24. Descriptive statistics, correlation, regression, and mediation analysis were performed. Cronbach's alpha was used to assess the reliability of the scales, with values above 0.7 considered acceptable. The mediation analysis was conducted using Hayes' PROCESS macro.

RESULTS

Table 1 highlights the demographic characteristics of respondents. The sample consists of 384 respondents, with a nearly equal gender distribution (47.4% male, 52.6% female). The majority fall within the 21–35 age group (57%), followed by 36–50 years (21.9%) and 51–65 years (14.6%). Most respondents have a graduate degree (41.1%) and belong to the middle class (44.3%) or upper-middle class (43.2%). These demographic variables help contextualize the study's findings regarding telemedicine acceptance.

Table 1: Demographic Characteristics of Respondents (N=384)

Characteristic	Frequency	Percentage (%)
Age Group		
21–35 years	219	57.0
36–50 years	84	21.9
51–65 years	56	14.6
Gender		
Male	182	47.4
Female	201	52.6
Education Level		
Graduate Degree	158	41.1
College Degree	82	21.4
High School	59	15.4
Socioeconomic Status		
Middle Class	170	44.3
Upper Middle Class	165	43.2

Table 2 reveals the descriptive statistics of constructs in which the mean scores and standard deviations indicate moderate levels of Internet Browsing (Mean = 2.90, SD = 0.78), Immunosuppression (Mean = 2.03, SD = 1.14), and Telemedicine Acceptance (Mean = 2.81, SD = 0.79). Fear of Healthcare-Associated Infections (HAI) shows a relatively higher mean score (3.64, SD = 1.10), suggesting a notable concern among respondents. These values provide an overview of the distribution of key variables used in the regression and mediation analyses.

Table 2: Model Summary (Regression Analysis)

Variable	Mean ± SD	Range
Internet Browsing (IV1)	2.90 ± 0.78	1.00–4.70
Immunosuppression (IV2)	2.03 ± 1.14	1.00–5.00
Fear of HAI (Mediator)	3.64 ± 1.10	1.00–5.00
Telemedicine Acceptance (DV)	2.81 ± 0.79	0.86–5.00

Table 3 The regression model shows a weak relationship ($R = 0.293$) and a low explanatory power ($R^2 = 0.086$, Adjusted $R^2 = 0.081$). This suggests that only

8.6% of the variance in telemedicine acceptance is explained by Internet Browsing and Immunosuppression. The small R^2 value indicates that other unmeasured factors may influence telemedicine acceptance, which is acknowledged as a limitation in the discussion.

Table 3: Model Summary (Regression Analysis)

Model	R	R^2	Adjusted R^2	Std. Error
1	0.293	0.086	0.081	0.754

Table 4 indicates the ANOVA results confirm that the overall regression model is statistically significant ($F = 17.740$, $p < 0.001$), indicating that at least one of the predictor variables significantly contributes to explaining variations in Telemedicine Acceptance. However, despite statistical significance, the low R^2 suggests the need for additional predictors to improve the model's explanatory power.

Table 4: ANOVA Results

Model	Sum of Squares	df	Mean Square	F	p-value
Regression	20.151	2	10.075	17.740	<0.001
Residual	215.246	379	0.568		
Total	235.397	381			

Table 5 shows Internet Browsing has a significant positive effect on Telemedicine Acceptance ($B = 0.285$, $p < 0.001$), suggesting that increased browsing is associated with higher acceptance. In contrast, Immunosuppression has a non-significant effect ($B = -0.029$, $p = 0.390$), implying that it does not significantly influence telemedicine acceptance. The confidence intervals confirm the significance of Internet Browsing while showing that Immunosuppression's effect crosses zero, reinforcing its non-significance.

Table 5: Regression Coefficients with 95% Confidence Intervals

Variable	B	Std. Error	β	t	p-value	95% CI (Lower–Upper)
Constant	2.045	0.173	–	11.849	<0.001	1.706–2.384
Internet Browsing (IV1)	0.285	0.050	0.284	5.726	<0.001	0.187–0.383
Immunosuppression (IV2)	-0.029	0.034	-0.043	-0.861	0.390	-0.096–0.038

V1: Internet Browsing; IV2: Immunosuppression; DV: Telemedicine Acceptance. Confidence intervals (CI) derived from 5,000 bootstrap samples. Bolded values indicate statistical significance ($p < 0.05$).

Table 6 reveals the mediation analysis and it suggests that Immunosuppression does not significantly predict Fear of HAI ($B = 0.060$, $p = 0.224$). However, Fear of HAI significantly influences Telemedicine Acceptance ($B = 0.116$, $p = 0.001$). The indirect effect of Immunosuppression on Telemedicine Acceptance via Fear of HAI is not significant ($B = 0.007$, 95% CI = -0.005 to 0.023), indicating that Fear of HAI does not mediate the relationship between Immunosuppression and Telemedicine Acceptance.

Table 6: Mediation Analysis Results (Fear of HAI)

Path	Effect	Boot SE	95% CI (Lower–Upper)	p-value
IV2 → Mediator (Fear of HAI)	0.060	0.050	-0.037–0.158	0.224
Mediator → DV (Telemedicine)	0.116	0.036	0.045–0.186	0.001
Indirect Effect	0.007	0.007	-0.005–0.023	–

Confidence intervals (CI) derived from 5,000 bootstrap samples

DISCUSSION

The current study findings highlight the significant role of internet browsing in telemedicine acceptance, consistent with prior research on technology adoption frameworks such as the Technology Acceptance Model (TAM) and Social Cognitive Theory. These theories emphasize that familiarity with technology, as facilitated by frequent internet use, enhances perceived ease of use and usefulness, thereby driving acceptance [14, 15]. For instance, younger populations (e.g., Generation Y and Z), who are more tech-savvy, demonstrated higher telemedicine adoption rates, aligning with global trends where digital literacy correlates with telehealth utilization [16, 17].

Contrary to expectations, immunosuppression did not significantly influence telemedicine acceptance ($p = 0.39$). This suggests that health vulnerabilities alone may not drive adoption, potentially due to cultural preferences for in-person consultations or distrust in remote diagnostics among immunocompromised patients [5]. However, the partial mediation effect of fear of hospital-acquired infections (HAI) indicates that while immunosuppression itself is not a direct predictor, the psychological fear of infection in clinical settings may indirectly encourage telemedicine use. This aligns with studies showing that perceived health risks during pandemics amplify reliance on telehealth [6, 7].

The present study is critically necessary at that time when COVID-19 lockdown restrictions began to relax, prompting healthcare regulators and professionals to seek a healthcare plan to mitigate the impact of future pandemics. This study found a low R value attributable to the negligible correlation between immunosuppression and the absence of a mediating effect of fear of getting HAI on the adoption of telemedicine [9]. This has facilitated opportunities for future researchers to include new variables to enhance the R value.

The acceptability of telemedicine among healthcare consumers in Karachi during the COVID-19 pandemic can be ascribed to various interconnected reasons. The

pandemic's urgency facilitated the swift development of telemedicine services. Research indicates that patients were predominantly content with telemedicine, highlighting advantages such as convenience, time efficiency, and less risk of infection [10, 11]. A recent survey has revealed that a substantial majority of participants deemed telemedicine beneficial during the epidemic with numerous individuals indicating a preference to persist with these services moving forward [2]. This corresponds with data from other regions, where patient satisfaction with telemedicine has been reported as high, especially when patients could connect successfully with their healthcare practitioners [12, 13].

Nonetheless, despite the favorable welcome, some challenges persist that may impede the long-term adoption of telemedicine in Karachi with inadequate technology infrastructure, insufficient training of healthcare personnel, and apprehensions about privacy and data security have been recognized as substantial obstacles [18]. A thorough assessment indicated that although telemedicine services were broadly accepted, their implementation encountered challenges associated with technical issues and regulatory frameworks [19]. The present study has tackled critical obstacles to facilitate the efficient integration of telemedicine into the healthcare system in Karachi and abroad.

Furthermore, the significance of healthcare practitioners in promoting telemedicine acceptability is paramount. Their thoughts and attitudes around telemedicine substantially affect patient acceptability. Research indicates that healthcare providers that are adequately trained and supportive of telemedicine are more inclined to promote its utilization among patients [20, 21]. Thereby, enhancing provider education and addressing their concerns regarding telemedicine can lead to improved patient outcomes and satisfaction.

Strength and Limitations of the study

The present study also bridges the gap that existed in prior researches from the perspective of the independent variables and mediating variables. Another advantage of this study is that it critically evaluates the customer's preferences and inclination towards telemedicine and telehealth in order to align independent organizational efforts in quality care delivery and growth of healthcare industry. The research is helpful for health legislative bodies in making policies for telemedicine and telehealth keeping in view the customer behavior and priorities. This study facilitates the Federal and Provincial Government of Pakistan to make discretion regarding allocation of budget for restructuring telehealth in Pakistan.

The most prominent limitation of this study is it is quantitative study and it introduces biasness in responses since respondents have to choose any option from the fixed set of answers. In addition, it is a cross sectional research that studies a population at one point of time. The scope of this study is limited to Karachi City, only leaving behind a huge chuck on population of Pakistan and the other countries. The usage of simple random sampling technique has narrowed the scope of our study. The effect of predictors, outcome and mediator is checked but the effect of moderator is not studied in this research. Lastly, this research is conducted at the student level with in duration of four months only.

Future Considerations

First of all, it is imperative for the future studies to incorporate new independent variables to increase the R value of the research. Since, the role of mediation proved partial in this study, and future researchers could study the mediator as predictor to check its complete effect on acceptance of telemedicine, as well as introduce a moderator in the study. Further, this research could be done in countries where the scope of telemedicine is still emerging. Lastly, our worthy researchers may conduct this research as longitudinal design and could use systematic- random method of sampling.

CONCLUSION

This study highlights that internet browsing significantly influences telemedicine acceptance, while immunosuppression does not. Fear of healthcare-associated infections (HAI) did not mediate this relationship, suggesting that telemedicine adoption is more technology-driven than health-risk motivated. Despite the model's statistical significance, its low explanatory power ($R^2 = 0.086$) indicates that additional factors influence telemedicine acceptance.

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REFERENCES

1. T Tsai CH. Integrating social capital theory, social cognitive theory, and the technology acceptance model to explore a behavioral model of telehealth systems. International Journal of Environmental Research and Public Health. 2014;11(5):4905-25. doi:10.3390/ijerph110504905.
2. Mahmoud K, Jaramillo C, Barteit S. Telemedicine in low- and middle-income countries during the COVID-19 pandemic: a scoping review. Frontiers in Public Health. 2022;10. doi:10.3389/f-pubh.2022.914423.
3. Roza S.. Perception and usage of telemedicine among national health insurance participants in padang city. Jurnal Ilmu Kesehatan Masyarakat 2023;14(3):281-292. https://doi.org/10.26553/-jikm.2023.14.2.281-292.
4. Zobair K., Sanzogni L., Houghton L., Sandhu K., & Islam M.. Health seekers' acceptance and adoption determinants of telemedicine in emerging economies. Australasian Journal of Information Systems 2021;25. https://doi.org/10.3127/a-jis.v25i0.3071.
5. Sabbir M., Taufique K., & Nomi M.. Telemedicine acceptance during the covid-19 pandemic: user satisfaction and strategic healthcare marketing considerations. Health Marketing Quarterly 2021;38(2-3):168-187. https://-doi.org/10.1080/07359683.2021.1986988.
6. Alboraie M., Abdalgaber M., Youssef N., Moaz I., Abdeen N., Abosheaishaa H.et al.. Healthcare providers' perspective about the use of telemedicine in egypt: a national survey. International Journal of Telemedicine and Applications 2022;2022:1-8. https://-doi.org/10.1155/2022/3811068.
7. K Khan UZ. Telemedicine in the COVID-19 era: A chance to make a better tomorrow. Pakistan Journal of Medical Sciences. 2020;36(6):1405. doi:10.12669/pjms.36.6.3112.
8. Harst L, Lantzsch H, Scheibe M. Theories predicting end-user acceptance of telemedicine use: systematic review. Journal of medical Internet research. 2019 May 21;21(5):e13117.
9. Frost J. How to interpret regression models that have significant variables but a low R-squared. Statistics by Jim. https://statisticsbyjim. com/regression/low-r-squaredregression. 2021.
10. Park H., Kwon Y., Jun H., Jung S., & Kwon S.. Satisfaction survey of patients and medical staff for telephone-based telemedicine during hospital closing due to covid-19 transmission. Telemedicine Journal and E-Health 2021;27(7):724-732. https://doi.org/10.1089/tmj.2020.0369.
11. Naik N., Ibrahim S., Sircar S., Patil V., Hameed B., Prasad B.et al.. Attitudes and perceptions of outpatients towards adoption of telemedicine in healthcare during covid-19 pandemic. Irish Journal of Medical Science (1971 -) 2021;191(4):1505-1512. https://doi.org/10.1007/s11845-021-02729-6.
12. Shaverdian N., Gillespie E., Cha E., Kim S., Benvengo S., Chino F.et al.. Impact of telemedicine on patient satisfaction and perceptions of care quality in radiation oncology. Journal of the National Comprehensive Cancer Network 2021;19(10):1174-1180. https://doi.org/10.6004/-jnccn.2020.7687.
13. Esber A., Teufel M., Jahre L., Schmitten J., Skoda E., & Bäuerle A.. Predictors of patients' acceptance of video consultation in general practice during the coronavirus disease 2019 pandemic applying the unified theory of acceptance and use of technology model. Digital Health 2023;9. https://doi.org/10.1177/20552076221149317.
14. Sabbir M., Taufique K., & Nomi M.. Telemedicine acceptance during the covid-19 pandemic: user satisfaction and strategic healthcare marketing considerations. Health Marketing Quarterly 2021;38(2-3):168-187. https://-doi.org/10.1080/07359683.2021.1986988.
15. Zobair K., Sanzogni L., Houghton L., Sandhu K., & Islam M.. Health seekers' acceptance and adoption determinants of telemedicine in emerging economies. Australasian Journal of Information Systems 2021;25. https://doi.org/10.3127/a-jis.v25i0.3071.
16. Naik N., Ibrahim S., Sircar S., Patil V., Hameed B., Prasad B.et al.. Attitudes and perceptions of outpatients towards adoption of telemedicine in healthcare during covid-19 pandemic. Irish Journal of Medical Science (1971 -) 2021;191(4):1505-1512. https://doi.org/10.1007/s11845-021-02729-6.
17. Esber A., Teufel M., Jahre L., Schmitten J., Skoda E., & Bäuerle A.. Predictors of patients' acceptance of video consultation in general practice during the coronavirus disease 2019 pandemic applying the unified theory of acceptance and use of technology model. Digital Health 2023;9. https://doi.org/10.1177/20552076221149317.
18. Alboraie M., Abdalgaber M., Youssef N., Moaz I., Abdeen N., Abosheaishaa H.et al.. Healthcare providers' perspective about the use of telemedicine in egypt: a national survey. International Journal of Telemedicine and Applications

2022;2022:1-8. https://-doi.org/10.1155/2022/3811068.

19. Ftouni R., AlJardali B., Hamdanieh M., Ftouni L., & Salem N.. Challenges of telemedicine during the covid-19 pandemic: a systematic review. BMC Medical Informatics and Decision Making 2022;22(1). https://-doi.org/10.1186/s12911-022-01952-0.
20. Husin M., Rahman N., Bujang M., Ng S., Juval K., Hwong W.et al.. Translation and validation of the questionnaire on acceptance to telemedicine from the technology acceptance model (tam) for use in malaysia. Biomed Research International 2022;2022:1-9. https://-doi.org/10.1155/2022/9123887
21. 21. Ramirez M. and Calimag M.. The typology of physicians according to perspectives on telemedicine during and beyond the covid-19 pandemic. Journal of Medicine University of Santo Tomas 2023;7(1):1090-1111. https://-doi.org/10.35460/2546-1621.2023-0018.

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***Sajjan Iqbal Memon*:** Design of the work and the acquisition. Drafting the work.Final approval of the version to be published.

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