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Determinants of Telemedicine Adoption Among Patients

Devin L. Revilla[1], Nenita I. Prado[2]
[1,2] Liceo de Cagayan Univeristy, Cagayan de Oro City, Philippines

Abstract: *The rapid advancement of technology has positioned telemedicine as a vital tool for enhancing healthcare accessibility, particularly for underserved populations. This study aims to identify the key determinants influencing telemedicine adoption from the patient's perspective, focusing on three critical factors: patient satisfaction, technology usability, and healthcare accessibility. Utilizing a quantitative research design, the study was conducted in the Davao Region, Philippines, employing descriptive-correlational and causal-comparative methodologies to analyze relationships and potential predictors of telemedicine adoption. Data were collected through four adapted questionnaires measuring the aforementioned variables, ensuring a reliable assessment of patient experiences. The findings reveal that healthcare accessibility is the most significant predictor of telemedicine adoption ($p < 0.05$), explaining 67.5% of the variance in usage, while patient satisfaction and technology usability did not demonstrate statistical significance. These results emphasize the importance of improving access to telemedicine services to enhance patient engagement and overall satisfaction. Furthermore, they indicate that while usability and satisfaction are relevant, they must be accompanied by increased accessibility to drive adoption effectively. This study contributes to the existing literature by shifting the focus from purely technical aspects of telemedicine to more patient-centered factors, highlighting the need for ongoing research into the barriers and facilitators affecting telemedicine utilization. Addressing these insights can aid healthcare providers and policymakers in developing strategies that better meet the needs of diverse patient populations, ensuring equitable access to healthcare services through telemedicine.*

Keywords: *adoption factors, healthcare accessibility, patient satisfaction, technology usability, telemedicine.*

1. INTRODUCTION

What is the purpose of the study? Why are you conducting the study? The main section of an article should begin with an introductory section that provides detailed information about the paper's purpose, motivation, research methods, and findings. The introduction should be written in relatively nontechnical language, yet clear enough for an informed reader to understand the manuscript's contribution.

The rapid advancement of technology has transformed healthcare, with telemedicine emerging as a key tool for connecting patients and healthcare providers through electronic communication (Shirzadfar & Lotfi, 2017; Jagarapu & Savani, 2021). Telemedicine enables healthcare access across geographical barriers, enhancing patient satisfaction and accessibility, particularly in underserved areas (Flodgren et al., 2015). Despite its potential, the adoption of telemedicine is influenced by several critical determinants, including technology usability, patient satisfaction, and healthcare accessibility, each of which plays a crucial role in shaping user acceptance and sustained engagement with telemedicine (Nguyen et al., 2020; Eldaly et al., 2022).

A gap remains in the literature, however, as much of the existing research has focused on the technical aspects of telemedicine rather than on the patient-centered factors influencing adoption. For example, while system reliability and usability are well studied, less is known

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about how individual determinants like satisfaction, perceived accessibility, and ease of use influence patient adoption directly. Addressing these patient-centered factors is essential to developing a comprehensive understanding of what drives patients to use or discontinue telemedicine services.

This study seeks to examine the key determinants influencing telemedicine adoption from the patient's perspective, focusing on patient satisfaction, technology usability, and healthcare accessibility. By identifying and analyzing these factors, the study aims to provide a holistic view of the elements impacting patient engagement with telemedicine.

The study draws on established theoretical frameworks to contextualize these determinants. The Unified Theory of Acceptance and Use of Technology (UTAUT) and Technology Acceptance Model (TAM) highlight the significance of usability and perceived ease of use, while the Health Belief Model (HBM) emphasizes individual beliefs about the benefits and barriers to healthcare engagement (Venkatesh et al., 2003; Davis, 1989; Champion & Skinner, 2008). Additionally, the Patient-Centered Care (PCC) framework underscores the importance of personalized care in enhancing patient satisfaction, while the Access to Care Framework and Social Cognitive Theory provide insights into how social and structural factors shape perceptions of accessibility and usability (Shaler, 2007; Penchansky & Thomas, 1981; Bandura, 1989). Together, these frameworks offer a structured basis for examining the determinants of telemedicine adoption and understanding how they contribute to a more patient-centered approach to healthcare technology.

2. LITERATURE REVIEW

This section highlights the literature and related studies on patient satisfaction, technology usability, health care accessibility and telemedicine adoption among patients which comprises information, ideas, concepts both local and foreign sources that serve as background and framework of the components of the study.

Patient satisfaction in telemedicine is a crucial aspect of healthcare delivery, as it directly impacts the acceptance and effectiveness of telemedicine services (Haleem et. al., 2021). Nguyen et. al. (2022) defines patient satisfaction in telemedicine as to the degree to which patients perceive the telemedicine experience as meeting or exceeding their expectations, including factors such as the quality of care received, its similarity to face-to-face encounter, and perception of the interaction.

Technology usability is a critical factor influencing the adoption and effectiveness of telemedicine services, shaping patients' experiences and perceptions of remote healthcare delivery. Several studies have investigated the usability of telemedicine platforms, providing insights into the key determinants and implications of technology usability in telemedicine (Parmanto et al., 2016).

Klaassen, Beijnum, and Hermens (2016) conducted a comprehensive literature survey to explore the usability of telemedicine systems. Their research highlighted a significant increase in the deployment of telemedicine systems post-2008, with a particular focus on older adults and individuals with cardiovascular conditions. The study found questionnaires to be the most common method for evaluating telemedicine systems, underscoring the critical role of usability studies in the development and final acceptance of telemedicine by end-users (Klaassen, Beijnum, & Hermens, 2016).

Telemedicine is defined as the use of electronic information and communication technologies to provide and support healthcare when distance separates the participants. It encompasses a wide range of services and technologies, including video conferencing, remote monitoring, and mobile health applications (Vaughan et al., 2020). Healthcare accessibility, on the other hand, refers to the ease with which individuals can obtain timely and appropriate health services. It is influenced by various factors, including physical access, affordability, and availability of healthcare services (World Health Organization, 2020).

Telemedicine adoption, the process by which individuals and healthcare organizations integrate remote healthcare services into their practice, has garnered increasing attention in recent years due to advancements in technology and the growing need for accessible healthcare delivery. Numerous studies have examined the factors influencing telemedicine adoption from various perspectives. Venkatesh et al. (2016) proposed the Unified Theory of Acceptance and Use of Technology (UTAUT), which has been widely used to understand and predict telemedicine adoption behaviors. Their research identified performance expectancy, effort expectancy, social influence, and facilitating conditions as key determinants of technology adoption, including telemedicine.

Telemedicine adoption among patients is influenced by a multitude of factors, including patient satisfaction, technology usability, and healthcare accessibility. Numerous studies have delved into these predictors, providing valuable insights into the determinants driving patients' decisions to embrace telemedicine services (Alviani et al., 2023).

Beginning with patient satisfaction, research by Abdulwahab and Zehan (2021) highlighted the positive correlation between patient satisfaction and telemedicine adoption, emphasizing that satisfied patients are more likely to utilize and recommend telemedicine services. Similarly, a study by Zobair et al. (2021) underscored the importance of patient satisfaction in predicting telemedicine adoption, demonstrating that positive experiences with telemedicine lead to higher levels of satisfaction and increased willingness to continue using telemedicine platforms.

Moving to technology usability, findings from a study by Serrano et al. (2019) revealed that the ease of use and accessibility of telemedicine platforms significantly predict adoption among patients, with user-friendly interfaces and intuitive design enhancing acceptance and engagement. Moreover, research by Rahi and Alghizzawi (2020) explored the role of perceived ease of use and usefulness in predicting telemedicine adoption intentions, highlighting the pivotal role of technology usability in shaping patients' attitudes towards telemedicine services.

Regarding healthcare accessibility, a study by George and George (2023) investigated the impact of telemedicine on improving healthcare accessibility, particularly in underserved rural areas, emphasizing that enhanced accessibility drives telemedicine adoption among patients facing geographical barriers to traditional healthcare services. Furthermore, research by Caffery et al. (2016) examined the influence of telemedicine on reducing wait times and increasing appointment availability, demonstrating that improved accessibility leads to higher adoption rates among patients seeking timely and convenient healthcare solutions.

3. METHODS

This chapter presents the methodology that was employed in the study. It outlines the research setting, research design, respondents and sampling procedure, research instruments, research protocol, data gathering procedure, methods of data analysis, and validity and reliability of the instruments. Additionally, it discusses the statistical techniques utilized to analyze the data collected. These methodological aspects are crucial in ensuring the rigor and validity of the study’s findings, thereby contributing to the overall credibility and trustworthiness of the research outcomes.

Research Design

This study utilizes a quantitative approach focused on predictive analysis through descriptive-correlational and causal-comparative research designs. Descriptive correlational research examines the relationships among variables such as patient satisfaction, technology usability, and healthcare accessibility in telemedicine adoption,

identifying associations without manipulation (Siedlecki, 2020). This method helps pinpoint potential predictors of telemedicine adoption (Thomas, 2020).

The causal-comparative design further enriches the analysis by exploring potential cause-and-effect relationships between independent variables (e.g., usability, accessibility) and telemedicine adoption as the dependent variable. While it does not involve manipulation, this design investigates natural differences and associations, providing insights into predictive factors affecting adoption rates (Umstead & Mayton, 2018; Azalea, 2022). Together, these methods allow for a structured analysis of the predictors influencing telemedicine adoption and enhance the understanding of the variables that significantly affect patient engagement.

Research Locale

This study was conducted in Region 11, or the Davao Region, located in southeastern Mindanao, Philippines. Known for its diverse cultural heritage and vibrant economy, the region has made significant strides in telemedicine, utilizing telecommunications technology to provide remote healthcare services. Davao Region hosts various healthcare facilities, including hospitals, clinics, and health centers, many of which have adopted telemedicine to improve access, particularly in remote areas.

The region's unique blend of urban and rural settings provides an ideal backdrop for examining differences in telemedicine adoption across community types. With technologically advanced hospitals in urban centers and basic health units in rural areas, the Davao Region's diverse healthcare landscape allows for a comprehensive exploration of the nuances of telemedicine utilization based on varying levels of healthcare infrastructure and access.

Research Participants

The selection of respondents for this study is crucial to ensure the reliability and relevance of the findings, focusing on individuals aged 20 and older in Region 11 (Davao Region, Philippines) who have recently used telemedicine services. A structured sampling plan is essential for validity and representativeness, given the difficulty of identifying the total population of patients attending telemedicine programs. The investigator employs a two-step approach, starting with quota sampling to estimate the total population by dividing it into subgroups based on relevant characteristics, such as location across the five provinces of Davao del Norte, Davao de Oro, Davao del Sur, Davao Oriental, and Davao Occidental. After estimating the total population, stratified random sampling is used to

select participants from these identified subgroups, ensuring the sample represents various strata based on characteristics like age and geographic location.

Research Instrument

The study utilized four adapted questionnaires to assess various aspects of telemedicine: the Telemedicine Satisfaction Questionnaire, Technology Usability Scale, Healthcare Accessibility Scale, and Telemedicine Adoption Scale. The Telemedicine Satisfaction Questionnaire, adapted from Yip et al. (2023), consists of 16 items and has a Cronbach's alpha of 0.925, measuring quality of care, similarity to face-to-face encounters, and perceptions of interaction using a 5-point Likert scale to gauge patient satisfaction. The Technology Usability Scale, based on Parmanto et al. (2016), evaluates usability with six indicators—usefulness, ease of use, interface quality, interaction quality, reliability, and future use—and has a Cronbach's alpha of 0.914, indicating high reliability. The Healthcare Accessibility Scale, adapted from the Perceived Access to Health Care Questionnaire by Hoseini-Esfidarjani et al. (2021), includes 30 items with a Cronbach's alpha of 0.918, focusing on access and affordability, also utilizing a 5-point Likert scale. Lastly, the Telemedicine Adoption Scale, based on Okrah (2021), measures the intention to adopt telemedicine through eight indicators, including effort expectancy and social influence, with a high reliability score of 0.928. All instruments consistently use a 5-point Likert scale to quantify responses, ensuring robust data collection for the study.

Data Gathering Procedure

The data gathering procedure for this study was systematically designed to collect high-quality information reflecting the experiences and perceptions of telemedicine users in Region 11, Philippines. It began with the validation of a comprehensive questionnaire aimed at measuring key variables: technology usability, healthcare accessibility, patient satisfaction, and telemedicine adoption. The questionnaire underwent a pilot study, confirming its reliability with high Cronbach's alpha values across various dimensions. Ethical approval was secured from the dean of the college of nursing and the Liceo Research Ethics Board to ensure the protection of participants' rights and welfare.

Recruitment involved stratified random sampling, targeting individuals who had used telemedicine services within the past year. Collaborations with healthcare providers and outreach through social media facilitated participant identification. Informed consent was obtained, and participants were assured of confidentiality and their right to withdraw from the study at any time. The electronic questionnaire was distributed via Google Forms to enhance accessibility, with technical support provided to assist participants as needed. After

data collection, responses were compiled and checked for completeness and accuracy, preparing the dataset for detailed analysis using appropriate statistical techniques. Throughout the process, strict confidentiality and data security protocols were maintained to protect participant information, ensuring reliable and valid findings that contribute meaningful insights into telemedicine adoption in Region 11.

Ethical Considerations

The study adhered to strict ethical standards as outlined by the Liceo de Cagayan Research Ethics Board, ensuring a thorough evaluation of various factors such as inclusion and exclusion criteria, privacy, and data protection. Participants included adults aged 20 and above from Region 11 who had used telemedicine services within the past year, while those under 20, non-residents, or without internet access were excluded to maintain focus and relevance. The study lasted approximately one month, involving questionnaire completion and possible follow-ups, with strict measures in place to ensure privacy and confidentiality of participant data, which was stored securely and anonymized. Transparency was prioritized through clear communication of study goals and regular updates, while any potential conflicts of interest were disclosed and managed. Participants were recruited through stratified random sampling, with efforts made to ensure informed consent and community engagement through collaborations with healthcare providers and telemedicine platforms. The study emphasized participant safety, communicated the benefits of research, and provided small non-monetary incentives. Finally, findings will be shared with stakeholders through presentations and publications, ensuring that the results contribute to improving telemedicine practices.

4. RESULTS

The regression analysis in Table 1 examines the impact of three independent variables—patient satisfaction, technology usability, and healthcare accessibility—on the adoption of telemedicine as the dependent variable. The results reveal that the model is statistically significant, as demonstrated by the F-statistic ($F = 204.518$, $p = 0.000$), indicating that these variables explain a significant portion of the variation in telemedicine adoption. With an R^2 value of 0.675, it is evident that 67.5% of the variance in telemedicine adoption can be attributed to patient satisfaction, technology usability and healthcare accessibility. This meant further that 32.5% of the variation telemedicine adoption can be attributed to other variables not covered in this study. Examining further, the table showed that among the three exogenous

variables, healthcare accessibility is the variable that projected a p-value lower than 0.05 alpha level, and therefore considered to be significant.

Table 4. Determinants of Telemedicine Adoption Among Patients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.932	.134		6.973	.000
Patient Satisfaction	.004	.057	.005	.067	.947
Technology Usability	.104	.082	.116	1.259	.209
Healthcare Accessibility	.633	.063	.721	10.112	.000

Dependent Variable: Telemedicine Adoption; F= 204.518; p=0.000; R=0.821; R^2=.675

5. DISCUSSION

Telemedicine adoption among patients is influenced by a multitude of factors, including patient satisfaction, technology usability, and healthcare accessibility. Numerous studies have delved into these predictors, providing valuable insights into the determinants driving patients' decisions to embrace telemedicine services (Alviani et al., 2023).

These findings highlight that accessibility is crucial for increasing telemedicine adoption, especially for underserved populations, as individuals with greater access to healthcare services are more inclined to utilize telemedicine for its convenience and ability to bridge gaps in timely healthcare delivery (George & George, 2023; Serrano et al. 2019; Smith et al., 2021; Caffery et al., 2016). Conversely, improvements in patient satisfaction and technology usability must be complemented by efforts to enhance accessibility, as the lack of significant relationships indicates that these factors alone are insufficient for increasing telemedicine uptake. This complexity aligns with existing research, which emphasizes that telemedicine adoption often hinges on specific needs and use cases rather than general satisfaction with the healthcare system (Alviani et al., 2023; Nguyen et. al. 2022; Haleem et. al., 2021). Therefore, further research is needed to explore the specific barriers and facilitators affecting telemedicine adoption beyond broad metrics of technology use or patient satisfaction.

6. CONCLUSION

In conclusion, the findings from this study illuminate the critical role of healthcare accessibility in driving telemedicine adoption among patients. The statistical analysis reveals that while patient satisfaction and technology usability are important components of the telemedicine experience, they do not serve as significant predictors of adoption in this context. Instead, healthcare accessibility stands out as the primary determinant, with a strong positive correlation to telemedicine use, particularly for underserved populations who rely on these services to overcome barriers to traditional healthcare.

This research underscores the necessity for healthcare providers and policymakers to prioritize improving access to telemedicine services as a means of enhancing overall patient engagement and satisfaction. Efforts to address the barriers to accessibility must be the focal point of future initiatives, as improvements in patient satisfaction and technology usability alone are insufficient to foster widespread adoption. These findings are consistent with existing literature, which emphasizes that telemedicine utilization often depends on specific patient needs and the availability of services rather than just general satisfaction with healthcare options.

Ultimately, this study highlights a need for ongoing research to further explore the nuanced factors influencing telemedicine adoption. Understanding the barriers and facilitators at play will be essential for developing targeted strategies that encourage greater uptake of telemedicine services, ensuring that they are effectively meeting the needs of diverse patient populations.

LIMITATION

The study investigates the determinants influencing telemedicine adoption among patients in the Davao Region, Philippines, utilizing a descriptive-correlational and cross-sectional research design. The scope of the study includes exploring key factors such as healthcare access, patient attitudes, and demographic characteristics, with data collected through structured questionnaires from a representative sample of patients. By employing a quantitative approach, the study identifies significant variables impacting telemedicine adoption, providing insights that can inform healthcare providers and policymakers. However, the study has certain limitations. It is geographically confined to the Davao Region, which may not represent the experiences of patients in other areas or countries with varying healthcare infrastructures. The reliance on self-reported data could introduce response bias, and the findings reflect only a snapshot during the study period, potentially overlooking evolving trends in telemedicine usage. Additionally, while healthcare access was identified as a significant factor, other potential influences, such as cultural aspects or physician engagement, were not extensively examined. Furthermore, the study focuses on existing telemedicine systems in the Davao Region, which may differ from more advanced systems in technologically developed areas. Despite these limitations, the study provides valuable insights into the factors affecting telemedicine adoption and serves as a foundation for further research in this field.

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