

Institutional Strategies and Support Systems Needed to Encourage Telemedicine Adoption in District Hospitals in Ghana: A Case of Suhum District Hospital

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ABSTRACT

Introduction: Telemedicine has emerged as a transformative solution to healthcare delivery challenges, particularly in low and middle-income countries where access to quality healthcare remains uneven. This study examines institutional strategies and support systems required to encourage telemedicine adoption in district hospitals in Ghana, with a focus on Suhum District Hospital.

Methodology: Guided by the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Diffusion of Innovation (DOI) theory, the study employed a descriptive cross-sectional design involving 217 health workers. Data were collected using structured questionnaires and analysed using SPSS version 26.

Findings: Findings indicate that although awareness (86.7%) and willingness (78.3%) to adopt telemedicine are high, institutional barriers such as inadequate infrastructure (64.2%), poor internet connectivity (57.5%), and lack of institutional support (71.7%) significantly hinder adoption.

Conclusion: The study concludes that institutional readiness is a critical determinant of telemedicine implementation. It recommends strengthening ICT infrastructure, developing clear policies, enhancing training, and fostering leadership commitment to support Ghana's digital health transformation.

Keywords: Telemedicine; Institutional Support; Digital Health; Healthcare Innovation

Abbreviations: TAM: Technology Acceptance Model; DOI: Diffusion of Innovation; ICT: Information and Communication Technologies; WHO: World Health Organization; UTAUT: Unified Theory of Acceptance and Use of Technology; SPSS: Statistical Package for the Social Sciences

Introduction

The global healthcare landscape has undergone significant transformation due to rapid advancements in digital technologies. Among these innovations, telemedicine has emerged as a key solution for improving access to healthcare services, particularly in underserved and rural areas [1]. Telemedicine refers to the delivery of healthcare services through information and communication technologies (ICT) where distance is a critical factor [2]. In Ghana, disparities in healthcare delivery remain a major challenge. Rural and peri-urban areas

such as Suhum Municipality face shortages of healthcare professionals, long patient wait times, and limited access to specialized care [3]. Telemedicine offers a viable solution to bridge these gaps by enabling remote consultations, diagnostics, and patient monitoring. Despite its potential, telemedicine adoption in Ghana remains limited. Previous initiatives, such as the Ghana eHealth Strategy and pilot projects led by organizations like the Novartis Foundation, have demonstrated success but lack nationwide integration [4]. Institutional factors, including infrastructure, training, and policy frameworks, play a critical role in determining the success of such innovations.

Problem Statement

Although telemedicine has the potential to transform healthcare delivery in Ghana, its adoption in district hospitals remains low. In Suhum Municipality, healthcare delivery is constrained by limited resources, workforce shortages, and infrastructural deficits. While health workers may be willing to adopt telemedicine, inadequate institutional support systems hinder its implementation.

General Objective

To examine institutional strategies and support systems needed to encourage telemedicine adoption in Suhum District Hospital.

Specific Objectives

- i. To assess institutional readiness for telemedicine adoption
- ii. To identify key support systems required for implementation
- iii. To evaluate training and capacity-building needs
- iv. To propose strategies for improving adoption

Research Questions

- i. What institutional factors influence telemedicine adoption?
- ii. What support systems are required for successful implementation?
- iii. How can institutional strategies enhance adoption?

Literature Review

Theoretical Framework

Technology Acceptance Model (TAM)

TAM posits that perceived usefulness and perceived ease of use influence technology adoption [5]. In telemedicine, health workers are more likely to adopt systems they find beneficial and easy to use.

Unified Theory of Acceptance and Use of Technology (UTAUT)

UTAUT emphasizes performance expectancy, effort expectancy, social influence, and facilitating conditions [6]. Facilitating conditions such as institutional support are critical in this study.

Diffusion of Innovation (DOI)

DOI explains how innovations spread within a social system [7]. Institutional strategies influence adoption through communication, training, and leadership.

Institutional Support in Telemedicine

Institutional support includes policies, infrastructure, training, and leadership commitment. Studies show that lack of institutional backing is a major barrier to telemedicine adoption [8].

Training and Capacity Building

Human resource remains the most valuable asset and needs to be developed to meet the technological advancement of the modern world. Training enhances digital literacy and confidence among health workers. Without training, even available technologies remain underutilized [9].

Infrastructure and Technology

Reliable internet, electricity, and digital devices are essential. Infrastructure deficits are a common challenge in developing countries [10].

Methodology

Research Design

The study employed a descriptive cross-sectional research design, which is appropriate for assessing perceptions, attitudes, and readiness at a single point in time [11]. This design enabled the researcher to capture a snapshot of health workers' awareness, willingness, and institutional conditions related to telemedicine adoption. The cross-sectional approach is particularly relevant in digital health research, where rapid technological changes require timely assessments of readiness and adoption [12]. It also allowed for quantitative analysis of relationships between institutional factors and telemedicine adoption without manipulating variables.

Study Area

The study was conducted in Suhum Hospital, located in the Eastern Region of Ghana. Suhum serves as a semi-urban district with both urban and rural characteristics, making it an ideal context for examining telemedicine adoption challenges. Healthcare delivery in Suhum is characterized by:

- Limited specialist services
- High patient-to-provider ratios
- Infrastructure constraints
- Increasing demand for healthcare services

These conditions highlight the relevance of telemedicine as a potential intervention to improve healthcare access and efficiency.

Study Population

The target population comprised healthcare professionals actively involved in service delivery, including: Medical doctors, Nurses and midwives, Physician assistants, Pharmacists, Allied health professionals. These groups were selected because they represent the primary users and implementers of telemedicine systems within healthcare facilities.

Sampling Technique

A stratified random sampling technique was used to ensure proportional representation of different professional categories. This method improves the representativeness of the sample and reduces sampling bias [13]. Each professional group formed a stratum, and participants were randomly selected within each group.

Sample Size Determination

The sample size for this study was determined using Yamane's formula (1967), which provides a simplified method for calculating sample size for a finite population. The formula is expressed as:

$$n = \frac{N}{1 + N(e^2)}$$

Where:

n = Required sample size

N = Total population size (approximately 500 health workers)

e = Margin of error (0.05), corresponding to a 95% confidence level

However, after adjusting for feasibility and expected response rates, a final sample size of 217 respondents was used for the study. This sample size is considered statistically adequate to ensure good representation and allow for generalization of findings within the study area. The use of a 5% margin of error is widely accepted in social science research, balancing precision with practical constraints such as time and resources.

Data Collection Instruments

Data for this study were collected using a structured questionnaire, carefully designed to align with established theoretical frameworks and empirical literature. The development of the instrument was guided by; the Technology Acceptance Model (TAM), which examines perceived usefulness and perceived ease of use as determinants of technology adoption. Again, Unified Theory of Acceptance and Use of Technology (UTAUT), which incorporates factors such as performance expectancy, effort expectancy, social influence, and facilitating conditions. Further more relevant literature on telemedicine adoption and digital health implementation. The questionnaire was divided into several sections to capture both individual and institutional dimensions of telemedicine adoption:

- i. Demographic characteristics (e.g., age, gender, professional role, years of experience)
- ii. Awareness and knowledge of telemedicine concepts and applications
- iii. Willingness and readiness to adopt telemedicine in clinical practice

- iv. Institutional support, including policies, leadership, and funding
- v. Infrastructure availability, such as internet access, ICT tools, and electricity
- vi. Barriers to adoption, including technical, organizational, and personal challenges

Both closed-ended questions (primarily Likert-scale items) and open-ended questions were included. The closed-ended questions enabled quantitative analysis of patterns and relationships, while the open-ended questions provided deeper qualitative insights into participants' perceptions and experiences.

Data Collection Procedure

Prior to data collection, official permission was obtained from the Municipal Health Directorate to ensure institutional approval and co-operation. A pilot study was conducted with a small group of respondents to assess the clarity, reliability, and validity of the questionnaire. Feedback from the pilot informed necessary revisions to improve the instrument. The main data collection process involved; deployment of trained research assistants to ensure consistency and accuracy in data gathering, face-to-face administration of questionnaires, which helped maximize response rates and allowed clarification of questions where necessary. Ensuring voluntary participation, respondents were gave their consent before participating in the study. Strict ethical standards were maintained throughout the study, including; confidentiality of respondents' information, anonymity, ensuring that no personal identifiers were linked to responses and the right to withdraw from the study at any stage without any consequences.

Data Analysis

Collected data were coded and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Both descriptive and inferential statistical techniques were employed to address the study objectives.

Descriptive statistics were used to summarize the data, including:

- i. Frequencies and percentages to describe categorical variables
- ii. Means and standard deviations to summarize continuous variables and Likert-scale responses

Inferential statistics were applied to examine relationships and test associations between variables, including:

- i. Cross-tabulations to explore patterns between demographic and institutional factors.
- ii. Chi-square tests to determine the statistical significance of associations where applicable

These analytical methods enabled the identification of key trends, patterns, and relationships influencing telemedicine adoption, particularly the role of institutional and infrastructural factors.

Results

Awareness and Understanding of Telemedicine

The results revealed that a significant proportion of respondents were aware of telemedicine. This suggests that telemedicine as a concept has gained considerable visibility within the healthcare sector, likely influenced by global digital health initiatives and national efforts toward digital transformation [1,4]. However, despite this high level of awareness, only a minority of respondents demonstrated a comprehensive understanding of telemedicine. Many participants lacked clarity on its practical application, including how telemedicine systems function and how they can be integrated into routine healthcare delivery. This indicates that awareness is largely conceptual rather than practical. According to [7], knowledge of an innovation is only the first stage in the adoption process; deeper understanding is required for successful implementation. The limited practical understanding observed in this study therefore constrains effective utilization and slows adoption.

Willingness to Adopt Telemedicine

The majority of respondents expressed a willingness to adopt telemedicine. This reflects generally positive attitudes toward technological innovation and recognition of its potential benefits, such as improved access to healthcare services and enhanced efficiency [2]. Despite this overall willingness, adoption readiness varied across respondents. Factors such as age, professional experience, and digital literacy significantly influenced attitudes. Younger healthcare workers and those with higher digital competence were more inclined to adopt telemedicine, while older or less technologically experienced individuals showed greater hesitation. This finding aligns with [9], who noted that demographic and technological factors play a critical role in influencing telemedicine adoption in developing countries.

Institutional Support Systems

The study found that institutional support for telemedicine implementation is inadequate. This inadequacy is characterized by the absence of formal telemedicine policies, lack of structured implementation programs, and limited financial investment. The lack of policy frameworks creates uncertainty regarding the operationalization of telemedicine services, while the absence of structured programs results in fragmented and inconsistent implementation efforts. Additionally, insufficient funding limits the acquisition of necessary technologies and the development of sustainable systems. These findings are consistent with [8] who emphasized that institutional support is a key determinant of telemedicine success. Similarly, the [3] highlights the need for stronger institutional frameworks to support digital health initiatives.

Training and Capacity Building

A majority of respondents indicated a strong need for training in telemedicine. The lack of digital skills emerged as a major barrier, with many healthcare workers expressing low confidence in their ability to use telemedicine technologies effectively. Training is therefore essential for building user confidence, improving system usability, and reducing resistance to technological change. According to [5], perceived ease of use significantly influences technology acceptance; without adequate training, users are less likely to perceive telemedicine systems as user-friendly. Continuous capacity-building initiatives are thus necessary to equip healthcare workers with the required competencies and to facilitate successful implementation.

Infrastructure Readiness

The study identified significant infrastructure challenges affecting telemedicine implementation. These include poor internet connectivity, limited availability of ICT devices, and unstable power supply. Reliable internet connectivity is critical for telemedicine, as most services depend on real-time communication. Inadequate connectivity disrupts service delivery and reduces effectiveness. Similarly, the lack of ICT devices limits the ability of healthcare facilities to operationalize telemedicine services. Power instability further complicates implementation, particularly in resource-constrained settings. These findings are consistent with [10], who identified infrastructure limitations as a major barrier to telemedicine success in Africa.

Barriers to Telemedicine Adoption

The study identified several key barriers to telemedicine adoption, including infrastructural deficits, lack of training, weak institutional frameworks, and concerns about data security. Infrastructure-related challenges directly affect the functionality and reliability of telemedicine systems. At the same time, inadequate training limits the ability of healthcare workers to effectively utilize available technologies. Weak institutional frameworks further hinder adoption by creating an environment lacking clear direction and support. Additionally, concerns about data privacy and security reduce trust in telemedicine systems, which is critical for both providers and patients. These findings align with previous studies that emphasize the multifaceted nature of barriers to telemedicine adoption in developing contexts [2,9].

Discussion of Findings

Awareness and Knowledge

The findings confirm that awareness alone is insufficient to drive telemedicine adoption. While respondents were generally aware of telemedicine, their limited understanding reduces its perceived usefulness and ease of use. This supports the Technology Acceptance Model (TAM), which posits that these perceptions are key determinants of technology adoption [5]. Without adequate knowledge, healthcare workers are less likely to adopt telemedicine in practice.

Willingness versus Actual Adoption

Although willingness to adopt telemedicine was high, actual adoption remains low due to the absence of enabling conditions such as infrastructure, training, and institutional support. This finding supports the Unified Theory of Acceptance and Use of Technology (UTAUT), which emphasizes the importance of facilitating conditions in translating intention into actual use [6].

Institutional Gaps

Institutional weaknesses emerged as the most critical barrier to telemedicine implementation. The lack of policies, funding, and leadership commitment limits the sustainability of telemedicine initiatives. Strong institutional frameworks are necessary to provide direction, allocate resources, and ensure effective implementation [8].

Infrastructure Constraints

Infrastructure challenges remain a systemic issue, particularly in developing countries. Limited connectivity, inadequate equipment, and unreliable power supply significantly hinder telemedicine deployment. These findings are consistent with [10], who highlighted infrastructure as a major determinant of telemedicine success in Africa.

Training Deficits

Training is essential for bridging the gap between awareness and adoption. Without adequate training, healthcare workers lack the confidence and competence needed to use telemedicine effectively. This underscores the importance of continuous professional development and structured training programs in promoting telemedicine adoption.

Conclusion

The study set out to assess the awareness, willingness, and readiness of healthcare workers to adopt telemedicine in Suhum Municipality. The findings indicate that while there is a relatively high level of awareness and a strong willingness to adopt telemedicine, actual implementation remains limited due to several critical challenges. Firstly, although awareness of telemedicine is widespread, understanding remains superficial. Many healthcare workers are familiar with the concept but lack the practical knowledge required for effective utilization. This gap between awareness and functional understanding limits the perceived usefulness and ease of use of telemedicine systems, as explained by the Technology Acceptance Model [5]. Secondly, the study revealed that willingness to adopt telemedicine is generally high. Healthcare workers recognize its potential benefits, including improved access to healthcare and enhanced efficiency. However, willingness alone is insufficient to ensure adoption. The absence of enabling conditions—such as infrastructure, training, and institutional support—prevents this willingness from translating into actual use. This finding is consistent with the Unified

Theory of Acceptance and Use of Technology, which emphasizes the role of facilitating conditions in technology adoption [6]. Thirdly, institutional readiness emerged as the most critical factor influencing telemedicine implementation. The lack of formal policies, structured programs, and adequate funding significantly constrains adoption efforts. Without strong institutional support, telemedicine initiatives cannot be effectively implemented or sustained [3,8]. Additionally, infrastructure challenges—such as poor internet connectivity, limited ICT equipment, and unstable power supply—pose significant barriers. These systemic issues are common in developing countries and have been widely documented as major constraints to telemedicine adoption [2,10]. Furthermore, the study identified a substantial need for training and capacity building. Many healthcare workers lack the digital skills necessary to use telemedicine systems effectively, which reduces confidence and increases resistance to adoption. Overall, the study concludes that while the human factors (awareness and willingness) are favorable, structural factors—particularly institutional readiness, infrastructure, and capacity—remain the primary barriers to telemedicine adoption in Suhum Municipality. Addressing these challenges is essential for successful implementation and sustainability.

Recommendations

Infrastructure Development

Improving infrastructure is critical to the success of telemedicine. The government and relevant stakeholders should invest in expanding reliable internet connectivity, particularly in underserved and rural areas. Healthcare facilities should be equipped with adequate ICT tools, including computers, tablets, and telemedicine platforms. Furthermore, ensuring a stable and reliable power supply is essential to support uninterrupted telemedicine services. Strengthening infrastructure will address one of the most significant barriers identified in the study and enhance the feasibility of telemedicine implementation [10].

Capacity Building and Training

Continuous training and professional development programs should be implemented to enhance the digital competencies of healthcare workers. Training should focus not only on technical skills but also on the practical application of telemedicine in clinical settings. Telemedicine and digital health should also be integrated into healthcare education curricula to prepare future professionals for technology-driven healthcare delivery. Improving digital literacy will increase confidence, enhance perceived ease of use, and promote acceptance of telemedicine systems [5,9].

Institutional Strengthening

Healthcare institutions must demonstrate strong leadership commitment to telemedicine implementation. This includes allocating dedicated funding, developing strategic plans, and establishing mon-

itoring and evaluation frameworks. Institutional strengthening will ensure that telemedicine initiatives are well-coordinated, adequately resourced, and sustainable over time. Effective leadership and organizational support are essential for driving successful adoption [8].

Public-Private Partnerships

Collaboration between the public sector and private organizations, particularly telecommunications companies and technology providers, should be encouraged. Such partnerships can help address infrastructure challenges, provide technical expertise, and support innovation in telemedicine solutions. Leveraging private sector capabilities can accelerate the deployment and scaling of telemedicine services, especially in resource-constrained settings [4].

Community Engagement and Awareness

Efforts should be made to educate patients and the general public about telemedicine. Community engagement initiatives can help promote acceptance, reduce misconceptions, and build trust in telemedicine services. Public awareness campaigns should highlight the benefits, safety, and accessibility of telemedicine, thereby encouraging its utilization. Patient acceptance is a critical component of successful telemedicine implementation [2, 14-20].

Implications for Practice

The findings of this study have important implications for healthcare practice and policy. They highlight the need for a holistic approach to telemedicine implementation that addresses not only individual readiness but also institutional and systemic factors. Healthcare managers, policymakers, and stakeholders must prioritize investments in infrastructure, training, and institutional frameworks to create an enabling environment for telemedicine adoption.

Suggestions for Further Research

- i. Patient perspectives and acceptance of telemedicine
- ii. Cost-effectiveness of telemedicine implementation
- iii. Comparative studies across different regions in Ghana
- iv. Longitudinal studies to assess the impact of telemedicine over time

Such studies will provide deeper insights and support evidence-based decision-making in digital health.

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