

Telehealth acceptance among health workers as a digital health strategy

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Abstract

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Purpose: This study analyzes the acceptance of telehealth among health workers at Gondangrejo Community Health Center, Indonesia, and at Sentro De Saude Becora Timor Leste, as a digital health strategy. **Methods:**

This study employed an analytical observational research design with a cross-sectional approach using the Technology Acceptance Model questionnaire. The sample in this study comprised 30 health workers from the Gondangrejo Health Center in Indonesia and the Sentro De Saude Becora in Timor Leste. Data analysis and statistical tests used Pearson correlation. **Results:** There was a positive and significant relationship between perceived ease of use and perceived usefulness ($p\text{-value} < 0.001$; $r=0.972$), perceived usefulness and attitude toward using ($p\text{-value}=0.015$; $r=0.359$), perceived ease of use and attitude toward using ($p\text{-value}=0.042$; $r=0.305$), attitude toward using and behavioral intention to use ($p\text{-value} < 0.001$; $r = 0.888$), perceived usefulness and behavioral intention to use ($p\text{-value} < 0.016$; $r=0.356$), behavioral intention to use and actual system use ($p\text{-value} < 0.022$; $r=0.342$). **Conclusion:** Acceptance of telehealth by healthcare workers is influenced by perceived usefulness, perceived ease of use, attitude toward using, behavioral intention to use, and actual system use.

Keywords: acceptance; health workers; telehealth

INTRODUCTION

The development of health information technology encourages the advancement of various modern health services. Telehealth is a long-distance health service that uses communication and information technology to provide diagnostic consultations and patient care management [1]. Telehealth services can include clinical teleconsultation, tele-ultrasonography, teledentistry, tele-electrocardiography, teleradiology, and other services, all in accordance with technological developments. Telehealth services help improve the quality of health services by saving time, reducing costs, and increasing service effectiveness. The use of telemedicine in Indonesia increased rapidly during the COVID-19 pandemic. The biggest challenge to telemedicine is its

low adoption rate [2]. In addition, a lack of understanding of telemedicine technology also contributes to low adoption. Poor use of health information technology will lead to poor patient safety and increased fatigue among health workers. This study highlights the challenges of implementing digital technology in the healthcare sector from the perspective of direct users (healthcare workers), who are often a key factor in the success or failure of technology adoption [3].

The definitions of telemedicine and telehealth state that these terms are closely related and cannot be separated, as they provide faster communication links between health workers and the community [4]. Various factors undoubtedly influence the successful implementation of telemedicine or telehealth. Finance, skills, and culture play a significant role in the successful implementation of telemedicine or telehealth [5]. In

practice, although technological sophistication is seen as a promising future for health services, failures still occur [6]. In reality, the use of technology in health services represents a significant change that requires adaptation. The implementation of telemedicine or telehealth will not be effective if health service providers are not prepared for these changes [7]. Implementing telemedicine or telehealth is indeed not easy. Based on existing data, the failure rate is 70%, with the primary factor not the technology itself but the lack of readiness to use existing technology [6].

The acceptance of health workers in receiving and implementing telehealth and telemedicine has been widespread across countries at both advanced and emerging stages of development. The assessment of health workers' readiness includes multiple forms of telemedicine and telehealth, such as telemonitoring for diabetes, teleconsultation for children and the elderly, teledentistry, and the use of e-health applications. The acceptance of health workers in developing countries is often measured through the dimension of readiness, while another approach is to assess the country's overall readiness to implement telehealth and telemedicine. In developing countries, although the implementation of telehealth and telemedicine has not been considered a mature approach to delivering health services [8], including in Indonesia and Timor-Leste.

A crucial barrier to telehealth implementation is health workers' acceptance of it [9]. Therefore, it is essential to identify the factors that prevent health workers from adopting telehealth. The acceptance of health workers in providing telehealth and telemedicine has been widely adopted in both developed and developing countries. In developing countries, although the implementation of telehealth and telemedicine has not been considered a mature approach to delivering health services [8], including in Indonesia and Timor-Leste. Examples of telehealth used in Indonesia, such as Halodoc and Alodokter, are used by the public to consult with doctors. In Timor-Leste, telehealth has been implemented through tele-obgyn, in which health workers monitor the health of pregnant women via WhatsApp. Based on research [10] and on experience with digital technology among health workers in Timor-Leste, experiences are highly varied. One example is their experience using hand phones or mobile phones to support their daily communication with family members, health workers, and the community at large. While numerous studies have addressed the benefits of telehealth and its implementation from a patient or public policy perspective, there is limited research specifically analyzing telehealth acceptance from the perspective of healthcare professionals, particularly in developing

countries or health systems with limited resources. Furthermore, most studies do not combine a holistic approach to analyzing technological, organizational, and individual factors. Regarding this ability, the respondents indicate that 100% use the phone. This study aims to analyze the acceptance of telehealth among health workers at the Gondangrejo Community Health Center in Indonesia and the Sentro De Saude Becora in Timor Leste.

METHODS

This study employed an analytical observational research design with a cross-sectional approach [11]. This study aims to examine health workers' acceptance using the TAM (Technology Acceptance Model), including perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and actual system use. The population in this study comprised health workers at Sentro De Saude Becora in Timor-Leste and at Gondangrejo Primary Care. The sampling used purposive sampling. To determine the sample size, the Slovin formula was used to obtain 30 health workers from the Gondangrejo Health Center, Indonesia, and the Sentro De Saude Becora, Timor Leste. The inclusion criteria for this study were health workers registered at the Gondangrejo Health Center in Indonesia and at the Sentro De Saude Becora in Timor Leste. The exclusion criteria in this study were research subjects who were unwilling to participate in the series of studies.

This research was conducted at the Gondangrejo Health Center and the Sentro De Saude Becora in Timor Leste, in March - May 2025. Data sources use primary and secondary data. Primary data, such as characteristics of health workers and their acceptance of telehealth, are collected using questionnaires; secondary data, such as the number of health workers and basic data from health centers, are also collected. The research instrument used in this study was a TAM questionnaire via Google Form, which included the characteristics of the research subjects and their acceptance of telehealth [12]. The validity test results showed that all variables were valid, as their calculated r values were > 0.361 . Perceived usefulness ($r=0.712$). Perceived ease of use ($r=0.698$). Attitude toward using ($r=0.753$). Behavioral intention ($r=0.715$), actual system use ($r = 0.667$). The results of the reliability test show Cronbach's Alpha > 0.6 , with perceived usefulness ($r = 0.885$). Perceived ease of use ($r=0.829$). Attitude toward using ($r=0.653$). Behavioral intention ($r=0.715$), actual system use ($r=0.779$). The data were analyzed using SPSS version 22, employing a bivariate Pearson correlation test to assess health workers' acceptance of the

system using TAM, comprising perceived usefulness, perceived ease of use, attitude toward using, behavioral intention to use, and actual system use. Apart from TAM acceptance among health workers, the characteristics of health workers, including age, education, and gender, were also analyzed. Each variable was presented using frequency distributions and percentages.

Data processing techniques in quantitative research can be divided into the following main stages: editing, coding, scoring, data entry, and tabulation. The data meet the requirements for normality and homogeneity, so the Pearson Product-Moment correlation test is used. This research was conducted based on the permission of the ethics commission of the Faculty of Health Sciences, Kusuma Husada University, Surakarta (approval number from ethic letter 2505/UKH/L/02/EC/I/2025) and the Unit of Ethical Research and Development, Timor Leste National Public Health Institute (approval number from ethic letter 388/INSP-TL/UEPD-AL/IV/2025).

RESULTS

Table 1 was conducted to describe the characteristics of respondents according to the variables studied. This is primary data collected from 30 respondents who completed a questionnaire. Based on Table 1, the respondents' countries of origin are grouped into two: Indonesia and Timor-Leste. It is known that 15 respondents come from Indonesia (50%), while 15 respondents are from Timor-Leste (50%). Respondents are grouped by gender into two categories: male and female. It is known that the majority of respondents are female (26 people, 86.67%), while the male respondents are 4 people (13.33%). Because respondents' education varied in this study, age was classified into three categories: Diploma III, Bachelor's, and Master's/Specialist. It is known that 8 respondents had a Diploma III (26.67%), 20 had a Bachelor's degree (66.67%), and 2 had a Master's/Specialist degree (6.66%). The age of respondents in this study varies, and the profession is classified into six categories: midwives, pharmacists, sanitarians, medical recorders, doctors, and nurses. It is known that most respondents work as midwives, with 11 people (36.67%).

Based on Table 2, the findings indicate a significant, positive correlation between perceived usefulness and attitude toward use ($p=0.015$; $r=0.359$). There is a significant and positive correlation between perceived ease of use and perceived usefulness ($p<0.001$; $r=0.972$). The findings indicate a significant, positive correlation

Table 1. Respondent characteristics (n=30)

Variables	n	%
Country of origin		
Timor Leste	15	50.00
Indonesia	15	50.00
Sex		
Male	4	13.30
Female	26	86.70
Education		
Diploma III	8	26.70
Bachelor	20	66.70
Master/Specialist	2	6.60
Profession		
Midwife	11	36.70
Pharmacist	2	6.70
Public health	2	6.70
Nurse	8	26.70
Medical recorder	2	6.70
Doctor	5	16.65
Age (years)		
16-25	1	3.30
26-35	18	6.00
36-45	9	60.00
46-55	2	6.70

between perceived ease of use and attitude toward use ($p=0.042$; $r=0.305$). There is a significant and positive correlation between Attitude toward using and behavioral intention to use ($p<0.001$; $r=0.888$) and a significant and positive correlation between perceived usefulness and behavioral intention to use ($p<0.016$; $r=0.356$). The findings indicate a significant and positive correlation between behavioral intention to use and actual system use ($p<0.022$; $r=0.342$).

Table 2. Bivariate analysis

Dependent variables	Independent variables	p	r
Perceived usefulness	Attitude toward using	0.015	0.359
Perceived ease of use	Perceived usefulness	<0.001	0.972
Perceived ease of use	Attitude toward using	0.042	0.305
Attitude toward using	Behavioral intention to use	<0.001	0.888
Behavioral intention to use	Actual system use	0.022	0.342

p (p-value); r (Pearson correlation coefficient)

Based on Figure 1, there is a telehealth acceptance model for health workers at Gondangrejo Health Center and Becora Health Center, Timor Leste. The analysis reveals several positive relationships among key variables: perceived ease of use is positively associated with perceived usefulness and with attitude toward using. Similarly, attitude toward using is positively linked to behavioral intention to use, and both perceived usefulness and behavioral intention to use are positively related to actual system use. The acceptance of telehealth among healthcare workers is influenced by factors such as perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and actual system use. Additionally, a positive relationship is observed between perceived usefulness and attitude toward using.

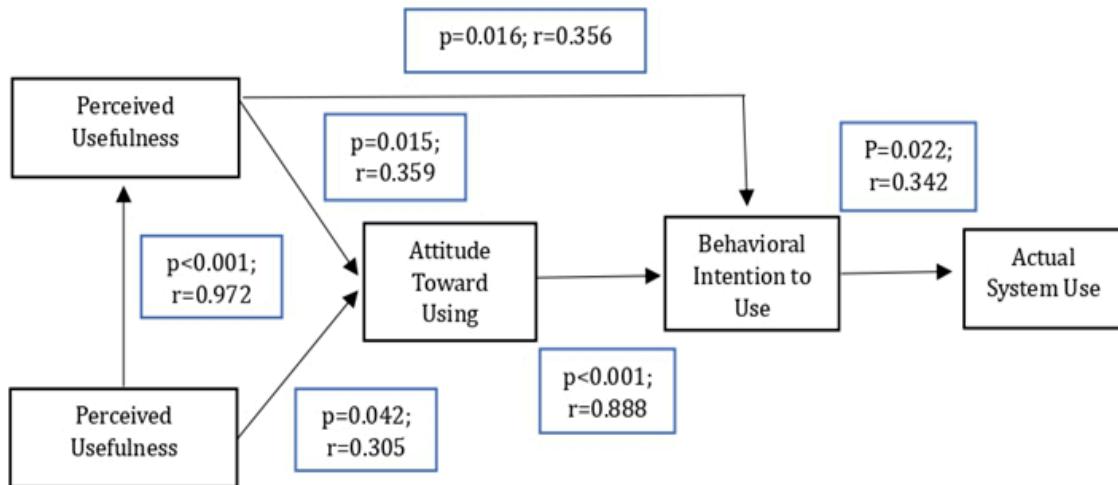


Figure 1. Telehealth acceptance model for health workers at Gondangrejo Health Center and Becora Health Center, Timor Leste

DISCUSSION

The development of digital technology in the health sector has led to various innovations, including telehealth services. Telehealth enables the provision of efficient and practical remote health services, especially in hard-to-reach areas. However, the success of implementing this technology depends heavily on its acceptance by health workers [13]. According to the Technology Acceptance Model (TAM) developed by Davis (1989), Two primary factors influence an individual's attitude and intention to use technology: Perceived Usefulness, which refers to the degree to which a person believes that using a particular system will enhance their performance, and Perceived Ease of Use, which reflects the extent to which a person believes that utilizing the system will be effortless or require minimal effort [14].

A positive and significant relationship was found between perceived usefulness and attitudes towards the use of telehealth, meaning that the higher the perceived usefulness, the more positive the attitude towards the use of telehealth ($p=0.042; r=0.305$). Suppose the perceived usefulness of telehealth is high (eg, facilitating diagnosis, saving time, improving communication between facilities). In that case, health workers will have a more positive attitude toward adopting and using the technology [15]. In applying digital technology in the health sector, telehealth is a key solution to overcome access and service challenges, especially in remote areas or across countries. However, the success of its implementation is greatly influenced by the acceptance of end users—in this case, health workers. According to the Technology

Acceptance Model (TAM) by Davis (1989), Perceived ease of use plays an essential role in shaping the perceived usefulness of a technology system. When technology is considered easy to use, users tend to see it as more useful ($p < 0.001; r=0.972$).

Perceived ease of use refers to the extent to which healthcare workers find the telehealth system easy to learn and operate. Perceived Usefulness means the extent to which healthcare workers feel that telehealth improves work efficiency, diagnosis, consultation, and patient care. In TAM, perceived ease significantly influences perceived usefulness. That is, if telehealth is perceived as easy to use, then users will consider it functionally useful [16]. Suppose health workers find the telehealth system easy to access and operate. In that case, they will view this technology as a tool that can significantly enhance the efficiency and quality of health services in both Indonesia and Timor-Leste.

Digital transformation in the health sector is increasingly important, especially for enhancing access and efficiency in health services. One form of this transformation is the use of telehealth. However, the success of telehealth implementation is highly dependent on the acceptance of health workers as primary users. The TAM developed by Davis (1989) is a theoretical framework often used to evaluate technology acceptance, with two variables: Perceived Ease Of Use (PEOU) - the perception of how easy the technology is to use. Attitude Toward Use (ATU) - the user's attitude towards the use of technology (WHO, 2020). Perceived ease of use (PEOU) has a positive and significant relationship with attitude toward telehealth use (ATU) ($p=0.042; r=0.305$). Differences in geographical and cultural contexts between Indonesia and Timor-Leste may influence these perceptions. The easier the

technology is perceived, the more positive health workers' attitudes towards its use. This is important for digital health technology adoption policies in both countries [17].

Digital transformation in healthcare services is a strategic need, especially in areas with limited medical access, such as Gondangrejo (Indonesia) and Timor-Leste. Telehealth is present as an innovative solution to bridge the service gap. However, the adoption of this technology is greatly influenced by healthcare workers' acceptance, particularly their attitudes towards its use and how those attitudes affect its intensity. Attitude reflects health workers' positive or negative evaluation of telehealth. Perceptions of benefits and convenience influence attitude. Refers to how often and how strongly health workers want to actively use the telehealth system in their daily practice. These two factors influence attitude toward use, which, in turn, influences behavioral intention to use, and ultimately results in actual system use [18]. There is a significant relationship between attitudes toward telehealth use and the intensity of use behavior among health workers. The more positive the attitude formed by the perception of benefits and convenience, the higher the intensity of use ($p < 0.001$; $r = 0.888$). TAM-based digital health strategies can be used to map and improve technology adoption in primary health care across countries [19].

The development of digital technology in health services has enabled the implementation of telehealth as a remote health service solution. This study aims to analyze the relationship between perceived usefulness and the intensity of telehealth use behavior among health workers at the Gondangrejo Health Center (Indonesia) and at several Health Centers in Timor Leste, using the TAM approach. The TAM model states that perceived usefulness and perceived ease of use are the main determinants of attitudes and behavior in using technology [14]. The results of this study are expected to provide strategic recommendations for developing policies to digitalize primary health services in areas with limited geographic access. From the data obtained, there is a significant positive correlation between perceived usefulness and the intensity of use behavior ($p < 0.016$; $r = 0.356$). This finding is consistent with the TAM model, which shows that the higher the perception of health workers towards the benefits of technology, the higher their tendency to use it. A comparison of Puskesmas across two regions reveals variations in practice adoption, influenced by technological infrastructure, training, and policy support. Perceived usefulness has a significant relationship with the intensity of telehealth use behavior by health workers in both study locations. Implementing a digital

health strategy requires strengthening perceptions of benefits through training, socialization, and the provision of supporting infrastructure [20].

Digital transformation in healthcare is an important strategy to address the challenges of access and limited resources, especially in remote areas. Telehealth is an innovative solution for remote healthcare, but its success depends heavily on healthcare workers' acceptance and actual use. The findings indicate a significant and positive correlation between the intensity of behavioral use and actual system use ($r = 0.65$, $p < 0.01$) in both Gondangrejo and Timor Leste, although there are differences in the infrastructure context ($p < 0.022$; $r = 0.342$). These results confirm previous findings that the higher the behavioral intention to use the system, the more likely someone is to do so. Supporting factors such as training, ease of access, and institutional policies also play an essential role in bridging intentions with real actions [21]. There is a significant relationship between the intensity of use behavior and actual telehealth use across the two study sites.

This implication is important for policymakers to strengthen the digitalization of health services through training and adequate infrastructure. The most important finding of this study is that healthcare workers' acceptance of telehealth is strongly influenced by perceived ease of use, perceived benefits, and organizational or infrastructure support. Healthcare workers are more likely to accept telehealth if they perceive the technology as easy to use, believe it improves work efficiency, and feel supported by adequate training and facilities. Intensive training and education for healthcare workers to familiarize themselves with telehealth technology are essential. Future research can examine the effectiveness of telehealth after its widespread and sustained implementation. A limitation of this study is that participants were limited to a specific group (e.g., healthcare workers at a particular community health center or in a specific region), so the results cannot be broadly generalized.

CONCLUSION

The findings indicate a significant and positive correlation between perceived ease of use and perceived usefulness ($p < 0.001$; $r = 0.972$), perceived usefulness and attitude toward using ($p = 0.015$; $r = 0.359$), perceived ease of use and attitude toward using ($p = 0.042$; $r = 0.305$), attitude toward using and behavioral intention to use ($p < 0.001$; $r = 0.888$), perceived usefulness and behavioral intention to use ($p < 0.016$; $r = 0.356$), Behavioral Intention to use and actual system use ($p < 0.022$; $r = 0.342$). Acceptance of telehealth by

healthcare workers is influenced by perceived usefulness, perceived ease of use, attitude toward use, behavioral intention to use, and actual system use.

The suggestions in this research are strengthening digital training to increase perceived ease of use. Institutional policies that support the formal use of telehealth. Routine evaluation of health workers' attitudes and experiences. Cross-country collaboration for the exchange of best practices in telehealth adoption.

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