

The relationship between knowledge and the utilization of telemedicine among health students at Batari Toja Bone Institute in 2025

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Abstract. Telemedicine is a healthcare service that utilizes telecommunication technology to support consultations and clinical interventions without face-to-face interactions. This study aims to examine the relationship between knowledge and the utilization of telemedicine among health science students at Institut Batari Toja Bone. This research employed a quantitative method with a cross-sectional approach. The sample consisted of 66 health science students at Institut Batari Toja, selected through purposive sampling, with participants drawn from study programs relevant to the health sector, namely Health Administration, Occupational Health and Safety, Midwifery, and Nursing. Data were collected using a questionnaire and analyzed using the Chi-square test. The results showed that of the 66 respondents, the majority of respondents demonstrated good knowledge (93.9%) and optimally utilized telemedicine (90.9%). Bivariate analysis using the Chi-square test produced a p-value of 0.003 ($p < 0.05$), confirming a significant relationship between the level of knowledge and the utilization of telemedicine. The conclusion is that knowledge level has a significant association with telemedicine utilization among health science students at Institut Batari Toja Bone in 2025. This underscores the importance of strengthening education on the use of digital health technologies as a strategic approach to addressing the challenges of modern healthcare services.

1 Introduction

Indonesia, as the fourth most populous country in the world, has great potential for the development of digital health technologies. These technologies can facilitate easier access to healthcare services for the Indonesian population (1).

Alongside the rapid digitalization of society, issues of equity in healthcare have also expanded into the digital realm or e-environment, leading to the concept of Digital

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Health Equity. Within this context, telemedicine has been shown to have significant potential in improving the quality and outcomes of public health (2).

Telemedicine, as a subset of telehealth, specifically refers to the provision of remote healthcare services and education using telecommunication technology. It involves the use of electronic communication and software to deliver clinical services to patients without the need for in-person visits (3). As a key element of modern healthcare, telemedicine bridges the gap between patients and healthcare providers (4).

In recent years, telemedicine has rapidly developed into one of the most important innovations in healthcare. This technology allows healthcare providers to deliver care across geographical boundaries, which is especially beneficial in remote or underserved areas with limited access to comprehensive medical facilities. With advancements in communication and information technology, telemedicine has become an effective tool to improve the quality of healthcare services (5).

Although telemedicine has been utilized for several decades, research continues to highlight its potential to enhance healthcare quality while simultaneously reducing costs for both users and providers. The development of telemedicine should be positioned as a complement to existing healthcare procedures, not as a complete digital replacement, but as a means to optimize healthcare delivery in areas where improvements are needed (6). Telemedicine also plays a role in promoting equitable access to healthcare across regions, including rural and underdeveloped areas. By leveraging communication technologies, communities that previously faced challenges in accessing medical care can now receive consultations and treatment from specialists. This reduces disparities in healthcare services and fosters a more inclusive system, providing greater opportunities for individuals to access appropriate care according to their medical needs (5).

Despite its proven benefits, the adoption of telemedicine among health science students remains suboptimal. Knowledge is a critical factor influencing one's ability to effectively utilize technology, including digital health services. As future healthcare professionals, health science students are expected to have adequate knowledge of telemedicine, including its concepts, benefits, and applications in clinical practice. Adequate knowledge is essential to ensure their readiness to integrate telemedicine into healthcare delivery in the future.

The effectiveness of telemedicine implementation largely depends on users' knowledge and digital literacy. For health science students, sufficient knowledge serves as a prerequisite for effectively adopting and integrating telemedicine into their future clinical practice (7).

While numerous studies worldwide have explored students' perceptions of telemedicine (8)(9), only a limited number of studies have been conducted in Indonesia highlighting knowledge gaps, perceptions, skills, training, and resistance to telemedicine adoption among healthcare professionals (10).

Previous studies indicate a gap between knowledge and practice of telemedicine among health science students. For example, a study at Universitas Andalas Padang revealed that only 15.2% of students actively used telemedicine services, with the majority never utilizing them despite being willing to do so in the future (11).

Similarly, a study in Africa reported that while 61.9% of respondents had good knowledge of telemedicine, only 25.8% demonstrated adequate skills in its use, underscoring the gap

between knowledge and practical application (12). A study in Peru found that nearly 50% of medical students had limited knowledge of telemedicine, with no significant relationship between previous training or experience and their level of knowledge (13). In India, a study showed that most healthcare professionals in Jhansi District, Uttar Pradesh, had limited knowledge and skills in telemedicine, but exhibited positive attitudes toward its potential, underscoring the need for education and training (14). Similarly, research in Saudi Arabia revealed that 65% of medical students had never received formal education on telemedicine, reflecting a lack of awareness and training that limited their adoption of the technology (15).

In Indonesia, research directly examining the relationship between knowledge and utilization of telemedicine among health science students is still very limited. As future medical professionals, students at institutions such as Institut Batari Toja Bone must possess comprehensive knowledge of telemedicine to actively contribute to the advancement of digital healthcare systems.

Institut Batari Toja Bone, as a health education institution, plays a strategic role in preparing students to face technological advancements in medicine. This study aims to analyze the relationship between knowledge and the utilization of telemedicine among health science students at Institut Batari Toja Bone in 2025. The findings are expected to serve as a basis for developing educational programs and training initiatives that align with the digitalization of healthcare services.

Based on this background, the study entitled “The Relationship Between Knowledge and the Utilization of Telemedicine Among Health Science Students at Institut Batari Toja Bone in 2025” seeks to evaluate the extent to which students’ knowledge influences their use of telemedicine. This research is expected to contribute to the development of educational strategies and curriculum enhancement in health higher education to make it more adaptive to digital technologies.

2 Methods

This study employed a quantitative research design using a cross-sectional approach. The sample consisted of 66 health students at Institut Batari Toja. The sampling technique used was purposive sampling, with participants selected from study programs relevant to the health field, namely Health Administration, Occupational Health and Safety, Midwifery, and Nursing. Data were collected using a questionnaire as the research instrument. The data were processed and analyzed using IBM SPSS Statistics version 22, and the Chi-Square test was applied to examine the relationships between variables.

3 Result and Discussion

Respondent Characteristics

Table 1. Distribution Based on Respondents’ Characteristics at Institut Batari Toja Bone in 2025

Characteristics	Frequency (n=66)	Percentage (%)
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Age ≤ 20 years 21-23 years ≥ 24 years		
	45	68.2
	20	30.3
	1	1.5
Gender Male Female		
	10	15.2
	56	84.8
Education Level Diploma (D3) Bachelor (S1)		
	55	83.3
	11	16.7
Study Program Health Administration Midwifery Occupational Health and Safety (K3) Nursing		
	2	3
	26	39.4
	9	13.6
	29	43.9
Total	66	100.0

Table 1 presents the frequency distribution based on respondents’ characteristics. The results show that the majority of study participants were in the age group of ≤ 20 years, totaling 45 individuals (68.2%). Based on gender, the respondents were predominantly female, with 56 individuals (84.8%). In terms of educational level, most respondents held a diploma (D3) degree, accounting for 55 individuals (83.3%). Regarding study programs, the largest group of respondents came from the Nursing program, totaling 29 individuals (43.9%).

Table 2. Distribution of Respondents Based on the Variables Studied at Institut Batari Toja Bone in 2025

Variable	Frequency (n=66)	Percentage (%)
Telemedicine Knowledge Good Poor		
	62	93.9
	4	6.1
Telemedicine Utilization Good Poor		
	60	90.9
	6	9.1
Total	66	100.0

Table 2 shows that, based on the results of the study conducted among 66 respondents at Institut Batari Toja Bone in 2025, a total of 62 respondents (93.9%) had good knowledge of telemedicine, while 4 respondents (6.1%) demonstrated limited knowledge. In terms of telemedicine utilization, 60 respondents (90.9%) were categorized as having good utilization, whereas 6 respondents (9.1%) were categorized as having poor utilization. These findings indicate that the majority of respondents not only possessed good knowledge of telemedicine but had also implemented it optimally, reflecting significant potential for the development and application of digital health services within health education institutions.

Table 3. Bivariate Analysis of Knowledge and the Utilization of Telemedicine

at Institut Batari Toja Bone in 2025							
Telemedicine Knowledge	Telemedicine Ulitization				Total		p-value
	Good		Poor				
	n	%	n	%	N	%	
Good	58	87.9	4	6.1	62	93.9	0.003
Poor	2	3	2	3	4	6.1	
Total	66	90.9	6	9.1	66	100.0	

Table 3 shows that the results of bivariate analysis using the Chi-Square test demonstrated a significant relationship between knowledge level and the utilization of telemedicine at Institut Batari Toja Bone in 2025 ($p = 0.003$). The majority of respondents with good knowledge also reported good utilization of telemedicine (87.9%), whereas respondents with lower knowledge levels tended to demonstrate lower utilization. These findings indicate that the higher an individual's knowledge of telemedicine, the greater the likelihood of utilizing it optimally.

3.1 Relationship Between Knowledge and the Utilization of Telemedicine

Based on the results of the study conducted among 66 respondents at Institut Batari Toja Bone in 2025, it was found that the majority of respondents possessed good knowledge of telemedicine, totaling 62 individuals (93.9%), while only 4 respondents (6.1%) had limited knowledge. This finding indicates that information regarding telemedicine has been adequately disseminated among health science students.

Furthermore, regarding telemedicine utilization, 60 respondents (90.9%) were categorized as having good utilization, while 6 respondents (9.1%) exhibited poor utilization. This indicates that most respondents not only understood the concept of telemedicine but were also capable of effectively implementing it in their health practice.

Overall, the high proportion of respondents with good knowledge and utilization of telemedicine reflects substantial potential for the application of digital health services among health science students. These results may also serve as a basis for developing educational programs and expanding access to telemedicine services within health education institutions.

Bivariate analysis using the Chi-Square test demonstrated a significant relationship between knowledge level and telemedicine utilization at Institut Batari Toja Bone in 2025. Of the total 66 respondents, the majority with good knowledge also exhibited good telemedicine utilization, totaling 58 individuals (87.9%). In contrast, only 4 respondents (6.1%) with good knowledge showed poor utilization. Conversely, among respondents with limited knowledge, 2 individuals (3%) still demonstrated good telemedicine utilization, while 2 others (3%) showed poor utilization.

The statistical test show that a p-value of 0.003 ($p < 0.05$), indicating a statistically significant relationship between knowledge level and telemedicine utilization. These findings suggest that the better an individual's knowledge of telemedicine, the greater the likelihood of optimal utilization. Accordingly, enhancing knowledge about telemedicine among health science students may serve as an effective strategy to promote the adoption and use of digital health technologies more broadly.

This study demonstrates that knowledge level is closely related to telemedicine utilization among health science students. Respondents with good knowledge tend to exhibit higher levels of telemedicine utilization. These findings align with health behavior theory, which posits that knowledge is a key determinant in shaping individuals' attitudes and behaviors toward innovations in healthcare. Students who possess sufficient understanding of telemedicine concepts, benefits, and procedures are more confident in using these services compared to students with limited knowledge.

The high level of student knowledge observed in this study may be attributed to increased exposure to information regarding digital transformation in healthcare through social media, seminars, and integration into the academic curriculum. Adequate knowledge also positively influences students' attitudes toward telemedicine as a solution to improve healthcare access, particularly for populations residing in remote or hard-to-reach areas. This indicates a significant opportunity to further integrate telemedicine into broader healthcare systems.

These results are consistent with the findings of Banowati, 2023 which showed that among pharmacy students in the Special Region of Yogyakarta, knowledge and perceptions of telemedicine were associated with willingness to use it. This demonstrates that successful telemedicine implementation depends not only on technological availability but also on human resource readiness to understand and apply it. Therefore, it is recommended that telemedicine education be incorporated into both curricular and extracurricular activities to better prepare students, as knowledge can be considered a critical asset in developing the competencies of health science students and enhancing their adaptability to medical technology (3).

Moreover, this study provides insight that increasing knowledge may reduce barriers to telemedicine adoption, such as concerns about data security, technical limitations, or perceptions that face-to-face consultations are superior to digital services. With appropriate education, students can understand that telemedicine is not intended to replace conventional services but serves as a complement capable of enhancing the effectiveness and efficiency of healthcare delivery.

These findings align with multiple previous studies, which reported significant positive relationships between literacy and telemedicine utilization among students. Higher literacy levels positively influenced both knowledge and telemedicine use, enhancing students' ability to utilize telemedicine effectively.

A related study by Ghaddaripouri et al 2023 examined medical students' knowledge, attitudes, and perceptions of telemedicine, highlighting a positive association between their knowledge of telemedicine and willingness to use it in clinical practice, thereby impacting future healthcare delivery.

Another related study by Mutlu et al 2022 reported a moderate positive correlation ($r = 0.559$, $p < 0.001$) between awareness of telemedicine use and knowledge, indicating that increased telemedicine knowledge is associated with higher awareness among medical students and physicians. Enhanced knowledge increases the likelihood of utilizing telemedicine services in healthcare.

These findings are also consistent with Hyder & Razzak, 2020, who reported that individuals with higher perceptions of telemedicine competence ($P < 0.001$) were more likely to have positive attitudes toward telemedicine. They believed that telemedicine

has the capacity to reduce transportation costs and the number of required medical staff, streamline healthcare logistics, and facilitate better healthcare delivery (6). Shoukat Ali Arain et al, 2023 also reported that telemedicine is effective in saving time and improving access to healthcare (15).

Conversely, these findings differ from Gutierrez et al, 2023, which found no significant differences in perceptions among medical students regarding telemedicine knowledge, safety, or usefulness (13).

Given the significant relationship between knowledge and telemedicine utilization, developing education strategies based on digital health literacy is crucial. Health education institutions, including Institut Batari Toja Bone, should integrate telemedicine materials into the curriculum and provide students with more practical experience in its use. These efforts are expected to cultivate a generation of health professionals ready to face the challenges of the digital era and capable of sustainably utilizing telemedicine in their professional practice.

4 Conclusion

This study demonstrates that knowledge level has a significant relationship with the utilization of telemedicine among health science students at Institut Batari Toja Bone in 2025. The majority of respondents had good knowledge (93.9%) and utilized telemedicine optimally (90.9%). Bivariate analysis using the Chi-square test yielded a p-value of 0.003 ($p < 0.05$), confirming the significant association between knowledge level and telemedicine utilization. These findings indicate that improving knowledge plays a vital role in promoting effective adoption and use of telemedicine among health science students. Therefore, integrating telemedicine education into the health sciences curriculum should be strengthened to better prepare students for the digital transformation of healthcare services. The results of this study are expected to provide a foundation for developing learning strategies and policies that support telemedicine utilization while contributing to the enhancement of healthcare quality in the digital era.

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