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Review Article

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Literature Review: Factors Influencing the Use of Telemedicine Services

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Abstract: Telemedicine has become an essential component of healthcare delivery, particularly during and after the COVID-19 pandemic. Despite its rapid expansion, utilization of telemedicine services remains uneven, influenced by various individual and contextual factors.
Objective: This study aimed to review factors influencing the use and adoption of telemedicine services, with a focus on education level, knowledge, and attitudes.
A literature review was conducted using Google Scholar to identify relevant quantitative studies published between 2021 and 2025. Articles were selected based on predefined inclusion and exclusion criteria, including open-access availability, full-text access, and relevance to telemedicine utilization. Six articles met the criteria and were included in the review.
The findings indicate that education level shows inconsistent associations with telemedicine utilization and tends to influence adoption indirectly through digital literacy and access to technology. Knowledge consistently emerged as a significant determinant of telemedicine use, with higher knowledge levels increasing the likelihood of utilization. Attitudes toward telemedicine, particularly perceived usefulness, ease of use, and trust, were found to significantly influence intention to adopt and actual use of telemedicine services.
Telemedicine utilization is primarily driven by cognitive and perceptual factors rather than education level alone. Enhancing knowledge and fostering positive attitudes toward telemedicine are essential to improving adoption and sustainable use. Targeted educational interventions and efforts to improve digital literacy are recommended to optimize telemedicine implementation..

Keywords: *Telemedicine, Education Level, Knowledge, Attitude, Healthcare Utilization*

1. Introduction

As technological advancements continue to progress, technology has become increasingly essential across various aspects of human life, including the healthcare sector. One significant advancement in information and communication technology (ICT) within healthcare is the development of e-health. The utilization of ICT in health services offers numerous benefits, such as improving the quality, accessibility, and continuity of healthcare delivery, accelerating work processes particularly in healthcare facilities and optimizing data flow to enhance the availability of reliable health data and information (Minister of Health Regulation No. 46, 2017). Telemedicine represents one of the key applications of telehealth services (Minister of Health Regulation No. 20, 2019). During the COVID-19 pandemic, teleconsultation emerged as the most frequently used telemedicine service. Nevertheless, concerns persist regarding the ability of telemedicine to deliver outcomes comparable to traditional face-to-face

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consultations conducted in the same physical setting (Alonso et al., 2021; Putri et al. 2025).

Telemedicine has expanded rapidly in recent years, largely due to the increasing use of information technology, advances in communication systems, wireless sensing technologies, and widespread mobile internet access (Gu et al., 2019; Mahdavi et al., 2025). As an integral part of the World Health Organization's (WHO) digital health initiatives, telemedicine provides healthcare services at a distance through information and communication technologies (ICT) with the goal of improving the accessibility, quality, and efficiency of medical care. Telemedicine includes not only patients' remote access to health services via telemedicine platforms, but also remote consultations and diagnostic support delivered by healthcare professionals. This approach allows individuals to obtain high-quality medical services without being constrained by geographical barriers (Melh et al., 2018; Yao et al., 2025).

Telemedicine has introduced innovative approaches to the management of chronic diseases by providing services such as remote monitoring of blood pressure and blood glucose levels, virtual health consultations, and structured disease management programs. These strategies facilitate continuous long-term care and support more efficient use of healthcare resources (Kuan et al., 2022). Telemedicine utilization has increased during the COVID-19 pandemic. With the pandemic in general, telemedicine use increased by 78% during the COVID-19 pandemic (Murima et al., 2022).

Several theories explain the utilization of healthcare services. According to Andersen's theory (1975) as cited in Arifin et al. (2020), healthcare utilization is influenced by predisposing characteristics, enabling characteristics, and need characteristics. Predisposing characteristics include demographic factors, social structure factors (such as ethnicity, occupation, and education level), and belief factors (attitudes and beliefs). Enabling characteristics consist of family resources such as family income, ability to pay for services, knowledge, and participation in health insurance and community resources, including the availability of healthcare facilities, availability of health personnel, costs incurred, and ease of access to healthcare services. In addition, healthcare utilization is influenced by need characteristics. Meanwhile, according to Dever's theory (1984) as cited in Arifin et al. (2020), factors related to healthcare utilization include sociocultural factors, organizational factors, consumer-related factors comprising sociodemographic, socioeconomic (education level, occupation, and family income), and sociopsychological aspects and provider-related factors, such as physician services, paramedical services, ease of obtaining information, and availability of healthcare facilities. These factors are interrelated and can be used to predict healthcare service utilization.

2. Method

This study is a literature review. Articles were identified through database searches conducted using Google Scholar. The selection of literature to be reviewed was determined based on predefined inclusion and exclusion criteria as follows:

Inclusion criteria:

a. Literature published between 2021 and 2025.

b. Articles available in full-text format.

c. Open-access articles that can be downloaded.

d. Original research articles (quantitative).

e. Studies examining factors influencing the use, acceptance, adoption, or utilization of telemedicine services.

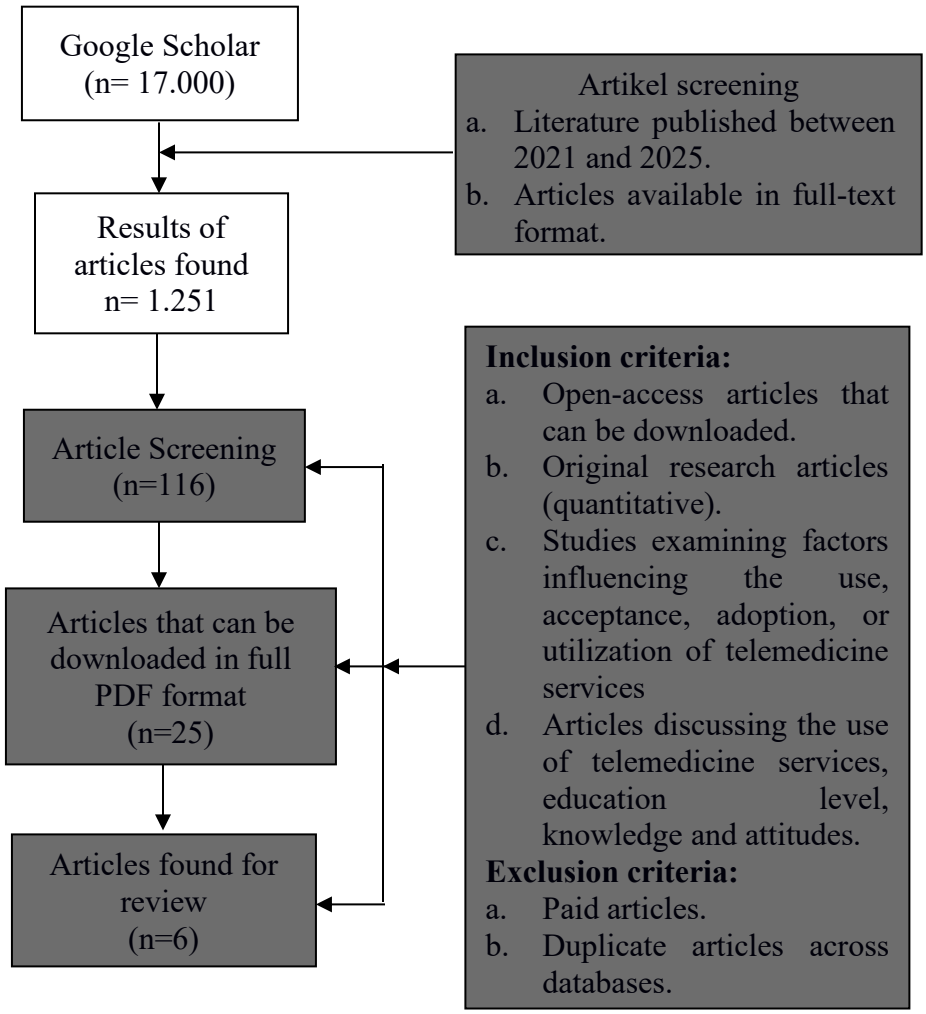
f. Articles discussing the use of telemedicine services, education level, knowledge and attitudes.

Exclusion criteria:

a. Paid articles.

b. Duplicate articles across databases.

Subsequently, the researchers determined the keywords using Medical Subject Headings (MeSH). For international journals, the keywords used were “use of telemedicine services” AND “education level” AND “knowledge” OR “attitudes”. The results of the search that went through the selection process are presented in Figure 1.



3. Result

Based on a literature search of various databases, such as Google Scholar, conducted during the 2021–2025 period, six articles met the inclusion criteria and were relevant to the topic of factors influencing the use, acceptance, adoption, or utilization of telemedicine services. These articles addressed various factors, including education level, knowledge, and attitudes, as presented in the following table.

Table 1. Results of the Review of 6 Articles

No	Researcher's Name	Title	Research Results	Findings
1.	Putri et al. (2025)	Analysis of Factors Related to the use of Telemedicine Application Services	Research results show that factors related to the use of telemedicine application services in Aceh Province are the use of the JKN mobile	The study found that telemedicine use was significantly associated with the use of the JKN Mobile application, lower

No	Researcher's Name	Title	Research Results	Findings
			application (OR=1.61; 95%CI=1.06-2.54; p value=0.025), income < Minimum Wage (OR=1.64; 95%CI=1.13-2.37; p-value=0.008), and 4G/LTE internet network (OR=1.69; 95%CI=1.01-2.84; p-value=0.046). The most dominant factor related to the use of telemedicine is non-BPJS Kesehatan insurance users (AOR=2.42; 95%CI=0.53 – 11.05). Factors that are not related to the use of telemedicine applications are alodokter, age, gender, education, occupation, region, health insurance, length of application use and experience of using telemedicine.	income levels, and access to a 4G/LTE internet network. The strongest predictor was being a non-BPJS Kesehatan insurance user, while education level and most sociodemographic factors were not significantly related to telemedicine utilization.
2.	Quintal et al. (2025)	Socioeconomic Factors Associated With the Use of Telehealth in Primary Care Services During the COVID-19 Pandemic	The research results showed that 38.2% of respondents (N = 7,008) reported using remote consultation services, with prescription renewal being the primary reason for telehealth use. Among respondents who did not use telehealth services, 40% were unaware that they could contact their family doctor via email. Factors positively associated with telehealth utilization included older age, female gender, being married, completing the questionnaire without assistance, consumption of over-the-counter and prescribed medications, unmet healthcare needs, and registration with a family doctor. In contrast, education level was found to be negatively associated with telehealth use.	Telehealth utilization during the COVID-19 pandemic was reported by 38.2% of respondents, mainly for prescription renewal. Telehealth use was positively associated with older age, female gender, marital status, medication use, unmet healthcare needs, and registration with a family doctor, whereas higher education level showed a negative association with telehealth use.
3.	Yao et al. (2025)	Factors influencing the adoption of telemedicine services among middle-aged and older patients with chronic conditions in rural China: a multicentre cross-sectional study	The research results showed that a total of 880 middle-aged and older patients with chronic conditions living in rural areas were included in this study, with an average telemedicine adoption intention score of 3.94 (standard deviation = 1.02). Structural Equation Modeling (SEM) analysis revealed that SI, SE, PR, and PHT functioned as peripheral	Among middle-aged and older patients with chronic conditions in rural China, telemedicine adoption intention was moderately high. Perceived usefulness, attitude toward use, and social influence significantly influenced adoption intention, while education level, income, healthcare needs, and

No	Researcher's Name	Title	Research Results	Findings
			variables, whereas PEU, PU, and ATU served as core mediating variables that positively influenced patients' intention to adopt telemedicine services, which subsequently affected their actual usage behavior. Furthermore, SI ($z = 4.767$, $p < 0.001$), PU ($z = 2.894$, $p = 0.004$), and ATU ($z = 4.545$, $p < 0.001$) demonstrated significant direct positive effects on patients' intention to adopt telemedicine services. In addition, Generalized Linear Model (GLM) analysis indicated that education level ($\beta = 0.032$, $p < 0.001$), monthly income ($\beta = 0.009$, $p = 0.049$), required care ($\beta = 0.034$, $p = 0.007$), and cancer diagnosis ($\beta = -0.147$, $p < 0.001$) were significant predictors of telemedicine adoption intention.	cancer diagnosis were significant predictors of telemedicine adoption
4.	Hawa et al. (2023)	Knowledge Is (Still) Key: Awareness to Shape Trends in Telemedicine Use during the Pandemic Based on Management Perceptions and Implementation Systems	The research results showed that all respondents perceived the administrative factors in the implementation of telemedicine to be good. Chi-square analysis indicated that data security did not have a significant effect on telemedicine implementation ($p = 0.090$; > 0.05), whereas knowledge had a significant effect on telemedicine implementation ($p = 0.043$; < 0.05). Furthermore, multivariate analysis revealed that knowledge significantly influenced telemedicine use ($p = 0.033$; < 0.05), with respondents who had better knowledge being 1.624 times more likely to use telemedicine services.	The findings indicated that this study examined factors influencing the use of telemedicine and revealed that knowledge was the most significant factor affecting telemedicine utilization. Insufficient knowledge creates an information gap that acts as a barrier to accessing and adopting new tools and technologies.
5.	Baradwan et al. (2023)	Perceived Knowledge, Attitudes, and Barriers Toward the Adoption of Telemedicine Services in the Kingdom of Saudi Arabia: Cross-Sectional Study	The research results showed that a total of 1,024 participants were included in the survey. The proportion of participants who had used telemedicine services increased from 49.61% (508/1,024) before the COVID-19 pandemic to 61.91% (634/1,024) during the pandemic, and then slightly decreased to 50.1% (513/1,024)	Telemedicine use increased during the COVID-19 pandemic and declined slightly afterward. Participants generally had high knowledge levels and positive attitudes toward telemedicine. Place of residence significantly affected knowledge, attitudes, and perceived

No	Researcher's Name	Title	Research Results	Findings
			after the pandemic. The mean knowledge score was 3.52 (SD = 1.486; range 0–5), indicating a high level of knowledge, while the mean attitude score was 37.08 (SD = 8.526; range 11–55), reflecting generally positive attitudes toward telemedicine. Place of residence (rural versus non-rural) had a significant effect on knowledge, attitude, and barrier scores, whereas gender did not show a significant effect. Furthermore, multivariable regression analysis demonstrated that several sociodemographic factors were significantly associated with knowledge and attitudes regarding the adoption of telemedicine services.	barriers, while several sociodemographic factors were associated with telemedicine adoption.
6.	Chagpar (2021)	Sociodemographic factors affecting telemedicine access: A population-based analysis	The research results showed that 25,049 respondents, representing a population of 245,842,992 individuals, participated in the survey. Among the respondents, 19% reported that they never or almost never used a computer, 18% stated that they did not use the internet, and 25% indicated that they did not use email. During the previous 12 months, 55% of respondents had searched for health information online, 11% had filled a prescription online, 16% had scheduled a medical appointment via the internet, and 17% had communicated with a healthcare provider by email. Internet usage varied significantly by region, age, race, education level, family income, and insurance status, but showed no variation by gender.	Telemedicine access was strongly influenced by digital literacy and internet use. Significant disparities in internet and computer use were observed across age, education level, income, region, and insurance status, indicating that sociodemographic factors play a major role in telemedicine accessibility.

4. Discussion

4.1 Education level

Education level is an important sociodemographic factor that may influence the use and adoption of telemedicine services; however, findings across studies show inconsistent results. Several studies included in this review indicate that education does not always play a decisive role in telemedicine utilization. For instance, Putri et al. (2025) found no significant association between

education level and the use of telemedicine applications, suggesting that access-related factors such as internet availability and insurance status may be more influential than formal education. Similarly, Quintal et al. (2025) reported a negative association between education level and telehealth use, where individuals with higher education were less likely to use telehealth services during the COVID-19 pandemic. This may be explained by a preference for face-to-face consultations among highly educated individuals or greater awareness of alternative healthcare options.

In contrast, Yao et al. (2025) demonstrated that education level significantly predicted telemedicine adoption intention among middle-aged and older patients with chronic conditions in rural China. Higher education may enhance individuals' ability to understand and trust digital health technologies, thereby increasing their willingness to adopt telemedicine services. Chagpar et al. (2021) further supported this finding by showing that education level was strongly associated with internet use and digital literacy, which are essential prerequisites for telemedicine access. Overall, these findings suggest that education level influences telemedicine use indirectly through digital skills and access to technology, rather than acting as a standalone determinant.

4.2 Knowledge

Knowledge consistently emerged as a key determinant of telemedicine utilization across the reviewed studies. Hawa et al. (2023) highlighted that knowledge was the most significant factor influencing telemedicine use, with respondents who had better knowledge being more likely to utilize telemedicine services. Insufficient knowledge was identified as a major barrier, creating information gaps that limit awareness, confidence, and readiness to use telemedicine platforms.

Baradwan et al. (2023) also reported high levels of knowledge among participants, which were associated with increased adoption of telemedicine services, particularly during the COVID-19 pandemic. Knowledge enables individuals to understand the benefits, procedures, and limitations of telemedicine, thereby reducing uncertainty and perceived risks. Furthermore, knowledge is closely linked to exposure to information, digital literacy, and prior experience with technology, which enhance individuals' ability to navigate telemedicine systems effectively.

These findings align with health behavior theories, such as Andersen's model, which emphasizes enabling factors such as knowledge and access to information as critical components of healthcare utilization. Therefore, improving public knowledge through education campaigns and targeted socialization programs is essential to increase telemedicine adoption, especially in populations with limited digital exposure.

4.3 Attitute

Attitude toward telemedicine plays a crucial role in shaping individuals' intention to adopt and use telemedicine services. Positive attitudes, including perceived usefulness, ease of use, and trust in telemedicine, were shown to significantly influence adoption intention and actual utilization. Yao et al. (2025) found that attitude toward use was a core mediating variable that positively affected telemedicine adoption intention, which subsequently influenced usage behavior.

Similarly, Baradwan et al. (2023) reported generally positive attitudes toward telemedicine among participants, particularly during the COVID-19 pandemic, when telemedicine was perceived as a safe and convenient alternative to in-person care. Positive attitudes were influenced by sociodemographic factors and place of residence, indicating that contextual and environmental factors may shape perceptions of telemedicine.

Conversely, lack of awareness and negative perceptions may hinder telemedicine adoption, as observed in Quintal et al. (2025), where a substantial proportion of non-users were

unaware that telehealth services were available. This finding suggests that attitudes are closely linked to knowledge and awareness, reinforcing the importance of integrated strategies that address both cognitive and perceptual aspects of telemedicine use

5. Conclusion and Suggestion

This literature review concludes that telemedicine utilization is influenced by education level, knowledge, and attitudes. Education level shows inconsistent effects on telemedicine use and appears to influence adoption indirectly through digital literacy and access to technology. Knowledge is a key determinant, as individuals with better understanding of telemedicine are more likely to use these services. Positive attitudes toward telemedicine, particularly perceived usefulness and ease of use, significantly increase intention and actual utilization.

Suggestions that can be given are efforts to improve telemedicine utilization should focus on increasing public knowledge and awareness through targeted education programs. Improving digital literacy, internet access, and user-friendly telemedicine platforms is essential, especially for vulnerable populations. In addition, strategies to strengthen positive attitudes and trust in telemedicine services should be integrated into routine healthcare delivery.

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