International Journal of Social Sciences and Management Review

Volume: 09, Issue: 06 November - December 2026

ISSN 2582-0176

FACTORS INFLUENCING AWARENESS OF TELEMEDICINE AMONG RESIDENTS OF TWO RURAL COMMUNES IN THE RED RIVER DELTA, VIETNAM

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https://doi.org/10.37602/IJSSMR.2026.9609

ABSTRACT

Drawing on a quantitative survey of 400 respondents, comprising both users and non-users of telemedicine services, in two rural communes of the Red River Delta, this article describes residents' awareness of telemedicine and identifies the factors associated with it. The results indicate that residents have a basic but incomplete awareness of telemedicine. About two-thirds of respondents were aware of at least one service delivered via telemedicine and of the equipment and infrastructure it requires; however, their knowledge was largely limited to simple services and skills, such as video-call consultations and smartphone use. Binary logistic regression identified seven factors significantly associated with at least one dimension of awareness in the full models: gender, commune of residence, household living standard, chronic disease, monthly medical check-ups, computer ownership, and frequency of Internet use. Age and education were significant only before health- and technology-related factors were controlled for.

Keywords: awareness, telemedicine, rural areas, Red River Delta, Vietnam

1.0 INTRODUCTION

The rapid development of information technology has made telehealth an essential component of modern health care systems worldwide, particularly during the COVID-19 pandemic. In Vietnam, to promote the use of information technology in health care and to remove geographical barriers for people living in rural, mountainous, and remote areas, the Ministry of Health has issued a series of decisions and circulars guiding the implementation of telemedicine. These include Circular No. 49/2017/TT-BYT of 28 December 2017 on telehealth activities (Ministry of Health, 2017), Decision No. 2628/QĐ-BYT of 22 June 2020 approving the Telemedicine Scheme for the 2020–2025 period (Ministry of Health, 2020a), and Decision No. 5316/QĐ-BYT of 22 December 2020 approving the Health Sector Digital Transformation Program to 2025, with orientation to 2030 (Ministry of Health, 2020b). More recently, Law No. 51/2024/QH15 amending and supplementing a number of articles of the Law on Health Insurance, effective from 1 July 2025, brought telemedicine within the scope of services reimbursed by the health insurance fund (National Assembly, 2024). In practice, however, many people have not been reached by communication activities and are therefore unaware of digital health applications, while the language used to install and operate telemedicine software remains a barrier for rural residents and ethnic minority groups. People also show limited interest in, and limited trust in, digital health systems. Shifting people's attitudes and behaviors

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Volume: 09, Issue: 06 November - December 2026

ISSN 2582-0176

from in-person care to telemedicine has been identified as the greatest obstacle (UNDP and Ministry of Health, 2023).

The digital divide, that is, the gap between those who have access to and knowledge of technology and those who do not, may limit patients' ability to use online patient portals. In a qualitative study by Alkureishi et al. (2021), patients reported that less technologically able individuals face considerable challenges in coordinating their care, such as scheduling visits, communicating with clinicians, and arranging referrals and tests, which may worsen their health care outcomes. During the COVID-19 pandemic, the reliance on online scheduling portals rather than telephone or postal outreach for vaccine appointments also posed significant barriers for this group (Alkureishi et al., 2021). In addition, eHealth literacy is clearly stratified by socioeconomic characteristics: older adults have lower eHealth literacy, whereas people with higher education and income have higher eHealth literacy (Guo et al., 2021).

Rural residents, older patients, ethnic minorities, and people with disabilities are among the groups at risk of being excluded from digital health because of limited digital health literacy (van Kessel et al., 2022a, 2022b). Low digital health literacy may have several consequences, including widening health inequalities as health care becomes increasingly digitalized. Patients who do not know how to use digital health tools, do not recognize their importance, or cannot access them in their preferred language tend not to use them, which places them at a disadvantage in interacting with health care providers and improving their health. Digital health literacy has recently been recognized as a "super social determinant of health" (Crawford and Serhal, 2020; Sheon, 2018).

Limited digital health literacy not only exacerbates inequalities in access to health care services but may also affect people's health. Individuals with higher digital health literacy tend to engage in more positive health behaviors (Kim and Son, 2017) and adhere better to disease prevention measures (Guo et al., 2021). Among older adults, digital health literacy is also associated with better cognitive health (Li et al., 2020). Awareness and understanding of digital technologies and digital health, including telemedicine, are therefore crucial to ensuring equitable access to health care in the current context of digital transformation.

Against this background, assessing people's awareness of telemedicine has both theoretical and practical significance for designing interventions that change health care behaviors, extend telemedicine services to rural and remote populations, and thereby give people opportunities to access quality health care. Based on survey data from two communes in the Red River Delta, this article examines residents' awareness of telemedicine and the factors influencing it. Awareness is assessed along three dimensions: awareness of the services delivered via telemedicine, awareness of the equipment required for telemedicine, and awareness of the skills needed to use telemedicine. The findings are expected to provide empirical evidence to help policymakers and health authorities identify bottlenecks in extending telemedicine to rural populations, thereby contributing to health equity and universal health coverage as Vietnam accelerates the digital transformation of its health sector.

2.0 CONCEPTS AND METHODS

2.1 Key concepts

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Volume: 09, Issue: 06 November - December 2026

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The World Health Organization defines telemedicine as "the delivery of health-care services where distance is a critical factor, by all health-care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries all in the interests of advancing the health of individuals and their communities" (WHO, 2022). Although advances in digital technology have introduced new terms and operational considerations, the core principle of telemedicine remains the remote delivery of health care through digital tools (WHO, 2022).

In Vietnam, the concept of telehealth is defined in Circular No. 49/2017/TT-BYT of 28 December 2017 issued by the Ministry of Health. According to Clause 1, Article 2 of this Circular, telehealth refers to the exchange of information related to an individual's health between health professionals and that individual, or among health professionals, at geographically distant locations by means of information technology and telecommunications (Ministry of Health, 2017). Telemedicine is one component of telehealth and has been codified in Article 80 of the Law on Medical Examination and Treatment No. 15/2023/QH15 (National Assembly, 2023). In this article, telemedicine refers to the means by which people at distant locations connect with health workers to exchange information on health counseling, disease prevention, and treatment, and to receive prescriptions, using information technology and telecommunication devices. The article does not address telemedicine between health professionals across different levels of the health care system.

2.2 Methods

The study was conducted in O Dien commune (Hanoi) and Hop Thinh commune (Bac Ninh province) in the Red River Delta, Vietnam, in the fourth quarter of 2025. The quantitative sample comprised 400 respondents across the two communes, of whom 266 (66.5%) had never used telemedicine services and 134 (33.5%) had used them. Because the study was exploratory, aiming to generate initial findings on people's awareness, attitudes, and behaviors regarding telemedicine, a service not yet widely implemented in health facilities or rural communities, purposive sampling was used to ensure a sufficient number of telemedicine users for comparative statistical analyses.

3.0 RESULTS

3.1 Residents' awareness of telemedicine

3.1.1 Awareness of services delivered via telemedicine

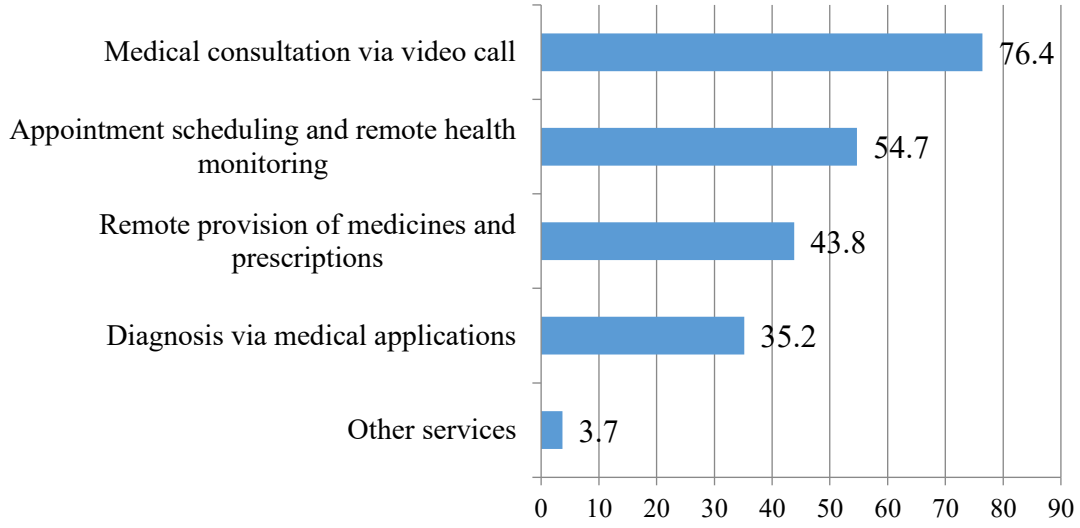
Regarding the services delivered via telemedicine, about one-third of respondents (133/400; 33.3%) did not know what services telemedicine provides, while the remaining two-thirds (267 respondents; 66.8%) reported knowing of at least one such service. The services identified by these 267 respondents are shown in Figure 1.

Figure 1. Respondents' views on the services delivered via telemedicine (%)

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Volume: 09, Issue: 06 November - December 2026

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Source: Project survey data (2025)

Among the services delivered via telemedicine, video-call medical consultation was the most frequently mentioned (76.4%), followed by appointment scheduling and remote health monitoring (54.7%), remote provision of medicines and prescriptions (43.8%), and diagnosis via medical applications (35.2%).

These results indicate that respondents' awareness of specific telemedicine services is neither complete nor comprehensive. They mainly associated telemedicine with remote health counseling, consultations with doctors by phone or video, and remote appointment scheduling, whereas more specialized services, such as remote provision of medicines and prescriptions (43.8%) or diagnosis via medical applications (35.2%), were less well known, and other services were mentioned by only 3.7% of respondents. In other words, people's understanding leans toward simple services that are easy to envisage and close to their everyday experience, possibly including informal telemedicine practices (e.g., calling or texting health workers they know), rather than formally implemented telemedicine services.

3.1.2 Awareness of the equipment required for telemedicine

Equipment and infrastructure are foundational, and indeed decisive, for accessing and using telemedicine. Unlike conventional care based on face-to-face contact, telemedicine depends entirely on devices such as telephones, computers, cameras, connection software, and a stable Internet connection. These serve as the bridge that enables doctors and patients to interact, exchange information, and carry out clinical activities remotely. Without such equipment, or if its quality is inadequate, telemedicine services cannot be delivered or will be ineffective. Awareness of the equipment required for telemedicine therefore directly affects people's access to telemedicine.

When asked "Do you know what equipment and infrastructure are needed to carry out telemedicine?", most respondents (64.8%) reported knowing, to varying degrees, the equipment and infrastructure required for telemedicine, such as smartphones, computers,

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Volume: 09, Issue: 06 November - December 2026

ISSN 2582-0176

Internet connections, and health-monitoring devices (42.5% knew well and 22.3% knew partially). Nevertheless, 35.3% did not know or were unsure about the equipment needed. This suggests that specific knowledge of the equipment and technical conditions required to use telemedicine remains limited among a segment of the community, and that a gap persists between having "heard of the service" and "understanding the conditions for using it."

3.1.3 Awareness of the skills required to use telemedicine

If equipment and infrastructure are the necessary condition, then basic knowledge and skills in operating, using, and interacting on technology platforms are the "sufficient condition" for accessing and using telemedicine effectively. In practice, telemedicine requires users to have the following knowledge and skills:

Skills in using technological devices: people need to know how to use information technology devices with or without an Internet connection, install or open applications, and join voice or video calls. Without these basic skills, people encounter difficulties from the very first step and cannot access the service even when they need it. Device-use skills are thus the bridge that turns potential access into actual use.

Skills in interacting with doctors via electronic devices, such as communicating, presenting, sharing, providing, and responding to information for doctors or health workers via text messages, images, or audio. These skills directly affect the quality of patient–provider interaction. In telemedicine, patients need to be able to describe their symptoms clearly, explain their health status, provide accurate information, use measuring devices where available, and send health information via applications or online platforms, so that doctors and health workers can receive the information, address the issues at hand, and provide accurate, appropriate, and timely advice and treatment.

Knowledge of telemedicine software: people need to understand how to use health applications and telemedicine software.

Without such knowledge and skills, or with incomplete or inaccurate knowledge and skills, the diagnostic and treatment process may be seriously affected. In other words, knowledge and skills not only enable connection but also determine the clinical effectiveness of the service.

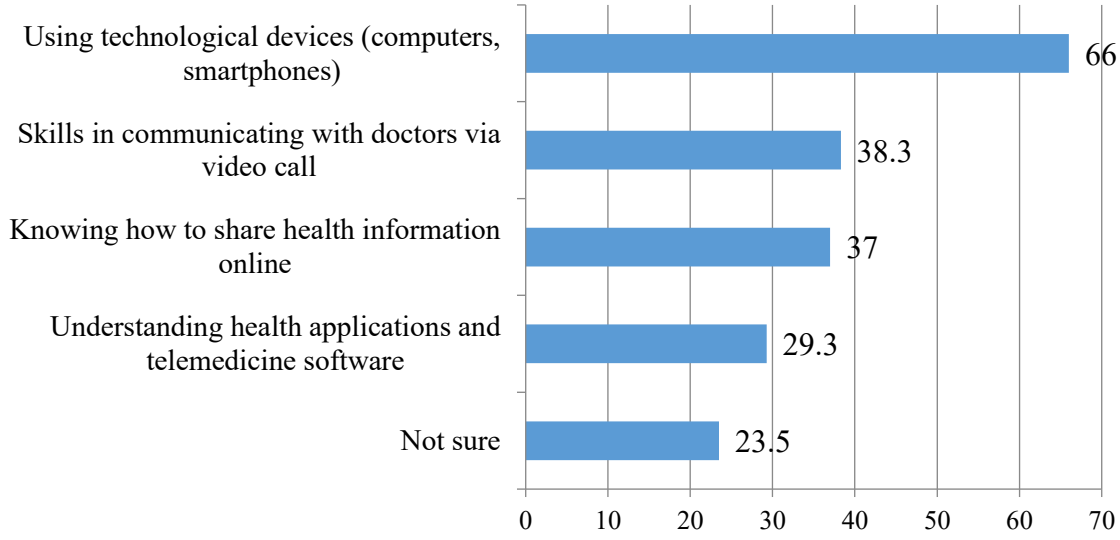
Respondents' views on the knowledge and skills needed to use telemedicine services are presented in Figure 2.

Figure 2. Respondents' views on the knowledge and skills required to use telemedicine effectively (%)

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Volume: 09, Issue: 06 November - December 2026

ISSN 2582-0176



Source: Project survey data (2025)

Figure 2 shows that skills in using technological devices (computers, smartphones) were the most frequently cited (66.0%), whereas other skills, namely communicating with doctors via video call, sharing health information online, and particularly understanding health applications and telemedicine software, were cited far less often (29.3%–38.3%). Thus, many respondents had begun to recognize the basic technological requirements for accessing telemedicine, such as using a smartphone, connecting to the Internet, and joining online communication platforms. The national digital transformation across many areas of social life has likely helped to build a certain foundation of awareness. However, this awareness remains largely confined to basic operational skills, while more advanced skills, such as sending medical data or sharing health-monitoring information via applications or online platforms, are not yet fully recognized, being selected by only 29%–38% of respondents.

Notably, a considerable proportion of respondents (23.5%) were unsure which skills are necessary to use telemedicine. This "unsure" group reflects a vague and unformed state of awareness: they may have heard of telemedicine but do not understand what they need to prepare in order to use it. This raises the question of whether current communication about telemedicine remains at the level of general introduction and has yet to provide specific guidance on the skills required to use the service.

3.2 Factors influencing residents' awareness

Awareness was measured using three binary variables: awareness of the services delivered via telemedicine; awareness of the required equipment and infrastructure; and awareness of the knowledge and skills needed to use the service effectively (1 = aware; 0 = not aware). Each variable was analyzed using binary logistic regression.

Independent variables were grouped according to the analytical framework and entered into the models in blocks.

Model 1 included individual characteristics: gender (male = 0), age, education (lower secondary or below = 0), and occupation (other occupations = 0; retired, not working, or agriculture, forestry, and fisheries = 1).

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Model 2 added household and community characteristics: living standard (above average = 0) and commune of residence (Hop Thinh = 0).

Model 3 added health status and health care access (self-rated health, a medical visit in the past 12 months, monthly medical check-ups, chronic disease, and a travel time of 30 minutes or more to a health facility) together with technology ownership and use (regular Internet use, owning a computer/laptop/tablet, owning an Internet-connected smartphone, and having Wi-Fi/Internet at home). Model 3 is the full model.

Results are presented as odds ratios, Exp(B). An Exp(B) greater than 1 indicates that the group coded 1 has higher odds of being aware than the reference group (coded 0); an Exp(B) less than 1 indicates lower odds. For age, Exp(B) represents the change in the odds of awareness associated with each additional year of age. The results for each dimension of awareness are presented in turn below.

3.2.1 Factors influencing awareness of services delivered via telemedicine

Table 1. Logistic regression models of factors influencing awareness of services delivered via telemedicine

Independent variables	Model 1 Exp(B)	Model 2 Exp(B)	Model 3 Exp(B)
Individual characteristics			
Gender (male = 0)	0.793	0.768	0.772
Age	0.977**	0.976**	0.992
Education (lower secondary or below = 0)	1.657*	1.641*	1.451
Occupation (other = 0)	0.685	0.674	0.777
Household and community characteristics			
Living standard (above average = 0)		1.242	1.161
Commune of residence (Hop Thinh = 0)		1.099	0.902
Health status and health care access			
Self-rated health (not good = 0)			0.744
Medical visit in the past 12 months (no = 0)			1.019
Monthly medical check-ups (no = 0)			1.121
Chronic disease (no = 0)			0.422**
Travel time to health facility ≥ 30 minutes (< 30 minutes = 0)			0.856
Technology ownership and use			
Regular Internet use (no = 0)			1.585
Owns a computer/laptop/tablet (no = 0)			2.007**
Owns an Internet-connected smartphone (no = 0)			1.019
Has Wi-Fi/Internet at home (no = 0)			0.593
Constant	7.703	6.811	4.751
Nagelkerke R^2	0.126	0.128	0.187

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Source: Project survey data (2025)

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Table 1 shows that, among individual characteristics, age and education were significantly associated with awareness of telemedicine services in Models 1 and 2. Awareness decreased with age: each additional year of age reduced the odds of being aware of the services by approximately 2.3%–2.4% (Exp(B) = 0.977 and 0.976; $p < 0.01$). Respondents with upper secondary education or higher had approximately 1.6 times higher odds of being aware of the services than those with lower secondary education or below (Exp(B) = 1.657 and 1.641; $p < 0.05$). However, once health- and technology-related factors were added in Model 3, neither age nor education remained statistically significant (Exp(B) = 0.992 and 1.451, respectively). Gender and occupation were not significant in any of the three models.

Household and community characteristics were not significantly associated with awareness of telemedicine services. Neither living standard nor commune of residence was significant in Model 2 or Model 3, and Nagelkerke R^2 barely changed when these two variables were added (from 0.126 to 0.128). Thus, residents of the two communes did not differ significantly in their awareness of telemedicine services.

Among health and health care access factors, only chronic disease was significant, and the association was negative: respondents with a chronic disease had about 0.42 times the odds of being aware of telemedicine services compared with those without a chronic disease (Exp(B) = 0.422; $p < 0.01$). Self-rated health, medical visits in the past 12 months, monthly check-ups, and travel time to a health facility were not significant.

Among technology-related factors, only ownership of a computer/laptop/tablet was significant: owners of these devices had approximately twice the odds of being aware of telemedicine services compared with non-owners (Exp(B) = 2.007; $p < 0.01$). Regular Internet use, owning an Internet-connected smartphone, and having Wi-Fi/Internet at home were not significant. The explanatory power of the model increased from 12.6% in Model 1 to 18.7% in Model 3 (Nagelkerke R^2), indicating that the additional explained variation came mainly from the health- and technology-related factors.

3.2.2 Factors influencing awareness of the equipment and infrastructure required for telemedicine

Table 2. Logistic regression models of factors influencing awareness of the equipment required for telemedicine

Independent variables	Model 1 Exp(B)	Model 2 Exp(B)	Model 3 Exp(B)
Individual characteristics			
Gender (male = 0)	0.513**	0.457***	0.454**
Age	0.979*	0.972**	0.991
Education (lower secondary or below = 0)	1.980**	1.755*	1.503
Occupation (other = 0)	0.852	0.817	1.007
Household and community characteristics			
Living standard (above average = 0)		1.242	1.165

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Commune of residence (Hop Thinh = 0)		2.361***	1.960*
Health status and health care access			
Self-rated health (not good = 0)			0.711
Medical visit in the past 12 months (no = 0)			0.772
Monthly medical check-ups (no = 0)			0.553
Chronic disease (no = 0)			0.829
Travel time to health facility ≥ 30 minutes (< 30 minutes = 0)			0.710
Technology ownership and use			
Regular Internet use (no = 0)			2.896**
Owns a computer/laptop/tablet (no = 0)			1.569
Owns an Internet-connected smartphone (no = 0)			1.100
Has Wi-Fi/Internet at home (no = 0)			0.928
Constant	6.457	6.080	1.899
Nagelkerke R^2	0.156	0.198	0.263

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Source: Project survey data (2025)

Unlike awareness of services, awareness of telemedicine equipment and infrastructure was most clearly and consistently associated with gender among individual characteristics (Table 2). Across all three models, women had only about 0.45–0.51 times the odds of being aware of telemedicine equipment and infrastructure compared with men (Exp(B) = 0.513, $p < 0.01$; 0.457, $p < 0.001$; and 0.454, $p < 0.01$, respectively). This association remained virtually unchanged after controlling for household, health, and technology factors. Age was negatively associated with awareness in Models 1 and 2 (Exp(B) = 0.979, $p < 0.05$; and 0.972, $p < 0.01$), and respondents with upper secondary education or higher had approximately 1.8–2.0 times higher odds of being aware of the equipment than those with lower secondary education or below (Exp(B) = 1.980, $p < 0.01$; and 1.755, $p < 0.05$). In Model 3, neither age nor education remained significant. Occupation was not significant in any model.

Commune of residence was clearly associated with this dimension of awareness. Compared with residents of Hop Thinh, residents of O Dien had approximately 2.4 times higher odds of being aware of telemedicine equipment and infrastructure in Model 2 (Exp(B) = 2.361; $p < 0.001$) and nearly twice the odds in Model 3 (Exp(B) = 1.960; $p < 0.05$). Household living standard was not significant, nor was any variable in the health and health care access group.

Among technology-related factors, regular Internet use was the only significant variable: regular Internet users had approximately 2.9 times higher odds of being aware of telemedicine equipment and infrastructure than non-regular users (Exp(B) = 2.896; $p < 0.01$). Owning a computer or an Internet-connected smartphone, or having Wi-Fi/Internet at home, was not significant. Nagelkerke R^2 increased from 0.156 (Model 1) to 0.198 (Model 2) and 0.263 (Model 3); this full model had the highest explanatory power of the three dimensions of awareness.

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3.2.3 Factors influencing awareness of the knowledge and skills required to use telemedicine

Table 3. Logistic regression models of factors influencing awareness of the knowledge and skills required to use telemedicine

Independent variables	Model 1 Exp(B)	Model 2 Exp(B)	Model 3 Exp(B)
Individual characteristics			
Gender (male = 0)	0.827	0.655	0.532
Age	0.983	0.970*	0.982
Education (lower secondary or below = 0)	2.089**	1.857*	1.660
Occupation (other = 0)	0.859	0.758	0.974
Household and community characteristics			
Living standard (above average = 0)		2.657***	2.845**
Commune of residence (Hop Thinh = 0)		3.473***	3.058***
Health status and health care access			
Self-rated health (not good = 0)			1.224
Medical visit in the past 12 months (no = 0)			1.244
Monthly medical check-ups (no = 0)			0.451*
Chronic disease (no = 0)			1.557
Travel time to health facility ≥ 30 minutes (< 30 minutes = 0)			0.696
Technology ownership and use			
Regular Internet use (no = 0)			2.541*
Owns a computer/laptop/tablet (no = 0)			1.668
Owns an Internet-connected smartphone (no = 0)			1.687
Has Wi-Fi/Internet at home (no = 0)			0.516
Constant	6.951	4.873	1.003
Nagelkerke R^2	0.09	0.207	0.256

Note: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$. Source: Project survey data (2025)

Table 3 shows that, among individual characteristics, education was significant in Models 1 and 2: respondents with upper secondary education or higher had approximately 2.1 and 1.9 times higher odds, respectively, of being aware of the required knowledge and skills than those with lower secondary education or below (Exp(B) = 2.089, $p < 0.01$; and 1.857, $p < 0.05$). Age was significant only in Model 2 (Exp(B) = 0.970; $p < 0.05$). In Model 3, neither age nor education remained significant. Gender and occupation were not significant in any model.

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Household and community characteristics had the strongest influence on this dimension of awareness: adding living standard and commune of residence increased Nagelkerke R^2 from 0.09 (Model 1) to 0.207 (Model 2). Residents of O Dien had approximately 3.5 times (Exp(B) = 3.473; $p < 0.001$) and 3.1 times (Exp(B) = 3.058; $p < 0.001$) higher odds of being aware of the required knowledge and skills than residents of Hop Thinh in Models 2 and 3, respectively. Contrary to conventional expectations, respondents from households with an average or below-average living standard had approximately 2.7–2.8 times higher odds of being aware of the required knowledge and skills than those from households with an above-average living standard (Exp(B) = 2.657, $p < 0.001$ in Model 2; and 2.845, $p < 0.01$ in Model 3).

Among health and health care access factors, only monthly medical check-ups were significant, with a negative association: respondents who attended monthly check-ups had about 0.45 times the odds of being aware of the required knowledge and skills compared with those who did not (Exp(B) = 0.451; $p < 0.05$). Self-rated health, medical visits in the past 12 months, chronic disease, and travel time to a health facility were not significant.

Among technology-related factors, regular Internet use increased the odds of being aware of the required knowledge and skills approximately 2.5-fold (Exp(B) = 2.541; $p < 0.05$). Owning a computer or an Internet-connected smartphone, and having Wi-Fi/Internet at home, were not significant. The full model accounted for approximately 25.6% of the variation in this dimension of awareness (Nagelkerke $R^2 = 0.256$).

4.0 DISCUSSION

First, the findings indicate that rural residents' awareness of telemedicine in the Red River Delta remains at the level of "knowing about" rather than "understanding" it. About two-thirds of respondents knew at least one telemedicine service and knew about the required equipment, but their knowledge was concentrated on simple forms such as video-call consultations (76.4%) and skills in using smartphones and computers (66.0%). Nearly a quarter (23.5%) were unsure which skills they needed. This is consistent with the observation that telemedicine is still a new concept for many patients in Vietnam (Hoang and Do Le, 2024). The level of awareness in this study is higher than that reported in a survey of patients with chronic diseases in Central Vietnam, where only 26.6% had heard of telemedicine and 5.7% were using it (Nguyen, 2023). However, because the sample was purposively selected and included 33.5% prior users, the descriptive proportions are likely to be higher than those in the wider community.

Second, the three dimensions of awareness were shaped by different sets of factors. Awareness of telemedicine services showed little social differentiation: in the full model, only computer ownership and chronic disease were significant, and the model had the lowest explanatory power ($R^2 = 0.187$). In contrast, awareness of equipment and of the required knowledge and skills was more clearly differentiated by gender, commune of residence, living standard, and frequency of Internet use ($R^2 = 0.263$ and 0.256, respectively). In other words, the gaps between population groups lie less in having "heard of" telemedicine than in understanding the technical conditions and capabilities required to use it, which are precisely the conditions that determine whether awareness translates into actual use.

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Third, age and education were significant in Models 1 and/or 2 for all three dimensions but lost significance once health- and technology-related factors were added in Model 3. This suggests that age- and education-related gaps in awareness of telemedicine may be largely transmitted through access to and use of technology: younger and better-educated people may be more aware partly because they use the Internet more regularly (Tables 2 and 3) or own computers (Table 1). This interpretation is consistent with studies showing that eHealth literacy is stratified by socioeconomic status (Guo et al., 2021) and functions as a "super determinant" of health (van Kessel et al., 2022a). It is also in line with a study in Central Vietnam, in which upper secondary education or higher and easy access to information technology were associated with greater demand for telemedicine (Nguyen, 2023). However, given the cross-sectional data and the absence of a formal mediation test, this remains a hypothesis that requires further verification.

Fourth, among technology-related factors, use mattered more than ownership. Regular Internet use increased the odds of awareness of equipment (Exp(B) = 2.896) and of the required skills (Exp(B) = 2.541), whereas owning an Internet-connected smartphone or having Wi-Fi at home was not significant for any dimension. The digital divide thus lies not only in whether people have access to devices but also in whether they practice and accumulate experience in using the digital environment. This is consistent with the view that digital skills and connectivity are "super social determinants of health" (Sheon, 2018; Crawford and Serhal, 2020). Computer ownership was associated only with awareness of services; this variable may reflect exposure to online information or household socioeconomic status rather than a direct technical requirement, since most telemedicine services can now be accessed via smartphones.

Fifth, the gender gap in awareness of equipment and infrastructure persisted after controlling for education, living standard, and Internet use (Exp(B) ≈ 0.45–0.51), whereas gender was not associated with awareness of services or skills. This gap may be related to the gendered division of labor in rural households, in which men typically purchase, install, and troubleshoot devices and Internet connections. In addition, the marked differences between the two communes in technical and skills-related awareness, but not in awareness of services, point to the role of local context, such as the degree of urbanization and how primary health care facilities implement and communicate telemedicine. As the quantitative data do not allow these mechanisms to be identified, these explanations should be explored further through qualitative research.

Sixth, some counterintuitive findings warrant cautious interpretation. Respondents with chronic diseases were less aware of telemedicine services, and those attending monthly check-ups were less aware of the required skills, even though these groups are expected to benefit most from telemedicine. One plausible explanation is that these individuals have established routines and stable relationships with in-person care, while telemedicine has not yet been integrated into chronic disease management at the primary care level. This gap is noteworthy given the considerable demand for telemedicine among patients with chronic diseases, 47.7% of whom would like to use it in the future (Nguyen, 2023). Similarly, the greater awareness of the required skills among respondents from households with an average or below-average living standard may reflect practical motivation: for poorer households, travel and in-person treatment costs are a heavier burden, so they may be more interested in learning how to communicate with doctors remotely. Travel time to a health facility was not significant for any

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dimension, possibly because distance to health facilities is not a major barrier in these two peri-urban communes.

This study has several limitations. First, the sample was purposively selected in two communes, so the findings are not representative of the rural Red River Delta as a whole. Second, the cross-sectional design does not allow causal inference. Third, awareness was measured using self-reported binary variables, which may not fully capture respondents' level of understanding. Finally, the Nagelkerke R^2 values of the full models (0.19–0.26) indicate that many relevant factors were not included in the analysis, such as information sources and channels, trust in the service, and referrals by health workers.

5.0 CONCLUSION

This study of two rural communes in Vietnam's Red River Delta shows that rural residents have a basic but incomplete awareness of telemedicine. Residents were mainly aware of simple services and skills, while their understanding of specialized services, technical requirements, and the skills needed to use the service remained limited. The factors influencing awareness varied across dimensions. Awareness of telemedicine services was associated with computer ownership and chronic disease; awareness of equipment was associated with gender, commune of residence, and frequency of Internet use; and awareness of the required knowledge and skills was associated with commune of residence, living standard, monthly check-ups, and frequency of Internet use. Age and education were significant only before health- and technology-related factors were controlled for.

Several policy implications follow from these findings. First, communication about telemedicine should shift from general introductions to specific guidance on technical requirements and the steps involved in using the service. Second, digital skills training should prioritize groups at risk of being left behind, such as women, older adults, people with lower education, and infrequent Internet users, through hands-on support delivered by commune health stations and community digital technology teams. Third, telemedicine should be integrated into chronic disease management at the primary care level so that patients with chronic diseases and those attending regular check-ups become active users of the service. Fourth, implementation and communication strategies should take local differences into account. Future research should use representative samples, measure awareness with multi-level scales, and incorporate qualitative methods to clarify the mechanisms underlying the identified associations.

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