

Determinants of ICT Competency Among Primary Healthcare Providers: A Multivariate Statistical Study

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Abstract

Background: Information and Communication Technology (ICT) competency is essential for effective digital health implementation. However, limited evidence exists on the ICT readiness of healthcare providers in primary care settings in developing regions such as Ormoc City, Philippines.

Methods: A descriptive-correlational design was employed involving 328 healthcare providers from six health districts. Data were collected using a structured questionnaire assessing ICT competency in iClinicSystem utilization, access to health-related websites, communication, and content creation skills. Descriptive statistics and multiple linear regression were used for analysis.

Results: Healthcare providers demonstrated a moderate level of ICT competency across all domains. Respondents were predominantly female, middle-aged, and volunteer barangay health workers. Age and nature of employment were significant predictors of ICT competency, while education, income, and length of service were not.

Conclusion: ICT competency remains limited at the primary care level. Targeted training, improved infrastructure, and sustained institutional support are necessary to enhance digital health adoption and strengthen healthcare delivery systems.

Keywords: ICT competency; digital health; healthcare providers; primary healthcare; health information systems; Philippines

Introduction

Information and Communication Technology (ICT) competency refers to the knowledge, skills, and abilities required to effectively use digital technologies for communication, information processing, and problem-solving across various contexts (UNESCO, 2018; European Commission, 2019). In today's increasingly digital environment, ICT competencies are essential for participation in modern society, particularly in the healthcare sector where digital tools are used for patient data management, communication, and service delivery (World Health Organization [WHO], 2021).

In the Philippines, the integration of digital technologies in healthcare has been promoted through national initiatives such as electronic medical records (EMR) systems and the Department of Health's iClinicSys, which aim to improve efficiency and accessibility of health services (Department of Health [DOH], 2020). However, the successful implementation of these systems depends largely on the capability of healthcare providers to effectively utilize ICT tools (WHO, 2019).

Ormoc City, composed of multiple barangays and organized primary health care units, is undergoing rapid development and digital transformation in its health sector. Local consultations with health officials revealed that while ICT systems such as iClinicSys have been introduced, their utilization remains limited, particularly at the barangay level where access to digital infrastructure and training is constrained. Furthermore, the absence of fully implemented EMR systems and limited ICT resources in community health facilities highlight the need to assess the digital readiness of healthcare providers.

Assessing ICT competency is crucial in establishing baseline data that can guide strategic interventions, including infrastructure development, capacity-building programs, and policy formulation aimed at strengthening digital health systems. Previous studies emphasize that healthcare providers' ICT competency significantly influences the adoption and effective use of eHealth systems, ultimately impacting healthcare quality and efficiency (Adu et al., 2020; Kruse et al., 2018).

This study aimed to examine the level of ICT competency among healthcare providers in primary health care settings in a Philippine city. Specifically, it described the demographic characteristics of the respondents in terms of sex, age, educational attainment, professional category, monthly income, length of service, and employment status. It also assessed the level of ICT competency in relation to the utilization of iClinicSystem, access to recognized health-related websites, communication skills, and content creation skills. Moreover, the study investigated the relationship between demographic variables and ICT competency and determined which demographic factors significantly predict the level of ICT competency among healthcare providers.

Theoretical Framework

In aligning the Unified Theory of Acceptance and Use of Technology (UTAUT) with the general aim and specific objectives of this study, the researchers aim to comprehensively understand the factors influencing ICT competency among healthcare providers in health districts of Ormoc City. Firstly, by determining the demographic profile of respondents, the researchers delved into the facilitating conditions outlined in UTAUT, seeking to uncover contextual factors such as age, education level, and experience that may shape ICT competency (Venkatesh et al., 2003). Subsequently, in assessing the level of ICT competencies across various domains such as the extent of utilization of iClinicSystem, ability to access recognized health-related websites, communication and content creation. The researchers tap into UTAUT's constructs of performance expectancy and effort expectancy, aiming to gauge how health workers perceive the usefulness and ease of using ICT tools for different tasks (Venkatesh et al., 2003). Additionally, understanding which demographic variables serve as determinants of healthcare providers' ICT competency aligns with UTAUT's emphasis on social influence and facilitating conditions, shedding light on how contextual factors intersect with social influences to shape ICT adoption (Venkatesh et al., 2003).

Methodology

Research Design and Locale

A descriptive-correlational research design is appropriate. This design described the current state of ICT competency among healthcare providers and explored relationships between variables. The descriptive component used surveys and questionnaires to gather data on demographics, ICT competency, resources, and training opportunities. Descriptive statistics summarized the data. The correlational component employed statistical tests such as multiple regression analysis.

There are approximately 81 barangay health clinics in Ormoc City, organized into six (6) health districts: Curva District, Valencia District, Ipil District, Linao District, San Pablo District, and Doña Feliza Mejia District. These health districts encompass several barangays, addressing health concerns that go beyond the capabilities of individual barangays. Since only the health districts have assigned doctors, computers, and staff, the target locales for this study are the health districts of Ormoc. In this study, one health district in Kananga Leyte, a neighboring town of Ormoc city, assigned for pilot testing of the research questionnaire, as this district is closer to the city.

Research Participants and Sampling

In this study, the researchers used complete enumeration. The health districts have approximately 446 healthcare providers. Out of 446 healthcare providers are 226 accredited and 220 registered. Healthcare providers which on leave or in sick leave and not willing to participate to the study will be excluded. Number of healthcare providers that was expected for pilot testing is 50 from Kananga Leyte. According to Julious, S. A. (2005) in his paper titled "Sample size of 12 per group rule of thumb for a pilot study," published in *Pharmaceutical Statistics*, a pilot study often uses about 10% of the intended full sample size. This percentage is generally accepted as sufficient to uncover potential issues with the survey or research instrument while minimizing the resource expenditure before the full study.

The researchers ensured that ethical considerations are given utmost importance. Informed consent obtained from the Ormoc City Mayor to the head of Ormoc City Health down to all participants prior to their involvement in the study. Confidentiality and anonymity were maintained, to protect participants' identities throughout the research process.

Inclusion and Exclusion Criteria

The inclusion criteria for participants in this research project comprised healthcare providers actively engaged in health service delivery within the specified health districts of Ormoc City. These individuals must hold accredited or registered status. Geographically, participants must work within the designated health districts: Curva, Valencia, Ipil, Linao, San Pablo, and Doña Feliza Mejia. Additionally, respondents must be willing to participate the study. Conversely, exclusion criteria encompass healthcare providers with Non-consenting participants and individuals working outside the designated health districts of Ormoc City are also excluded. Administrative staff without direct involvement in health service delivery are not eligible for inclusion.

Research Instrument

The self-assessment questionnaire has 3 sections. The first section of the questionnaire is the demographic profile such as sex, age, educational status, profession type, monthly income, length of service and nature of employment. In the second section is the questionnaire of level of competency among healthcare providers in health districts of Ormoc City. The outcome variable is ICT and it was measured by twenty-five items divided into four major components. All items were measured in 5-point Likert scale ranging from Strongly Disagree (1) to Strongly

Agree(4). The first component of ICT is the Extent of utilization of iClinicSystem which has 7 items. The extent of utilization of iClinicSystem of DOH-EV CHD 7 is an important element in understanding the competency level of participants focused majorly on the scheduling, management of records and medical inventory, billing and invoicing, and generation of reports and analytics of the patient using the iClinicSystem.

The second component is the Ability to access recognized health-related websites which has 5 items. Ability to access recognized health-related websites describes the capacity of the respondents particularly the access of the Department of Health (DOH) website for necessary information, use of the PCHRD (Philippine Council for Health Research and Development) website for research and updates, access of PubMed to find relevant medical and health research articles, and use of Google Scholar to search for scholarly articles related to my field.

The third component is communication skills which has 7 items. Communication focuses on an individual's capability to communicate, share and interact with others using digital devices and network. It includes internet or local area connections. The fourth and last component under section two is content creation skills which has 6 items. Content creation describes an individual's ability to create/delete /manipulate contents such as text and images in different application software such as Microsoft Word, PowerPoint, paint and Excel in digital devices. It also includes adjusting settings based on one's interest of use.

Data Collection

Initially, necessary approvals obtained including the EVHRDC - Ethics Review Committee (ERC). Quantitative data collected through self-administered questionnaires distributed among healthcare providers in health districts. This process involved scheduling data collection sessions, obtaining informed consent, and administering the questionnaires, ensuring confidentiality and anonymity of participant responses. The sessions were scheduled at convenient times and locations, with informed consent obtained before proceeding. Pilot testing of the research questionnaire conducted in one selected health district in the Municipality of Kananga, Leyte, a town neighbor of Ormoc City, to refine its clarity and comprehensiveness based on participant feedback. To maintain confidentiality, the data was anonymized to protect participant identities. Prior to analysis, the research team prepared the data by organizing it into a format conducive to statistical analysis.

Data Analysis

The researchers first ensure the credibility and reliability of the data. Initially, the researchers encoded all participant responses into a single Excel file, which then transferred to Jamovi version 2.23.8 for statistical processing. The credibility and reliability assessed by content validity through the EVHRDC ethics board and the statistical software. Testing the reliability of data, the researchers used Cronbach's Alpha.

The first objective presented in a table, showing frequency and percentage distributions. The second objectives were analyzed using the weighted mean and standard deviation. The third and fourth objectives were analyzed using a General Linear Model (GLM) especially multiple linear regression. The GLM allows the inclusion of multiple independent variables, both categorical, such as sex, educational status, nature of employment, income, and profession, and continuous, such as age, to examine how these demographic factors influence the level of ICT competency. This approach is appropriate because the dependent variable is measured on a continuous scale.

Ethical Consideration

This study strictly adhered to the ethical principles required by the Eastern Visayas Health Research and Development Consortium (EVHRDC) Ethics Review Committee, protected the personal privacy and right to information of respondents, and ensured data security and confidentiality. During the conduct of the study, all respondents were required to sign an informed consent form to confirm that they were aware of their rights and obligations. When potential risks that could endanger the subjects were identified, the study immediately halted the relevant activities and reported to the EVHRDC Ethics Review Committee. Furthermore, in the use and analysis of data, anonymity and confidentiality were strictly maintained. This ethical compliance was supported by the Form 27.1 Approval Letter issued by the Eastern Visayas Health Research and Development Consortium Ethics Review Committee on October 04, 2024 with an ERC Protocol No. 2024-044.

Results and Discussions

Table1. Socio-demographic characteristics of participants

Socio-demographic characteristics	Numb	Perce
Male	14	4.3
Female	314	95.7
Age		
25–39	122	37.42
40–54	142	43.56
55–69	57	17.48
70–84	5	1.53
Educational Status		
College Graduate	47	15.5
College Level	61	20.1
Elementary Graduate	28	9.2
High School Graduate	159	52.5
Nature of Employment		
Job Order/Contract of Service	24	7.3
Plantilla/Temporary	18	5.4
Regular		
Regular/Permanent	41	12.5
Volunteer	245	74.7
Profession Type		
Barangay Health Worker	277	84.5
Doctor	4	1.2
Health Officer	3	0.9
Medical Technologist	1	0.3
Midwifery	34	10.4
Nurse	9	2.7
Monthly Income		
10,000 Below	146	49.6
10,000–25,000 Pesos	9	2.7
25,000–35,000 Pesos	15	4.6
35,000–45,000 Pesos	4	1.2
45,000–65,000 Pesos	2	0.6
65,000 Above	4	1.2
Length of Service		
1-3 years	56	17.1
4-6 years	57	17.4
7-10 years	45	13.8
Less than 1 year	18	5.5
More than 10 years	143	43.7

*The currency of Monthly income is in Philippine Peso (Php)

* The percentages are unequal as some participants marked N/A

Out of 446 participants, 328 participated in this study. The socio-demographic profile of the 328 participants revealed several notable characteristics that may have influenced their level of ICT competency. The majority were female (95.7%), which aligns with the gender distribution commonly observed among community health workers in developing countries (Shiferaw, Tilahun, & Endehabtu, 2020). Gendered occupational roles may shape access to and familiarity with technology, as female community health workers often face limited opportunities for ICT training compared to male counterparts (Shiferaw et al., 2020).

In terms of age, most respondents were 40–54 years old (43.6%), followed by those aged 25–39 years (37.4%).

This concentration among mid-career adults suggests participants possessed substantial professional experience but might be less digitally adaptive than younger workers; prior studies show younger health professionals typically demonstrate higher digital literacy and confidence (Shiferaw et al., 2020).

Regarding educational status, over half (52.5%) were high-school graduates, while only 15.5% were college graduates. This finding aligns with Alampay's (2006) work in the Philippines indicating that individuals with higher educational attainment exhibit greater access to and proficiency with ICTs. The relatively modest education level among respondents may therefore help explain variations in ICT competency observed later in this analysis.

The nature of employment was dominated by volunteers (74.7%), with only 12.5% regular or permanent staff. Volunteer workers often have limited institutional access to ICT infrastructure and training, which could hinder skill development and familiarity with digital systems. This workforce composition is consistent with the framework presented in the DOH's Barangay Health Workers' Reference Manual 2022, which positions barangay health workers (BHWs) as frontline community health workers who require ongoing capacity development and training support (Department of Health [DOH], 2022).

Most respondents identified as BHWs (84.5%), with only a small percentage comprising midwives, nurses, and doctors. This predominance of BHWs in the sample underscores the need for targeted digital training at the grassroots level. In terms of monthly income, nearly half (49.6%) reported earning ₱10,000 or less, reflecting low socioeconomic status. Alampay (2006) emphasised that income disparities contribute to the "digital divide," with lower-income individuals facing reduced access to ICT tools and infrastructure. Consequently, financial limitations among participants likely constrained their engagement with digital health technologies. For length of service, 43.7% had served more than 10 years, indicating that most respondents were experienced but possibly less exposed to new digital practices compared to newer entrants.

LEVEL OF ICT COMPETENCY

Table 2. Utilization of iClinicSystem

Indicators	Mean	SD
1. I use iClinicSystem for scheduling patient appointments	2.79	1.53
2. I use iClinicSystem to manage patient medical records	2.84	1.57
3. I use iClinicSystem for billing and invoicing	2.37	1.47
4. I use iClinicSystem to manage medical inventory	2.54	1.44
5. I use iClinicSystem to generate reports and analytics	2.65	1.46
6. I use iClinicSystem for internal communication with staff	2.63	1.43
7. I use iClinicSystem for telemedicine and virtual consultations	2.59	1.45
Average Weighted Mean	2.63	

Note: 3.25 to 4.00 indicated Strongly Agree; a mean score from 2.50 to 3.24 indicated Agree; a mean score from 1.75 to 2.49 indicated Disagree; and a mean score from 1.00 to 1.74 indicated Strongly Disagree.

The overall utilization of the iClinicSystem in Ormoc City reached an average weighted mean (AWM) of 2.63, falling within the 2.50–3.24 "Agree" range. This suggests respondents generally affirmed using the system for tasks such as scheduling patient appointments, managing medical records, billing and invoicing, inventory management, generating reports and analytics, internal communication, and telemedicine / virtual consultations. However, the relatively modest score suggests moderate rather than robust usage.

This pattern is in line with broader studies showing that health-care professionals often adopt digital-health tools more readily for routine workflow tasks, while more advanced functionalities such as analytics and teleconsultation lag behind, especially in low-resource and rural settings (Longhini et al., 2022; Borges do Nascimento et al., 2023). For instance, infrastructure limitations, training gaps, and workload concerns have emerged as major barriers to full adoption of digital health technologies among healthcare workers globally (Borges do Nascimento et al., 2023).

In Ormoc City, this finding takes on additional meaning in a health system expansion context: the ground-breaking ceremony for the new Ormoc City Hospital on 3 October 2025 marked a major infrastructure milestone (City

Government of Ormoc, 2025). The new facility featuring emergency, outpatient, ICU, delivery, and diagnostics services will raise expectations for digital health support, but it also signals that current ICT systems like iClinicSystem must scale alongside physical infrastructure.

Table 3. Ability to access recognized health-related websites

Indicators	Mean	SD
1. I can easily access the Department of Health (DOH) website for necessary information	2.91	1.46
2. I frequently use the PCHRD (Philippine Council for Health Research and Development) website for research and updates	2.53	1.39
3. I am able to access PubMed to find relevant medical and health research article	2.56	1.42
4. I effectively use Google Scholar to search for scholarly articles related to my field	2.57	1.46
5. I find it easy to navigate and extract useful information from these health-related websites	2.78	1.43
Average Weighted Mean	2.67	

Note: 3.25 to 4.00 indicated Strongly Agree; a mean score from 2.50 to 3.24 indicated Agree; a mean score from 1.75 to 2.49 indicated Disagree; and a mean score from 1.00 to 1.74 indicated Strongly Disagree.

The ability to access recognized health-related websites yielded an average weighted mean (AWM) of 2.67, which falls in the 2.50-3.24 “Agree” range. This suggests that respondents generally concurred they can access and use key platforms such as the Department of Health (DOH) website, the Philippine Council for Health Research and Development (PCHRD) portal, PubMed, and Google Scholar, and that they find navigating these sites and extracting useful information relatively manageable. While the mean is positive, a value closer to the lower bound of the “Agree” range indicates that there remains room for improvement in usage frequency or depth. Research on digital health literacy among health professionals highlights that access to online resources is necessary but not sufficient: active searching, critical appraisal, and integration of

information into practice often lag behind mere access (Longhini, Rossetini, & Palese, 2022). Moreover, the capacity to locate, evaluate and apply online health information is frequently compromised in resource-limited settings by intermittent connectivity, insufficient training, and limited institutional support (Borges do Nascimento et al., 2023). In the context of Ormoc City, where healthcare infrastructure is undergoing major expansion (e.g., the groundbreaking ceremony for the new Ormoc City Hospital in October 2025) and where many providers are volunteers with modest formal education and income, the moderate level of website-access ability may reflect transitional digital-health readiness rather than fully mature e-information usage.

Table 4. Communication Skills

Indicators	Mean	SD
1. I can easily open and read emails in my email account	2.92	1.53
2. I am proficient in composing and sending emails	2.49	1.40
3. I am skilled in encoding letters and official documents	2.42	1.38
4. I can effectively prepare PowerPoint presentations	2.44	1.41
5. I utilize Microsoft programs such as Excel and Word proficiently	2.38	1.40
Average Weighted Mean	2.53	

Note: 3.25 to 4.00 indicated Strongly Agree; a mean score from 2.50 to 3.24 indicated Agree; a mean score from 1.75 to 2.49 indicated Disagree; and a mean score from 1.00 to 1.74 indicated Strongly Disagree.

The respondents’ communication skills produced an Average Weighted Mean (AWM) of 2.53, placing the group in the “Agree” category (2.50-3.24). This implies that while many participants feel capable of basic digital communication tasks such as opening and reading emails (Mean = 2.92), they are less confident in more advanced tasks like composing emails (2.49), encoding letters/documents (2.42), preparing PowerPoint presentations (2.44), and using Microsoft Word/Excel proficiently (2.38). This gap between foundational skills and efficient use of

office applications mirrors findings in the literature: digital-communication proficiency in health settings often remains partial, particularly where training or infrastructure are limited (Bejaković, 2024). Further, research in healthcare contexts has emphasised that digital communication tools (e-mail, document creation, digital collaboration) require not only access but deliberate skill development without which professionals may use tools in a limited way or fallback to analogue processes (Peres et al., 2025). In this study, many respondents might hold foundational email/reading skills yet lack deeper fluency in document encoding, presentation preparation, or advanced Microsoft-suite use.

Table 5. Content creation Skills

Indicators	Mean	SD
1. I am proficient in creating group chats with different healthcare providers and clients	2.92	1.53
2. I effectively manage group chats to facilitate communication among healthcare providers and client	2.49	1.40
3. I am skilled at posting updates on our official website	2.42	1.38
4. I utilize various social media platforms effectively to communicate important information to clients and healthcare providers	2.44	1.41
Average Weighted Mean	2.53	

Note: 3.25 to 4.00 indicated Strongly Agree; a mean score from 2.50 to 3.24 indicated Agree; a mean score from 1.75 to 2.49 indicated Disagree; and a mean score from 1.00 to 1.74 indicated Strongly Disagree.

The respondents' content creation skills yielded an Average Weighted Mean (AWM) of 2.80, which falls within the "Agree" range (2.50–3.24). This suggests that participants generally believe they can create and manage digital content for communication purposes such as setting up and managing group chats with healthcare providers and clients (Mean = 2.94), posting updates to official websites (2.73), and using social media platforms to share information (2.79). However, since the value did not reach the "Strongly Agree" threshold (3.25+), there appears to be room for improvement in consistency, strategic use of multimedia content, and advanced content management (e.g., optimized website posting, richer social media engagement). This finding aligns with broader evidence that while healthcare professionals may adopt basic digital-communication tools, more sophisticated content-creation competencies (e.g., effective social-media campaigns, content strategy, multimedia production) tend to lag (Alotaibi, 2025). To fully harness digital communication in healthcare settings, training programs should emphasize not just tool use but also content strategy, design, and purpose-driven communication, especially in contexts like yours where many staff may have foundational digital skills yet limited advanced content creation experience.

Determinant of Healthcare Providers' ICT Competency

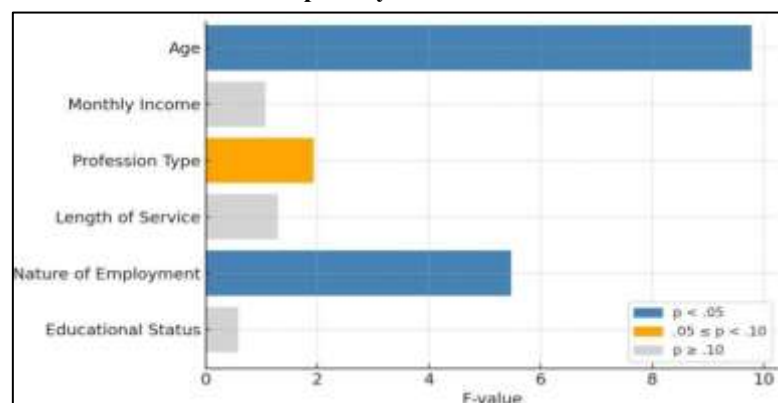


Figure 2. Determinants of Healthcare Providers' ICT Competency

The regression analysis using the Ordinary Least Squares (OLS) method revealed that the selected demographic variables accounted for 24.1% of the variance in healthcare providers' ICT competency ($R^2 = 0.241$, Adjusted $R^2 = 0.153$), indicating a moderate level of explanatory power. The model was statistically significant, $F(31, 270) = 2.76$, $p < .001$, suggesting that the included demographic factors collectively influence ICT competency levels.

Among the predictors, the nature of employment emerged as a significant determinant ($F = 5.47$, $p = .001$), implying that regular or permanent employees tend to exhibit higher ICT competency than contractual or job-order workers. This pattern suggests that stable employment may provide greater access to institutional resources,

training, and long-term ICT exposure. In contrast, temporary or contractual employees might lack such opportunities, contributing to gaps in digital skill development.

Age also showed a statistically significant relationship with ICT competency ($F = 9.78, p = .002$). Younger healthcare workers generally demonstrated greater familiarity and confidence in using digital tools, consistent with global evidence that younger professionals are typically more digitally fluent due to early exposure to technology (Nisar et al., 2019). However, this should not be interpreted as an inherent limitation among older staff; rather, targeted interventions such as peer-assisted learning, mentoring, or adaptive training approaches can help bridge generational gaps in digital competence (Al-Gahtani, 2016).

In contrast, educational attainment, length of service, profession type, and monthly income were not statistically significant predictors of ICT competency. This implies that formal education or work tenure alone may not guarantee proficiency with digital systems underscoring that practical experience, institutional support, and continuous exposure are stronger drivers of ICT competence (Rowe et al., 2021).

these findings further justify the need for institutional partnerships that enhance sustained ICT development. Eastern Visayas State University Ormoc City Campus (EVSU OCC), through its Computer Studies Department, is strategically positioned to collaborate with the Local Government Unit of Ormoc in addressing these gaps. Building upon previous recommendations, EVSU's BS Information Technology faculty could assist in designing targeted digital training modules for different employment types and age brackets, while also establishing continuous mentoring systems. Such collaboration would simultaneously strengthen the ICT capacity of health workers and fulfill the university's academic extension and community engagement mandates, ensuring that digital transformation efforts are inclusive and sustainable.

Conclusion

The healthcare providers generally demonstrate a moderate level of ICT competency, particularly in the utilization of the iClinicSystem, access to health-related websites, communication, and content creation skills. The socio-demographic profile of respondents highlighted a workforce largely composed of female, mid-aged, volunteer barangay health workers with relatively low income and educational attainment, which may contribute to disparities in ICT proficiency. Regression analysis further established that age and nature of employment significantly influence ICT competency, suggesting that younger and more regularly employed healthcare providers tend to exhibit higher levels of digital skills. In contrast, variables such as educational attainment, income, and length of service were not significant predictors, indicating that ICT competency is shaped more by variables rather than formal qualifications alone. These findings underscore the presence of a digital divide within the local healthcare system, particularly at the grassroots level. Although digital health initiatives such as the iClinicSystem have been introduced, their full potential is constrained. This situation reflects a transitional stage in digital health readiness, where foundational skills exist but require strengthening to achieve optimal system integration and efficiency.

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Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this study. The research was conducted independently, and all interpretations and conclusions are solely those of the authors and do not reflect the official position of any affiliated institution or funding agency.

Use of Artificial Intelligence (AI) Tools

The authors utilized ChatGPT, an artificial intelligence language model, to assist in organizing ideas, improving grammar, and enhancing the clarity of the manuscript. All content, interpretations, and conclusions presented in this study remain the sole responsibility of the authors. The use of AI tools did not influence the study design, data collection, analysis, or results.

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