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Domain-Specific Digital Health Literacy and Functional Engagement with E-Health Services in Primary Care

A Study from Surabaya, Indonesia

[1]Titin Wahyuni*, [1]Eka Wilda Faida, [1]Alfina Aisatus Saadah, [2]Krisnita Dwi Jayanti
Corresponding Author: *titin@stikes-yrsds.ac.id
[1] STIKES Yayasan RS Dr. Soetomo, Surabaya, Indonesia
[2] IIK Bhakti Wiyata, Kediri, Indonesia

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ABSTRACT

Digital health systems have been increasingly integrated into primary care globally. In Indonesia, Surabaya's municipal e-health programme has operated since 2013. Despite prolonged availability, face-to-face care remains dominant at community health centres (Puskesmas), suggesting that service availability alone may not ensure functional user engagement. This study described overall and domain-specific digital health literacy among primary care users and explored its associations with sociodemographic factors. A cross-sectional study was conducted among 100 adult users with prior e-health experience at an urban Puskesmas in Surabaya, using the eHealth Literacy Questionnaire (eHLQ). Descriptive statistics and Kendall's tau-b correlation were used to examine overall and domain-level literacy and associations with age, educational attainment, and income. Overall digital health literacy was generally moderate to high, with 39% high, 36% moderate, and 25% low. Domain-specific analysis showed that the ability to actively engage with digital services had the highest proportion of low literacy (41%), followed by the ability to use technology to process health information (37%). Understanding of health concepts and language had the highest mean score, with most respondents falling into the moderate or high categories. Age showed a weak negative association, education a weak positive association, and income was not statistically significant. The findings suggest that functional engagement with e-health services is domain-specific and shaped by factors beyond access alone, underscoring the need for

usability-focused design, integrated user support, and inclusive primary care strategies.

Keywords
Digital Health Literacy
Health System Design
Low-and Middle-Income Countries
Patient Engagement
Primary Care

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Introduction

Digital health transformation has become increasingly important for strengthening health systems and advancing equitable access to care in low- and middle-income countries (LMICs). Over the past two decades, digital health initiatives in LMICs have evolved from basic SMS-based platforms to mobile health applications, telemedicine, digital health information systems, and other digital interventions. However, persistent challenges related to digital literacy, infrastructure, equitable access, and service integration continue to limit the extent to which digital health can support inclusive care [1].

In primary care, digital transformation is increasingly associated with the concept of a digital front door, which refers to the channels through which patients access digitally enabled health services. This includes navigation, triage, electronic health record functionality, interoperability, workforce readiness, stakeholder engagement, and digital inclusion [2]. From this perspective, digital health implementation in primary care should be understood not only as technology adoption but also as the redesign of access points and user pathways within routine care.

In Indonesia, digital health services have expanded across both national and local health systems. At the national level, the JKN Mobile application illustrates how digital health can support administrative access and service efficiency, while also facing implementation challenges, including unstable connectivity, login difficulties, and users' reluctance or limited ability to use digital applications [3].

In Indonesia, Surabaya provides an important setting for examining this issue. The city is recognised as an early adopter of municipal digital health services, having launched its e-health programme in 2013. Initially intended to reduce patient queues, regulate arrival times, and improve administrative efficiency in community health centres (Puskesmas), the programme later expanded to include online registration, appointment scheduling, and queue management [4], [5]. After more than a decade of implementation, Surabaya can be viewed as a natural laboratory for studying digital health literacy and functional engagement in routine

primary care, because e-health services have been available long enough for users and facilities to develop patterns of use, adaptation, and support.

Although the Surabaya e-health system has been integrated into primary care delivery, the continued use of face-to-face registration and staff-mediated assistance suggests that long-term implementation does not necessarily guarantee independent digital use [6], [7]. Local studies have reported challenges with service quality, usability, and limited patient participation across several Puskesmas settings [8], [9], [10]. These findings indicate that the key issue is not simply whether digital services exist or whether users are aware of them, but whether users can engage with them functionally in routine care.

This distinction is conceptually important. Technology adoption refers to acceptance or initial use of a digital service, whereas functional engagement reflects the user's ability to navigate, interpret, and act through the digital system in routine care. Evidence from digital health technology acceptance studies shows that adoption is shaped by perceived usefulness, ease of use, age, culture, and technology type, indicating that acceptance is context-dependent rather than universal [11].

The eHealth Literacy Framework (eHLF) provides a useful theoretical basis for examining this issue. The eHLF conceptualises e-health literacy as a multidimensional interaction between individual capabilities, digital technologies, and the fit between services and users' needs [12]. The eHealth Literacy Questionnaire (eHLQ), developed from this framework, captures seven domains that reflect both users' skills and their interaction with digital services, including the ability to process health information, understand health concepts, actively engage with digital services, feel safe and in control, remain motivated, access functional services, and use services that suit individual needs [12]. This multidimensional approach is particularly relevant for primary care settings where digital platforms are embedded in everyday service pathways.

Despite growing research on digital health adoption, important gaps remain. First, much of the literature focuses on access, satisfaction, or general use, with less attention to domain-specific digital health literacy. Second, evidence from low- and middle-income country settings remains limited, particularly in primary care systems where digital services may coexist with in-person and staff-assisted pathways [13]. Third, few studies have examined functional engagement in contexts where e-health has been implemented for more than a decade. These gaps are important because prolonged exposure to digital services may not produce uniform literacy across domains.

Sociodemographic factors were selected because previous evidence indicates that digital health literacy is socially patterned rather than evenly distributed across populations. A systematic review and meta-analysis of the sociodemographic determinants of digital health

literacy found that age had a negative effect on digital health literacy, whereas higher educational level, higher income, and social support tended to have positive effects [14]. Age was included because older users may face greater difficulty in using digital health services, particularly when digital skills, confidence, and access to support are limited. This is supported by a study among older adults living alone in South Korea, which found that digital health literacy was significantly associated with age and educational level, with older age associated with lower digital health literacy and higher education associated with better literacy [15]. Educational attainment was included because it may influence users' ability to understand health information, interpret digital instructions, and complete health-related tasks. Monthly income was included because socioeconomic resources may affect access to digital devices and internet connectivity, as well as opportunities to obtain health information. Evidence from primary health care users in Montenegro also showed that health literacy was associated with demographic and socioeconomic factors, with low income remaining significantly associated with limited health literacy after adjustment [16]. For these reasons, age, educational level, and monthly income were selected as key sociodemographic variables in this study.

This study aimed to describe the overall level and domain-specific profile of digital health literacy among primary care e-health users in Surabaya and to examine its associations with age, educational attainment, and monthly income. The novelty of this study lies in its focus on domain-specific digital health literacy and functional engagement in a long-standing municipal e-health context in an LMIC primary care setting. By distinguishing technology adoption from functional engagement, this study seeks to inform the development of more inclusive, usable, and patient-centred digital health services in primary care.

Materials and Methods

This study employed a cross-sectional design to assess digital health literacy among users of e-health services in a primary care setting. The study was conducted at a community health centre (Puskesmas) in an urban area of Surabaya, Indonesia. Puskesmas serve as the first point of contact in the national primary healthcare system and have integrated e-health services into routine service delivery as part of Surabaya's long-standing municipal digitalisation initiative. The study population consisted of adult patients and accompanying family members with prior experience using e-health services at the selected facility. Respondents were recruited through purposive sampling because the study required participants who had previously used e-health services and could provide relevant responses regarding digital health literacy and functional engagement.

A total of 100 respondents were included. This sample size was considered adequate for the exploratory descriptive aim of the study, which was to profile overall and domain-specific digital health literacy and to examine preliminary associations with selected

sociodemographic factors, rather than to estimate population prevalence or test causal relationships. Inclusion criteria were: (1) aged 18 years or older; (2) prior use of e-health services at the facility; and (3) willingness to participate. Individuals unable to complete the questionnaire, either independently or with assistance, were excluded. Data were collected using a structured, self-administered questionnaire. For respondents who had difficulty completing the questionnaire independently, particularly older adults, trained data collectors provided assistance to ensure comprehension without influencing their responses. Prior to data collection, respondents were informed of the study objectives, the voluntary nature of participation, and data confidentiality, and verbal informed consent was obtained.

Digital health literacy was assessed using a questionnaire based on the eHealth Literacy Questionnaire (eHLQ), a multidimensional instrument developed and initially validated by Kayser et al. [12]. The questionnaire covered seven domains: using technology to process health information; understanding health concepts and language; ability to actively engage with digital services; feeling safe and in control; motivation to engage with digital services; access to digital services that work; and digital services that suit individual needs. In the present study, the questionnaire consisted of 24 Likert-type items scored from 1 to 4, where higher scores indicated higher digital health literacy. One nominal question regarding the most frequently used type of e-health service was analysed descriptively and was not included in the digital health literacy score.

Overall digital health literacy was calculated by summing the 24 Likert-type items, producing a possible total score range of 24 to 96. The total score was categorised into three levels using equal score intervals: low (24–48), moderate (49–72), and high (73–96). Domain-level descriptive scores were calculated as the mean of the relevant Likert-type items within each domain, with higher mean values indicating higher digital health literacy in that domain. For categorical presentation, domain-level summed scores were classified into low, moderate, and high categories using equal intervals according to each domain's possible score range.

The original eHLQ has demonstrated initial validity in previous research [12]. In this study, internal consistency of the questionnaire in the present sample was assessed using Cronbach's alpha. This reliability assessment was used to describe item consistency in the study sample and was not intended as a full local psychometric validation of the eHLQ. Descriptive statistics were used to summarise respondent characteristics and digital health literacy scores. Frequencies and percentages were used for categorical variables, while means and standard deviations were used to describe overall and domain-level digital health literacy scores. Associations between digital health literacy and sociodemographic variables, including age, educational level, and monthly income, were examined using Kendall's tau-b correlation. Kendall's tau-b was selected because the variables were ordinal or ordinally categorised and

the analysis aimed to assess monotonic associations without assuming normal distribution. Statistical significance was set at $p < 0.05$. Analyses were conducted using JASP version 0.95.1.

Results

Table 1 presents the sociodemographic characteristics of the 100 respondents. Most respondents were aged 20–40 years (51%), followed by those aged 40–60 years (35%) and over 60 years (13%), while only 1% were younger than 20 years. In terms of educational attainment, nearly half of the respondents had completed senior high school (46%), followed by higher education (36%), junior high school (16%), and primary school (2%). Monthly income was distributed across all categories, with the largest proportion earning IDR 2.5–3.5 million (36%), followed by IDR 1.5–2.5 million (27%), more than IDR 3.5 million (23%), and less than IDR 1.5 million (14%). Overall, the respondents represented a heterogeneous group of primary care users, with variation in age, education, and income.

Table 1. Sociodemographic characteristics of respondents (n = 100)

Characteristic	Category	n	%
Age group (years)	<20	1	1
	20–40	51	51
	40–60	35	35
	>60	13	13
Educational level	Primary school	2	2
	Junior high school	16	16
	Senior high school	46	46
	Higher education	36	36
Monthly income	< IDR 1.5 million	14	14
	IDR 1.5–2.5 million	27	27
	IDR 2.5–3.5 million	36	36
	> IDR 3.5 million	23	23

The questionnaire showed very high internal consistency in the present sample, with an overall Cronbach's alpha of 0.982 (95% CI: 0.978–0.986). Domain-level Cronbach's alpha values ranged from 0.890 to 0.983.

As indicated in Table 2, overall digital health literacy was generally moderate to high. The largest proportion of respondents was in the high category (39%), followed by the moderate category (36%), while 25% were classified as having low digital health literacy.

Table 2. Overall digital health literacy level among respondents (n = 100)

Digital health literacy level	Composite score range	n	%
Low	24-48	25	25
Moderate	49-72	36	36
High	73-96	39	39

Overall digital health literacy was classified using a composite score derived from the summed item scores. Based on the predefined scoring criteria, total scores of 24–48 were categorised as low, 49–72 as moderate, and 73–96 as high digital health literacy. Although most respondents demonstrated at least moderate digital health literacy, the presence of one-

quarter in the low category suggests that prolonged exposure to e-health services has not consistently translated into adequate user capacity across the population.

Table 3 presents the mean scores and categorical distribution of digital health literacy across the seven eHLQ domains. Overall, most domains showed a predominantly moderate profile, although the mean scores varied across domains. The highest mean score was observed in the domain of "understanding health concepts and language" (3.14 ± 0.62), followed by "feel safe and in control" (3.06 ± 0.67), indicating relatively stronger literacy in understanding health-related information and perceived control when using digital services. In contrast, the lowest mean score was found in the domain of "ability to actively engage with digital services" (2.46 ± 0.98), which also had the highest proportion of respondents in the low category (41%). The domain of "using technology to process health information" also showed a relatively weak profile, with 37% of respondents in the low category. These findings suggest that the main digital health literacy gaps were concentrated in functional domains related to active engagement, navigation, and information processing, rather than in basic understanding of health concepts or perceived safety.

Table 3. Distribution of digital health literacy levels across eHLQ domains (n = 100)

eHLQ Domain	Mean ± SD	Low n (%)	Moderate n (%)	High n (%)
Using technology to process health information	2.70 ± 1.01	37 (37)	34 (34)	29 (29)
Understanding health concepts and language	3.14 ± 0.62	10 (10)	60 (60)	30 (30)
Ability to actively engage with digital services	2.46 ± 0.98	41 (41)	42 (42)	17 (17)
Feel safe and in control	3.06 ± 0.67	17 (17)	56 (56)	27 (27)
Motivated to engage with digital services	2.65 ± 0.94	36 (36)	43 (43)	21 (21)
Access to digital services that work	2.86 ± 0.92	26 (26)	44 (44)	30 (30)
Digital services that suit individual needs	2.73 ± 0.93	31 (31)	45 (45)	24 (24)

Table 4 presents Kendall's tau-b correlations between sociodemographic factors and digital health literacy. Age showed a weak negative and statistically significant association with digital health literacy ($\tau^b = -0.322$, $p < 0.001$), indicating that digital health literacy tended to decrease with increasing age.

Table 4. Kendall's tau-b correlations between sociodemographic factors and digital health literacy (n = 100)

Variable	Kendall's τ^b	p-value	Interpretation
Age	−0.322	<0.001	Weak negative association; digital health literacy tended to decrease with increasing age.
Educational level	0.276	<0.001	Weak positive association; higher educational attainment was associated with higher digital health literacy.
Monthly income	0.148	0.054	Very weak positive association that did not reach statistical significance.

Educational level showed a weak positive and statistically significant association ($\tau^b = 0.276$, $p < 0.001$), suggesting that respondents with higher educational attainment tended to have

higher digital health literacy. Monthly income showed a very weak positive association that did not reach statistical significance ($\tau^b = 0.148$, $p = 0.054$). These findings suggest that age and education were more closely related to digital health literacy than income in this primary care sample.

Discussions

Digital health literacy among primary care users in this study was generally moderate to high, although one-quarter of respondents remained in the low category. The domain-level findings provide a more nuanced interpretation than the overall score alone. The highest mean scores were observed in the domains of understanding of health concepts and language and feeling safe and in control, whereas the lowest mean score was found in the ability to actively engage with digital services, followed by relatively low performance in using technology to process health information. A comparable pattern was reported among Spanish primary healthcare users, who scored highest in understanding health concepts and feeling safe and in control, while lower scores were observed for using technology to process health information and actively engaging with digital services [17].

These findings suggest that the main digital health literacy gap in this setting was not limited to access or general acceptance of digital services, but was concentrated in domains requiring active navigation, information processing, and functional interaction with the e-health system.

These domain-specific patterns can be interpreted through the eHLF, which conceptualises e-health literacy as a multidimensional interaction between users' capabilities, their engagement with technologies, and the fit between digital services and individual needs [12]. In this study, respondents appeared relatively stronger in health-related understanding and perceived safety, but weaker in domains that require users to process digital information and act independently within the system. Validation research using the eHLQ has similarly demonstrated that dimensions of e-health literacy vary according to users' information and communication technology use, supporting the interpretation of individual domains rather than treating digital health literacy as a single uniform capability [29]. This distinction is important because users may feel safe using e-health services and understand health-related language while still experiencing difficulty completing digital tasks without assistance. Thus, the findings support the value of assessing digital health literacy by domain rather than relying only on a total score.

The results are broadly consistent with international studies showing that digital health access does not automatically translate into meaningful engagement. A population-based primary care study in Ontario found limited uptake of some digital health functions and no consistent relationship between digital health access and patient experience [18]. Similarly,

studies of digital experience in primary care have shown that usability, support, and integration into routine care influence whether digital services are experienced as useful and accessible [19]. Evidence from England also highlights the role of digital facilitation in helping patients use online primary care services, particularly when patients face navigational or confidence-related barriers [20]. Furthermore, an Australian population-based study found that all seven eHLQ domains were associated with the use of a national web-based personal health record, with particularly strong associations for active engagement with digital services and using technology to process health information [21]. Compared with these studies, the present study adds evidence from a long-standing municipal e-health context in a low- and middle-income country setting, where the service has been available for years but functional engagement remains uneven across literacy domains.

The associations between sociodemographic factors and digital health literacy should be interpreted as correlational rather than causal. Age was weakly and negatively associated with digital health literacy, while educational level showed a weak positive association. These findings are consistent with previous studies suggesting that older adults may experience greater difficulty with digital navigation and that education may support health information processing and digital confidence [22], [23]. A recent scoping review similarly identified age, education, previous digital experience, access to digital devices, social support, and other contextual characteristics as important influences on digital health literacy among older adults [24]. However, the strength of these associations was modest, suggesting that age and education should not be viewed as the only explanations for differences in digital health literacy. Monthly income showed a very weak positive association that did not reach statistical significance, suggesting that economic status alone may be insufficient to explain digital health literacy in this primary care sample. This aligns with broader evidence that digital health inequalities are shaped not only by socioeconomic position but also by usability, service design, support systems, and inclusive digital health policies [25]–[28].

From a public health and primary care perspective, the findings suggest that e-health evaluation should move beyond measuring access, registration, or system availability. The weaker domains identified in this study point to the need for digital services that are easier to navigate, clearer in their presentation of health information, and supported by appropriate assistance within routine primary care workflows. Educational support may be particularly relevant because a meta-analysis of digital health literacy interventions among older adults found improvements in e-health literacy following structured interventions, with face-to-face and theoretically guided approaches showing promising effects [29]. This indicates that lower digital health literacy should not necessarily be regarded as a fixed individual limitation but as a potentially modifiable capability.

This is consistent with evidence from primary care settings showing that successful digital health use is shaped not only by technology itself but also by social and personal factors, technical and material conditions, organisational and policy support, and the preservation of trust and continuity of care in patient-provider relationships [30]. A scoping review of person-centredness in digital primary healthcare similarly identified accessibility, self-management, situation awareness, and potential tensions between digitalisation and patient-centred care as central considerations in service design [31]. Therefore, digital transformation should be evaluated not only in terms of technical efficiency but also according to whether services accommodate different user capabilities and preferences.

This interpretation is also consistent with primary care digital health literature, which emphasises that digital health innovation should not be viewed merely as technology deployment but as service redesign involving patient-centred models of care, provider readiness, workflow integration, and patient-provider co-design [32]. An overview of reviews on digital primary healthcare found that common implementation barriers included limited involvement of end users in technology development and inadequate digital training for both healthcare professionals and patients [33][34]. These findings reinforce the importance of designing digital health services around actual user needs rather than assuming that availability alone will result in effective use.

The most important practical implication is therefore not simply to expand digital access but to strengthen functional engagement through user-centred design, staff-assisted navigation when needed, and hybrid service pathways for users who cannot yet use digital services independently. Recent systematic-review evidence among older adults with chronic conditions indicates that tailored training, accessible technology design, healthcare-provider support, and hybrid models combining digital and conventional care can facilitate digital health adoption [35]. These approaches may help ensure that e-health implementation improves access without excluding users with lower digital health literacy.

Conclusion

This study found that digital health literacy among primary care e-health users in Surabaya was generally moderate to high, but important domain-specific gaps remained. The weakest domains were the ability to actively engage with digital services and use technology to process health information, indicating that long-term service availability does not necessarily ensure functional engagement. Age was negatively associated with digital health literacy, educational attainment was positively associated, and monthly income was not statistically significant. These findings highlight the need to move beyond measuring digital access alone and to strengthen usability, user support, and inclusive service pathways in primary care e-health implementation.

Limitation and Suggestions

Several limitations should be acknowledged. First, this single-site study in an urban Puskesmas in Surabaya may limit generalisability to other primary care settings. Second, purposive sampling of respondents with prior e-health experience may have introduced selection bias and excluded individuals with low digital access, potentially overestimating digital health literacy. Third, the sample of 100 respondents limits the precision of subgroup comparisons and supports interpreting the findings as exploratory. Fourth, self-reported digital health literacy may be affected by social desirability bias and may not reflect actual performance. Assistance provided during questionnaire completion may also have influenced responses. Fifth, the study did not conduct full local psychometric validation of the eHLQ. Finally, the cross-sectional design prevents causal inference. Future research should include larger, multi-site, probability-based samples, involve both e-health users and non-users, incorporate task-based assessments, and use longitudinal and qualitative approaches to better understand digital health literacy over time.

Ethical Considerations

Ethical approval was obtained from the Health Research Ethics Committee of STIKES Yayasan Rumah Sakit Dr. Soetomo, Surabaya, Indonesia, under certificate number KEPK/YRSDS/088/IX/2024, dated 17 September 2024.

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Conflict of Interest

The authors declare no conflict of interest.

References

[1] B. Sylla, O. Ismaila, and G. Diallo, "25 years of digital health toward universal health coverage in low- and middle-income countries: Rapid systematic review," *J. Med. Internet Res.*, vol. 27, Art. no. e59042, 2025, doi: 10.2196/59042.

[2] N. Rastogi, "Healthcare's new frontier: The digital front door," *BMJ Innov.*, vol. 8, no. 2, pp. 129–132, 2022, doi: 10.1136/bmjinnov-2021-000874.

[3] N. H. Mufidah, H. D. L. Putri, L. Schwermer, and R. H. Sajida, "Implementation of digital health services to improve public health: Challenges with the JKN Mobile App," *J. Social Dyn. Governance*, vol. 2, no. 2, pp. 63–72, 2025, doi: 10.26740/jsdg.v2i2.36652.

[4] I. Luthfi, D. Rahmadanik, and M. K. Widiyanto, "Implementasi E-Health dalam melayani pasien di Puskesmas Kalirungkut Kota Surabaya," *PRAJA Observer: J. Penelitian Administrasi Publik*, vol. 4, no. 1, 2024. [Online]. Available: https://aksiologi.org/index.php/praja/article/view/1300

[5] R. R. Yusuf and A. D. Fadhilah, "Surabaya e-Health sebagai bentuk reformasi kebijakan publik di Indonesia pada sektor pelayanan publik," in *Proc. Konferensi Nasional Ilmu Administrasi*, Bandung, Indonesia, 2023, pp. 316–323. [Online]. Available: https://knia.stialanbandung.ac.id/index.php/knia/article/view/891

[6] N. Jasmine and B. N. Harmawan, "Efektivitas implementasi E-Health di Puskesmas Kedungdoro dan Puskesmas Keputih Surabaya," *J. Ilm. Tata Sejuta STIA Mataram*, vol. 11, no. 1, pp. 17–37, 2025, doi: 10.32666/tatasejuta.v11i1.656.

[7] T. S. A. D. Martha and T. N. Rochmah, "Community satisfaction on the utilization of e-health information system in Surabaya City," *Public Health Perspective J.*, vol. 6, no. 3, 2021. [Online]. Available: https://journal.unnes.ac.id/nju/phpj/article/view/32939

[8] C. S. Elisabet U. B., S. Hartono, and A. I. Rochim, "Analisis efektivitas dan efisiensi penerapan E-Health dalam pelayanan kesehatan di Puskesmas Benowo," *PRAJA Observer: J. Penelitian Administrasi Publik*, vol. 4, no. 5, pp. 116–124, 2024, doi: 10.69957/praob.v4i05.1643.

[9] D. F. Saputri, "Implementasi layanan E-Health dalam meningkatkan kinerja pelayanan kesehatan di Puskesmas Pucang Sewu Kota Surabaya," vol. 9, 2020. [Online]. Available: https://jurnalmahasiswa.stiesia.ac.id/index.php/jira/article/view/3660

[10] M. I. H. Setiawan, R. A. S. Prayoga, and A. Kusumawati, "Analisis kualitas layanan E-Health Surabaya: Pendekatan integratif E-Servqual dan importance performance analysis (IPA)," *J. Sist. Inf. Inform.*, vol. 7, no. 2, pp. 255–267, 2024, doi: 10.47080/simika.v7i2.3409.

[11] A. Dondapati, R. K. Dehury, G. Acharyulu, S. Kandamuthan, and S. Ayaluri, "Acceptance of digital health technologies in health and aged care: A systematic review and meta-analysis," *Health Care Manage. Rev.*, vol. 51, no. 3S, pp. S42–S55, 2026, doi: 10.1097/HMR.0000000000000486.

[12] L. Kayser *et al.*, "A multidimensional tool based on the eHealth literacy framework: Development and initial validity testing of the eHealth Literacy Questionnaire (eHLQ)," *J. Med. Internet Res.*, vol. 20, no. 2, Art. no. e36, 2018, doi: 10.2196/jmir.8371.

[13] S. S. Kaboré *et al.*, "Barriers and facilitators for the sustainability of digital health interventions in low- and middle-income countries: A systematic review," *Front. Digit. Health*, vol. 4, 2022, doi: 10.3389/fdgth.2022.1014375.

[14] M. Estrela, G. Semedo, F. Roque, P. L. Ferreira, and M. T. Herdeiro, "Sociodemographic determinants of digital health literacy: A systematic review and meta-analysis," *Int. J. Med. Inform.*, vol. 177, Art. no. 105124, 2023, doi: 10.1016/j.ijmedinf.2023.105124.

[15] M. Hwang, G. Kim, S. Lee, and Y.-H. Park, "Digital health literacy and associated factors among older adults living alone in South Korea: A cross-sectional study," *Res. Community Public Health Nurs.*, vol. 35, p. 389, 2024, doi: 10.12799/rcphn.2024.00766.

[16] A. Rastoder Celebic *et al.*, "Association of health literacy with sociodemographic factors and medication adherence among primary health care users in Montenegro," *Healthcare*, vol. 14, no. 3, Art. no. 374, 2026, doi: 10.3390/healthcare14030374.

[17] D. García-García, M. J. Ajejas Bazán, and F. J. Pérez-Rivas, "Factors influencing eHealth literacy among Spanish primary healthcare users: Cross-sectional study," *Int. J. Environ. Res. Public Health*, vol. 19, no. 23, Art. no. 15497, 2022, doi: 10.3390/ijerph192315497. Studi ini sangat relevan karena pola domain eHLQ-nya hampir sama dengan hasil penelitian Anda.

[18] Z. Pasat *et al.*, "The relationship between patient experience and real-world digital health access in primary care: A population-based cross-sectional study," *PLoS ONE*, vol. 19, no. 5, 2024, doi: 10.1371/journal.pone.0299005.

[19] M. A. Choy *et al.*, "Evaluating the digital health experience for patients in primary care: Mixed methods study," *J. Med. Internet Res.*, vol. 26, 2024, doi: 10.2196/50410.

[20] B. M. Treadgold *et al.*, "Use of digital facilitation to support the use of digital services in general practice in England: An interview study with key stakeholders," *J. Health Serv. Res. Policy*, vol. 30, no. 3, pp. 161–170, 2025, doi: 10.1177/13558196251316446.

[21] C. Cheng, E. Gearon, M. Hawkins, C. McPhee, L. Hanna, R. Batterham, and R. H. Osborne, "Digital health literacy as a predictor of awareness, engagement, and use of a national web-based personal health record: Population-based survey study," *J. Med. Internet Res.*, vol. 24, no. 9, Art. no. e35772, 2022, doi: 10.2196/35772.

[22] M. H. Algifari, L. Zachary, R. P. Yuliani, H. Aditama, and S. A. Kristina, "Digital health literacy and its associated factors in general population in Indonesia," *Indonesian J. Pharm.*, pp. 355–362, 2024, doi: 10.22146/ijp.5640.

[23] C. A. N. Malarvizhi, A. Al Mamun, M. N. H. Reza, and M. M. Masud, "Ageing well with tech: Exploring the determinants of e-healthcare services adoption in an emerging economy," *Digit. Health*, vol. 10, 2024, doi: 10.1177/20552076241272577.

[24] Z. Shi, X. Du, J. Li, R. Hou, J. Sun, and T. Marohabutr, "Factors influencing digital health literacy among older adults: A scoping review," *Front. Public Health*, vol. 12, Art. no. 1447747, 2024, doi: 10.3389/fpubh.2024.1447747.
[25] N. Goldberg *et al*., "Sociodemographic and socioeconomic determinants for the usage of digital patient portals in hospitals: Systematic review and meta-analysis on the digital divide," *J. Med. Internet Res.*, vol. 27, 2025, doi: 10.2196/68091.
[26] P. Sharma and C. A. Patten, "A need for digitally inclusive health care service in the United States: Recommendations for clinicians and health care systems," *Perm. J.*, vol. 26, no. 3, pp. 149–153, 2022, doi: 10.7812/TPP/21.156.
[27] J. Shaw and W. Glover, "The political economy of digital health equity: Structural analysis," *J. Med. Internet Res.*, vol. 26, 2024, doi: 10.2196/46971.
[28] J. A. Coetzer, N. S. Goedhart, T. J. Schuitmaker-Warnaar, C. Dedding, and T. Zuiderent-Jerak, "Health equity in the digital age: Exploring health policy and inclusive digital care," *Health Policy Technol.*, vol. 14, no. 5, 2025, doi: 10.1016/j.hlpt.2025.101039.
[29] Q. Dong, T. Liu, R. Liu, H. Yang, and C. Liu, "Effectiveness of digital health literacy interventions in older adults: Single-arm meta-analysis," *J. Med. Internet Res.*, vol. 25, Art. no. e48166, 2023, doi: 10.2196/48166.
[30] K. P. Sze, Q. W. Fong, J. G. De Roza, E. S. Lee, and S. Y. Tan, "Exploring physicians' perceptions of digital health's impact on the patient-physician relationship in the primary health care setting: Qualitative descriptive study," *J. Med. Internet Res.*, vol. 26, 2024, doi: 10.2196/53705.
[31] A.-C. Linqvist Leonardsen, C. Bååth, A. K. Helgesen, V. A. Grøndahl, and C. Hardeland, "Person-centeredness in digital primary healthcare services—A scoping review," *Healthcare*, vol. 11, no. 9, Art. no. 1296, 2023, doi: 10.3390/healthcare11091296.
[32] A. L. Neves and L. Laranjo, Eds., *Digital Health for Primary Care*, 1st ed. Boca Raton, FL, USA: CRC Press, 2025, doi: 10.1201/9781003610519.
[33] V. M. D. Fava and L. V. Lapão, "Provision of digital primary health care services: Overview of reviews," *J. Med. Internet Res.*, vol. 26, Art. no. e53594, 2024, doi: 10.2196/53594.
[34] J. Hepburn, L. Williams, and L. McCann, "Barriers to and facilitators of digital health technology adoption among older adults with chronic diseases: Updated systematic review," *JMIR Aging*, vol. 8, Art. no. e80000, 2025, doi: 10.2196/80000.
[35] C. Cheng, G. Elsworth, and R. H. Osborne, "Validity evidence based on relations to other variables of the eHealth Literacy Questionnaire (eHLQ): Bayesian approach to test for known-groups validity," *J. Med. Internet Res.*, vol. 23, no. 10, Art. no. e30243, 2021, doi: 10.2196/30243.

Authors



Titin Wahyuni is a lecturer at the Diploma Programme in Medical Records and Health Information, STIKES Yayasan RS Dr. Soetomo, Surabaya, Indonesia. She holds the academic rank of *Lektor* and serves as Head of the Program of Study of Medical Records and Information Management. Her academic and research interests include medical records, health information management, digital health literacy, and primary healthcare information systems. (email: titin@stikes-yrsds.ac.id).



Eka Wilda Faida is a lecturer at the Diploma Programme in Medical Records and Health Information, STIKES Yayasan RS Dr. Soetomo, Surabaya, Indonesia. She holds the academic rank of *Lektor Kepala* and serves as Vice Chair for Academic Affairs of STIKES Yayasan RS Dr. Soetomo. Her areas of expertise include health management, medical records, health information management, and organisational management. (email: ekawildafaida@gmail.com).



Alfina Aisatus Saadah is a lecturer at the Diploma Programme in Medical Records and Health Information, STIKES Yayasan RS Dr. Soetomo, Surabaya, Indonesia. She holds the academic rank of *Lektor*. Her academic interests include health information management, medical records, maternal and public health, and healthcare service improvement. (email: aisatusalfina@gmail.com).



Krisnita Dwi Jayanti is a lecturer in the Bachelor of Public Health Program at IIK Bhakti Wiyata Kediri. She holds the academic rank of *Lekto*r. She is listed as a lecturer in the Epidemiology specialisation within the Public Health Study Program. (email: krisnita.jayanti@iik.ac.id).