

Research Article

The Effectiveness of Family-Based Digital Health Literacy in Improving Self-Health Monitoring in Active Farmers with Limited Mobile Phone Access

Supriadi^{1*}, Nur Aisyah², Indri Maydani³, Sukmawati⁴, Ulfarida⁵¹⁻⁵Prodi S1 Keperawatan STIKes Marendeng Majene*Author Correspondence: supriadi.ufvy.lnn@gmail.com

Abstract. Active farmers are a group of workers at risk of experiencing various health problems due to physical workload, environmental exposure, and limited access to health information. Low digital health literacy and limited mobile phone ownership mean that self-health monitoring has not been carried out optimally. One effort to overcome this problem is through family-based digital health literacy. This study aims to analyze the effectiveness of family-based digital health literacy on improving self-health monitoring in active farmers who have limited access to mobile phones. This study used a Pre-Experimental Design with a One Group Pretest-Posttest Design approach. The study sample consisted of 32 active farmers selected using purposive sampling. Data were collected using a family-based digital health literacy questionnaire and analyzed univariately and bivariately using the Wilcoxon Signed Rank Test with a significance level of $\alpha = 0.05$. The results showed that 17 respondents (53.1%) experienced an increase in digital health literacy scores after the intervention, while 15 respondents (46.9%) had scores that remained the same. The results of the Wilcoxon Signed Rank Test showed a Z value of -4.123 with Asymp. Sig. (2-tailed) = 0.000 ($p < 0.05$), indicating a significant difference between pre- and post-intervention scores. It was concluded that family-based digital health literacy effectively improved digital health literacy as an effort to support self-health monitoring in active farmers with limited access to mobile phones. This intervention can be used as a family-based health promotion strategy in community nursing practice, especially in rural communities.

Keywords: Active Farmers; Community Nursing; Digital Health Literacy; Family; Self-Health Monitoring.

Received: February 15, 2026

Revised: April 20, 2026

Accepted: June 28, 2026

Published: July 30, 2026

Curr. Ver.: July 30, 2026



Copyright: © 2025 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY SA) license (<https://creativecommons.org/licenses/by-sa/4.0/>)

1. Introduction

Farmers are a productive group that makes a significant contribution to national food security, but they are also a vulnerable group of workers experiencing various health problems due to the characteristics of their work. Agricultural activities require heavy physical work, are carried out repeatedly, and last for long periods in open environments, increasing the risk of musculoskeletal disorders, work fatigue, pesticide exposure, injuries from the use of agricultural equipment, and health problems triggered by extreme environmental temperatures. Furthermore, farmers in rural areas generally still face limited access to health services, health information, and digital technology that can support disease prevention efforts and self-monitoring of their health. These conditions make farmers one of the groups that require special attention in the development of community-based health promotion programs (National Institute for Occupational Safety and Health [NIOSH], 2024; World Health Organization [WHO], 2024).

In carrying out their daily activities, most farmers prioritize working in the fields over routinely monitoring their health. Health monitoring, such as checking blood pressure, monitoring fatigue, muscle and joint pain, hydration status, diet, and recognizing warning signs of disease, is often not part of their daily routine. This is influenced by high physical workloads, limited time, limited access to health information, and the lack of use of digital health

technology in rural areas. Yet, self-monitoring is a crucial preventive behavior for early detection of health problems and preventing complications. Various international reports indicate that strengthening primary health care services and utilizing digital technology are important strategies for reducing health disparities in rural communities (WHO, 2024; FAO, 2024).

The development of digital technology has opened up enormous opportunities to increase public access to health information. Through the internet, health apps, social media, and digital education platforms, people can obtain information on disease prevention, healthy lifestyles, and self-monitoring their health. However, the benefits of this technology are greatly influenced by an individual's level of digital health literacy. The World Health Organization explains that digital health literacy is a person's ability to search for, find, understand, evaluate, and use health information from electronic sources to support informed health decision-making. Individuals with good digital health literacy tend to be better able to utilize digital health services, avoid misinformation, and adopt better health behaviors than those with low digital health literacy (WHO, 2024).

In Indonesia, the use of information technology continues to show an upward trend. Data from the Central Statistics Agency (BPS) shows that the proportion of the population accessing the internet has increased year after year, including in rural areas. However, this increase in internet access has not been fully accompanied by an equal distribution of people's ability to utilize digital technology for health purposes. The digital divide persists among groups with low levels of education, limited income, the elderly, and those living in rural areas. This gap prevents some people from utilizing digital technology as a reliable source of health information, potentially undermining efforts to improve public health (BPS, 2025; WHO, 2024).

For farmers who do not have personal mobile phones or are unable to use smartphones independently, families play a crucial role as a liaison in obtaining digital health information. Technologically literate family members can assist in finding health information, explaining the information in easy-to-understand language, assisting in the use of health applications, and encouraging the application of the information in daily life. Family involvement also serves as a form of emotional, informational, and instrumental support that can increase individual motivation to adopt healthy lifestyle behaviors. In the context of community nursing, a family-based approach is seen as an effective strategy for improving health literacy while strengthening community independence in managing their health (Pailaha, 2023; Wilandika et al., 2023).

Family-based digital health literacy is a relevant approach for rural communities because it can bridge the gap in technology access still experienced by some farmers. Recent research shows that digital literacy and health literacy are significantly associated with digital health behaviors in rural communities. Individuals with better digital and health literacy tend to be more active in utilizing digital health services, seeking valid health information, and conducting self-monitoring of their health. Conversely, low digital literacy contributes to the widening health gap between urban and rural communities. Therefore, strengthening digital health literacy through family involvement is a strategy with the potential to improve self-monitoring behaviors among active farmers with limited access to mobile phones (Ji et al., 2024; FAO, 2024).

A common problem is that active farmers are not accustomed to routinely monitoring their health. Furthermore, limited access to mobile phones and poor ability to sort through digital health information can lead to farmers lacking appropriate health education. Therefore, a family-based digital health literacy strategy is needed to ensure farmers can still access health information even without personal mobile phones.

This research focuses on the limited number of studies addressing digital health literacy among active farmers, particularly those with limited access to mobile phones. Previous research generally focuses on individuals as direct users of technology, whereas in the context of farming communities, digital access often relies on family members. Furthermore, technology use among farmers is primarily associated with agricultural productivity, rather than self-monitoring of health. Therefore, this study addresses this gap by offering a family-based digital health literacy approach as a strategy to improve farmers' ability to monitor their health simply, independently, and sustainably.

The novelty of this research is the use of a family-based digital health literacy approach as a strategy to improve self-health monitoring among active farmers who do not own or have limited use of mobile phones. This approach positions the family as a digital health

companion, ensuring that health information remains accessible and applicable to farmers despite limited individual access to technology.

A preliminary survey conducted in Darma Village found that some active farmers lack the habit of routinely monitoring their health and still rely on family members to access information via mobile phones. This situation reinforces the need for research on family-based digital health literacy as a strategy to improve self-health monitoring among active farmers. Based on these conditions, this study is crucial to determine whether family-based digital health literacy can improve self-health monitoring among active farmers with limited mobile phone access.

2. Method

This study used a quasi-experimental design with a one-group pre-test and post-test design approach. The study was conducted by measuring farmers' self-health monitoring abilities before and after being given a family-based digital health literacy intervention. The study was planned to be carried out in the farming community area in the Village/Sub-district: Darma, Pekkabata Community Health Center working area, Polewali Mandar Regency. Research period: May - July 2026. The population in this study were all active farmers in the Pekkabata Community Health Center area and had limited access to mobile phones, totaling 58 people. The research sample was some of the active farmers who met the inclusion criteria, totaling 32 people. The sampling technique can use purposive sampling. This study used several instruments consisting of respondent characteristics instruments, family-based digital health literacy instruments, farmer self-health monitoring instruments, and observation sheets for intervention implementation. Data analysis used the Wilcoxon Signed Rank Test.

3. Results and Discussion

Respondent Characteristics Analysis

Table 1. Frequency distribution of characteristics of research respondents (N=32).

Category	n	%
Age		
20-35 years	17	53.1
>35 years	15	46.9
Gender		
Man	23	71.9
Woman	9	28.1
Education		
Low	22	68.8
Tall	10	31.3
Long Farming		
≤10 years	17	53.1
>10 years	15	46.9
HP Ownership		
No	17	53.1
Yes	15	46.9
Total	32	100.0

Source: Primary Data 2026.

Based on Table 1, it is known that of the 32 respondents, most are in the 20–35 years age group, namely 17 respondents (53.1%), while respondents aged over 35 years are 15 respondents (46.9%). Gender data shows that most respondents are male, namely 23 respondents (71.9%), while female respondents are 9 respondents (28.1%). Education data shows that most respondents have a low level of education, namely 22 respondents (68.8%), while respondents with higher education are 10 respondents (31.3%). Data on the length of farming shows that most respondents have worked as farmers for ≤10 years, namely 17 respondents (53.1%), while respondents with a work period of more than 10 years are 15 respondents (46.9%) and Data on cellphone ownership shows that most respondents do not have a cellphone, namely 17 respondents (53.1%), while respondents who have a cellphone are 15 respondents (46.9%).

Univariate Analysis

Table 2. Distribution of Family-Based Digital Health Literacy Before Intervention.

Before	n	%
Not enough	17	53.1
Enough	8	25.0
Good	7	21.9
Total	32	100.0

Table 2 shows that before the intervention, the majority of respondents had a low level of family-based digital health literacy, with 17 respondents (53.1%) having a low level of digital health literacy. Furthermore, 8 respondents (25.0%) were in the adequate category, while only 7 respondents (21.9%) were in the good category. These results indicate that before the intervention, respondents' ability to obtain, understand, and utilize digital health information was relatively low.

Table 3. Distribution of Family-Based Digital Health Literacy After Intervention.

After	n	%
Not enough	7	21.9
Enough	11	34.4
Good	14	43.8
Total	32	100.0

Table 3 shows that after the intervention, the majority of respondents were in the good category, namely 14 respondents (43.8%). Eleven respondents (34.4%) were in the adequate category, while the number of respondents in the poor category decreased to 7 respondents (21.9%). These results indicate a shift in the distribution of family-based digital health literacy categories towards the better after the intervention.

Bivariate Analysis

Table 4. Effectiveness of Family-Based Digital Health Literacy on Improving Self-Health Monitoring in Active Farmers with Limited Mobile Phone Access.

Variables	Negative Ranks n (%)	Positive Ranks n (%)	Ties n (%)	Z	Asymp. Sig. (2-tailed)
Family-based digital health literacy (Posttest–Pretest)	0 (0.0%)	17 (53.1%)	15 (46.9%)	-4.123	0.000

Wilcoxon Signed Rank Test Results

Based on Table 4, the analysis results using the Wilcoxon Signed Rank Test show that 17 respondents (positive ranks) experienced an increase in their family-based digital health literacy scores after the intervention, while no respondents (negative ranks) experienced a decrease in their scores after the intervention. Furthermore, 15 respondents (ties) had scores that remained constant before and after the intervention.

Based on the results of the Wilcoxon test, the Z value was obtained = -4.123 with Asymp. Sig. (2-tailed) = 0.000 ($p < 0.05$). These results indicate that there is a statistically significant difference between the family-based digital health literacy scores before and after the intervention. Thus, H_0 is rejected and H_1 is accepted, so it can be concluded that the family-based digital health literacy intervention has a significant effect on increasing digital health literacy in active farmers who have limited access to mobile phones.

Discussion

The results showed a significant difference between the level of family-based digital health literacy before and after the intervention. Based on the Wilcoxon Signed Rank Test results, the Z value was -4.123 with Asymp. Sig. (2-tailed) = 0.000 ($p < 0.05$). In addition, 17 respondents (53.1%) experienced an increase in their digital health literacy scores, while 15 respondents (46.9%) had scores that remained the same, and no respondents experienced a decrease in their scores. These findings indicate that family-based digital health literacy interventions can improve farmers' ability to obtain, understand, evaluate, and utilize digital health information despite limited access to mobile phones. These results support the opinion of Jackson et al. (2021) who stated that improving digital health literacy is an important strategy in realizing health equality in the era of digital transformation because individuals with good digital health literacy will more easily make the right health decisions.

The improvement in digital health literacy in this study shows that limited smartphone ownership is not the only factor determining a person's success in obtaining health information. In this study, families played a primary source of support, helping farmers access health information through digital devices owned by other family members. This condition aligns with the concept of digital health literacy, namely the ability of individuals to search for, understand, evaluate, and use health information obtained through digital media to support health decision-making. According to Pailaha (2023), rural communities generally face obstacles such as limited access to health services, low levels of education, limited resources, and the digital divide. Therefore, family- and community-based innovations are an effective strategy for improving public health literacy.

The results of this study also strengthen the Family-Centered Nursing theory, which positions the family as the primary unit in providing nursing care. Through this approach, the family plays a role in providing emotional, informational, and instrumental support, as well as monitoring the health behaviors of family members. In this study, family members assisted farmers in searching for health information via smartphones, explaining the information in easier-to-understand language, and encouraging the application of the information in daily life. According to Wilandika et al. (2023), nurses play a crucial role in improving health literacy through health education, effective communication, and family empowerment, enabling families to become active partners in improving the health status of their members.

The findings of this study align with numerous studies showing that digital technology-based interventions are more effective when combined with social and family support. In rural communities, low digital device ownership often presents a barrier to accessing health information. However, having family members with access to smartphones can mitigate this barrier through information sharing and assistance in understanding health materials. Pailaha (2023) explains that one recommended innovation for improving health literacy in rural areas is the use of digital technology combined with community- and family-based health education, allowing communities to continue to benefit from technology even when device access is limited.

Overall, the results of this study indicate that a family-based digital health literacy approach is an effective strategy for improving digital health literacy among active farmers with limited access to mobile phones. From a community nursing perspective, these findings imply that health promotion interventions should not only focus on improving individual capabilities but also optimize the potential of families as a primary source of support in the health learning process. Wilandika et al. (2023) emphasized that the success of health literacy programs is greatly influenced by the ability of health workers to empower families and communities through effective health communication. Furthermore, Pailaha (2023) stated that developing health literacy programs in rural communities requires collaboration between health workers, families, and communities to sustainably reduce the gap in access to health information.

The results of the study showed that a family-based digital health literacy intervention was able to improve digital health literacy among active farmers, even though most respondents had limited access to mobile phones. This finding indicates that the success of the intervention is not solely determined by the availability of digital devices, but also by the family's ability to facilitate access to health information. Families with smartphones act as intermediaries in searching for, filtering, and explaining health information to family members who do not have direct access to technology. This condition reinforces the concept that digital health literacy is a skill influenced by both individual and social environmental factors. Arias López et al. (2023) explain that digital literacy has developed into a new determinant of health because it affects people's ability to obtain information, access health services, and make informed decisions. Meanwhile, Pailaha (2023) emphasized that in rural communities, improving health literacy requires community- and family-based innovations to overcome the digital divide.

The success of the intervention in this study also demonstrates the importance of family support as a key component in the health learning process. A family-based approach allows for more intensive information transfer because communication is carried out by people who have emotional connections and daily interactions with the respondents. Families not only help obtain health information through digital media but also provide motivation, reminders about healthy behaviors, and support the application of that information in daily life. These findings align with the results of a *scoping review* conducted by Østergaard et al. (2023), which stated that a *family-focused nursing approach* increases the success of health intervention

implementation through active family involvement in decision-making and health behavior change. Furthermore, Wilandika et al. (2023) emphasized that family empowerment is one of the main strategies nurses use to improve public health literacy through effective health communication.

Regarding respondent characteristics, most farmers had primary to secondary education and limited smartphone ownership. These conditions are generally risk factors for low digital health literacy because individuals have limited access to, understand, and evaluate health information available online. However, the results of this study indicate that family-based interventions can reduce these barriers. This suggests that limited formal education and access to technology can be offset through collaborative learning processes within the family. Pailaha (2023) states that rural communities face various barriers to improving health literacy, such as low levels of education, limited resources, and unequal access to health services. Therefore, health interventions that involve families and communities are considered more effective than approaches that focus solely on individuals.

From a community nursing perspective, the results of this study strengthen the role of nurses as educators, facilitators, advocates, and community empowerers. Family-based digital health literacy interventions provide nurses with the opportunity to develop more contextual health education tailored to the socio-cultural conditions of rural communities. Nurses not only convey health information but also guide families in the appropriate use of digital technology, enabling families to become trusted sources of health information for their members. Wilandika et al. (2023) explain that the success of improving health literacy is greatly influenced by nurses' ability to build effective communication, increase family participation, and develop interventions tailored to community needs. On the other hand, Pailaha (2023) emphasizes that community nurses have a strategic role in reducing the health literacy gap through innovative community-based health education and the use of digital technology.

Overall, the results of this study provide evidence that family-based digital health literacy is an effective strategy for improving the ability of active farmers to access and utilize health information despite limited access to mobile phones. These findings extend previous scientific evidence that has focused more on the general population, patients with chronic diseases, and the elderly, while this study specifically examines active farmers in rural areas. Thus, this study contributes to the development of a family-based health promotion model in community nursing practice. Dong et al. (2023) reported that digital health literacy interventions consistently improved individuals' ability to use digital health technology and improved health behaviors. Furthermore, Arias López et al. (2023) stated that improving digital literacy is a key strategy for achieving health equity in the era of digital transformation because it can reduce disparities in access to health information between community groups.

Researchers assume that the success of the family-based digital health literacy intervention in this study was influenced by the active involvement of family members in assisting farmers during the learning process. Although some respondents had limited access to mobile phones or digital technology, the presence of family members who were more familiar with using smartphones enabled the effective transfer of health information. This assistance not only improved respondents' understanding of health information but also boosted their confidence in applying it in their daily lives.

4. Conclusion

Based on the results of the study on the Effectiveness of Family-Based Digital Health Literacy on Improving Self-Health Monitoring in Active Farmers with Limited Mobile Phone Access, it can be concluded that family-based digital health literacy interventions are effective in improving digital health literacy in active farmers with limited access to mobile phones. This is proven through the results of the Wilcoxon Signed Rank Test analysis which shows a significant difference between scores before and after the intervention (Asymp. Sig. (2-tailed) = 0.000; $p < 0.05$). A total of 17 respondents (53.1%) experienced an increase in digital health literacy scores after participating in the intervention, while 15 respondents (46.9%) had scores that remained the same and no respondents experienced a decrease in scores.

Reference

- Arias López, M., Fernández-Gutiérrez, M., Bas-Sarmiento, P., & Poza-Méndez, M. (2023). Digital health literacy and health equity: A systematic review. *PLOS Digital Health*, 2 (8), e0000279. <https://doi.org/10.1371/journal.pdig.0000279>
- Central Bureau of Statistics. (2025). *Indonesian telecommunications statistics 2024*. Central Bureau of Statistics.

- Dong, H., Li, Y., Zhang, X., Wang, J., & Zhao, Y. (2023). The effect of digital interventions on health literacy and health-related outcomes among individuals with chronic diseases: A systematic review and meta-analysis. *International Journal of Medical Informatics*, 177, 105114. <https://doi.org/10.1016/j.ijmedinf.2023.105114>
- Food and Agriculture Organization. (2024). *Towards digital inclusion in rural transformation*. F.A.O. <https://doi.org/10.4060/cc9816en>
- Jackson, D.N., Trivedi, N., & Baur, C. (2021). Re-prioritizing digital health and health literacy in Healthy People 2030 to affect health equity. *Health Communication*, 36 (10), 1155–1162. <https://doi.org/10.1080/10410236.2020.1748828>
- Ji, H., Dong, J., Pan, W., Yu, Y., et al. (2024). Associations between digital literacy, health literacy, and digital health behaviors among rural residents: Evidence from Zhejiang, China. *International Journal for Equity in Health*, 23, 68. <https://doi.org/10.1186/s12939-024-02150-2>
- National Institute for Occupational Safety and Health. (2024). *Agricultural safety*. Centers for Disease Control and Prevention.
- Østergaard, B., Dieperink, K. B., Mahrer-Imhof, R., & Brodsgaard, A. (2023). Family-focused nursing interventions in adult healthcare: A scoping review. *Journal of Clinical Nursing*, 32 (23–24), 7701–7720. <https://doi.org/10.1111/jocn.16848>
- Pailaha, A.D. (2023). Public health nursing: Challenges and innovations for health literacy in rural areas. *Public Health Nursing*, 40 (5), 769–772. <https://doi.org/10.1111/phn.13223>
- Wilandika, A., Pandin, MGR, & Yusuf, A. (2023). The role of nurses in supporting health literacy: A scoping review. *Frontiers in Public Health*, 11, 1022803. <https://doi.org/10.3389/fpubh.2023.1022803>
- World Health Organization. (2024). *New WHO and London School of Economics study identifies key digital factors affecting health*. WHO Regional Office for Europe.
- Yelton, B., et al. (2024). How has health literacy and digital health literacy scholarship evolved? A global qualitative study. *Health Promotion International*, 39 (5), daae123. <https://doi.org/10.1093/heapro/daae123>