Effectiveness of a Project-Based Learning Program on Health Literacy among Village Health Volunteers: A Quasi-Experimental Study

Suda Hanklang, Saisunee Lertkratoke, Suleegorn Sivasan*

Abstract: Health literacy is a critical determinant of health and a key factor in promoting empowerment and health equity. However, limited health literacy remains a persistent challenge in many rural areas of Thailand, particularly among village health volunteers, who are vital in delivering primary healthcare and health education. This study was conducted in Nakhon Ratchasima Province, where health volunteers act as key links between health services and the local population. This study investigated the effectiveness of a project-based learning program on the health literacy of village health volunteers in the community. A quasi-experimental, two-group pre-post-test design was used to compare mean scores on health literacy scales. Seventy participants were randomly assigned to either the intervention group (n = 35) or the control group (n = 35). The five-week project-based learning approach involved engaging participants in defining health-related problems, constructing and refining the project, designing and implementing solutions, and reflecting on the outcomes. Health literacy was assessed using a questionnaire, and the data were described using descriptive statistics. Two-way ANOVA was used to compare health literacy mean scores between groups and across pretesting and posttesting.

The results revealed that the mean scores for knowledge and understanding, media and information literacy, and total health literacy in the intervention group were significantly higher than those in both the pretest and the control group. These findings demonstrate the effectiveness of the project-based learning program in enhancing health literacy among the village health volunteers. This learner-centered strategy holds promise for integration into community health education initiatives led by community health nurses. Nevertheless, further validation across diverse settings, including both rural and urban areas, is essential to establish the program's generalizability and scalability.

Keywords: Health literacy, Project-based learning, Village health volunteers

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Introduction

A key factor in determining health and a vital force behind empowerment and health fairness is health literacy.[1] It can be defined as the knowledge, abilities, determination, and understanding people need to acquire, comprehend, evaluate, and employ health information in everyday lives, especially when it involves healthcare, preventing diseases, and lifelong health promotion.[2] Health literacy is pivotal in an individual's ability to manage health conditions, adhere to prescribed treatments, and make informed decisions regarding their overall well-being.[3] Insufficient health literacy has been associated with worse health outcomes, higher rates of hospitalization, and an increased probability of misunderstandings in healthcare settings.[4] Higher health literacy, on the other hand, makes people more skilled at accessing healthcare facilities, understanding insurance benefits, scheduling appointments, and advocating for their health needs, leading to improved health outcomes and reduced healthcare costs.[5]

Thailand's healthcare system at the district level focuses on investment in health delivery and training in the health workforce.[6] As part of a primary health team, village health volunteers (VHVs) are crucial to effective community involvement in primary health care. Their roles include health education, home visits, providing basic medical services, referrals, and data collection.[7]

Health literacy is critical and visible in the context of VHVs, who are often seen as key figures in providing health support within their communities.[8] Enhancing their health literacy is imperative to effectively contribute to the public health workforce and meet the evolving needs of the healthcare system.[9,10] Prior research has identified several factors influencing the health literacy of VHVs, including education level, access to health information, training opportunities, and support from healthcare professionals.[10] A study report in Japan found that volunteers with higher literacy were more active in outreach activities to family and the community.[11] Moreover, an educational intervention could improve health literacy and preventive behavior of health volunteers.[12,13]

Literacy curricula often culminate in implementing project-based activities, which provide learners with practical, meaningful experiences that facilitate acquiring and applying new knowledge.[14,15] These activities promote the internalization of health information and encourage learners to apply this knowledge in real-world contexts.[16]

It is commonly acknowledged that health literacy is a changeable factor of health that may be improved with focused interventions that increase personal competencies, lower obstacles to access to healthcare, and enhance health knowledge.[2] However, Nutbeam and Lloyd argue that addressing health literacy in isolation, particularly through downstream interventions, is insufficient to resolve the broader social inequalities that affect health outcomes.[2] While individuals can improve their health literacy, it is also critical for healthcare professionals, including VHVs, to possess a comprehensive understanding of health literacy and employ diverse strategies to support its development.

As leaders in community health, VHVs must be equipped with the knowledge and skills to access reliable health information sources and offer accurate health advice to the public.[17] However, a significant gap exists in the literature regarding strategies for promoting health literacy among VHVs, which is limited and needs further research.[10,18,19]

In this context, this study aimed to evaluate the effectiveness of a project-based learning program in enhancing the health literacy of VHVs within the community. Such projects empower learners to disseminate their newly acquired health knowledge to others in their families and communities, thereby fostering broader health education and awareness. Such initiatives are expected to improve care delivery, increase access to healthcare, and ultimately contribute to better health outcomes.

Conceptual Framework and Review of Literature

The theoretical framework used in this research was founded on project-based learning (PjBL)[20] and health literacy.[14] The idea of health literacy is constantly changing as a result of study and real-world experience. It can be seen as the individual abilities and talents that allow people to locate, comprehend, evaluate, and apply health information.[20] In Thailand, the Ministry of Health has developed a health literacy assessment tool based on principles for promoting and maintaining health, FEESA: F) Food, E) Exercise, E) Emotions, S) Smoking, and A) Alcohol consumption.[21] This tool includes six domains that assess essential health literacy skills: 1) health knowledge and understanding, 2) accessing health information and services, 3) communication for professional skill, 4) ability to manage health conditions, 5) media and information literacy, and 6) making appropriate health decisions.[21] Together, these skills empower individuals to manage their health effectively.

Poor health outcomes are more likely to occur in those with low health literacy, who struggle with managing chronic conditions, incur higher healthcare costs, and engage less in health-promoting behaviors.[3] Conversely, individuals with higher health literacy are better equipped to make educated health decisions, comprehend medical instructions, and navigate healthcare systems.[5]

VHVs are integral to disseminating health information within Thai communities and providing direct support for health-related matters.[8] As health leaders in their communities, VHVs are expected to model healthy behaviors and share accurate health information. Therefore, enhancing the health literacy of VHVs is crucial for improving community health outcomes.[17] Previous health literacy and health promotion programs emphasized educating and maintaining FEESA in Thailand, which improved the overall health literacy of VHVs.[22,23] Although previous research has demonstrated the positive impact of health literacy interventions for VHVs, translating this knowledge into consistent community-wide health promotion remains challenging.[18] The need for project-based learning (PjBL) to enhance health literacy among VHVs and facilitate its broader dissemination is increasingly recognized. Project-based learning is an instructional approach grounded in constructivist learning theories, emphasizing active exploration, and applying knowledge to real-world problems.[18] PjBL encourages learners to engage in deep, inquiry-based learning, promoting critical thinking, collaboration, and problem-solving skills.[15] The method centers around driving questions that guide inquiry, with research indicating that high-quality driving questions must be feasible, meaningful, and contextually relevant.[24] PjBL emphasizes significant learning outcomes, such as critical thinking and self-regulation, and is designed to address real-world challenges, which is particularly valuable in health education.[25] Additionally, the PJBL also increased students' information literacy skills.[26]

In the context of VHVs, by including students in the process of problem definition, inquiry, and knowledge application, PjBL can aid in the development of health literacy; by employing PjBL, VHVs are empowered to design, implement, and evaluate health projects, thereby reinforcing their health knowledge and disseminating it to the broader community.[27] Evidence from literature shows that PjBL could improve health literacy. Thus, the effectiveness of this approach can be structured around seven key steps: 1) setting health literacy goals and reviewing existing knowledge; 2) identifying meaningful health problems for project design; 3) defining and researching health issues; 4) developing and refining projects; 5) implementing projects; 6) reflecting on progress and providing feedback; and 7) evaluating outcomes and sharing findings with the community.

The PjBL approach offers a promising framework for enhancing the health literacy of VHVs and, by extension, improving public health outcomes. It fosters active learning and real-world problem-solving, addressing both the

need for health education and the challenge of applying knowledge in diverse community settings. As the PjBL model gains traction in educational settings, its potential for enhancing community health through VHVs is increasingly recognized.

Study Aim and Hypotheses

This study sought to evaluate the effectiveness of a project-based learning program to promote health literacy (PjBL-HL) among VHVs. It was hypothesized that: 1) after participating in the PjBL-HL program, the mean health literacy scores of the intervention group would be significantly higher than those before participation; and 2) after the program, participants in the intervention group would exhibit significantly higher mean health literacy scores compared to those in the control group.

Methods

Design: This quasi-experimental research used a two-group pretest/posttest design to address the research objectives. This report adheres to the Transparent Reporting of Evaluations with Nonrandomized Designs (TREND) statement checklist for quasi-experimental designs.

Sampling and Group Assignment: The sample size was determined using a G*Power analysis for F tests: ANOVA: Fixed effects, special, main effects, and interactions, with a significance level of 0.05, a power of 0.85, and an effect size of 0.40. This large effect size was justified based on theoretical expectations, the anticipated strength of the intervention, and practical constraints, such as limited access to the target population.[28] This study employed project-based learning (PjBL) as the instructional approach. PjBL has been widely recognized as a high-impact educational strategy that substantially improves learning outcomes, particularly in applied, community-based settings. Given the intervention's expected impact and the logistical constraints in recruiting participants from the target population of village health volunteers, a large effect size was considered appropriate. The power analysis indicated a minimum sample of 29 participants per group. To account for potential participant dropout, an additional 20% was added, resulting in a final target of 35 participants per group, yielding a total of 70 participants. A post-hoc power analysis was conducted based on the observed effect size, the partial eta squared = 0.103, corresponding to Cohen's f = 0.339, to determine the achieved statistical power of 0.798. This value is generally considered acceptable, as it approximates the conventional threshold of 0.80 for adequate power.

The inclusion criteria for participants were age 20 or older, serving as a village health volunteer for more than six months, and being willing and capable of participating in the study. Exclusion criteria included individuals with symptoms or illnesses that limit activity, those who had participated in any health literacy improvement programs within the prior six months, and individuals deemed incapable of completing the study duration.

Setting: Nakhon Ratchasima Province, the most populous region in northeastern Thailand, was selected as the study site. One district, with five health-promoting hospitals, was cluster-randomly chosen from the province's 32 districts.

A health-promoting hospital serving 15 villages was purposively selected from the district because most older people in Thailand live in rural locations, where access to nurse-provided health services is still restricted; thus, this rural community setting was selected.

Village health volunteers (VHVs) who work closely with these populations need health literacy. Therefore, this study examined the effectiveness of PjBL-HL in enhancing health literacy among VHVs operating in these areas. The intervention group engaged in a five-week program, and public health personnel provided the control group with routine

health education, which included basic health screenings such as vital sign measurement and Dextrostix (DTX), as well as basic knowledge about non-communicable diseases, aging care, dengue prevention, and more.

The selected health-promoting hospital, serving 15 villages, was divided into two zones: Zone A, with eight villages (115 VHVs), and Zone B, with seven villages (106 VHVs). Group assignment was done using cluster randomization, with Zone A assigned at random to the intervention group and Zone B serving as the control group. Finally, VHVs were randomly selected from each zone (**Figure 1**).

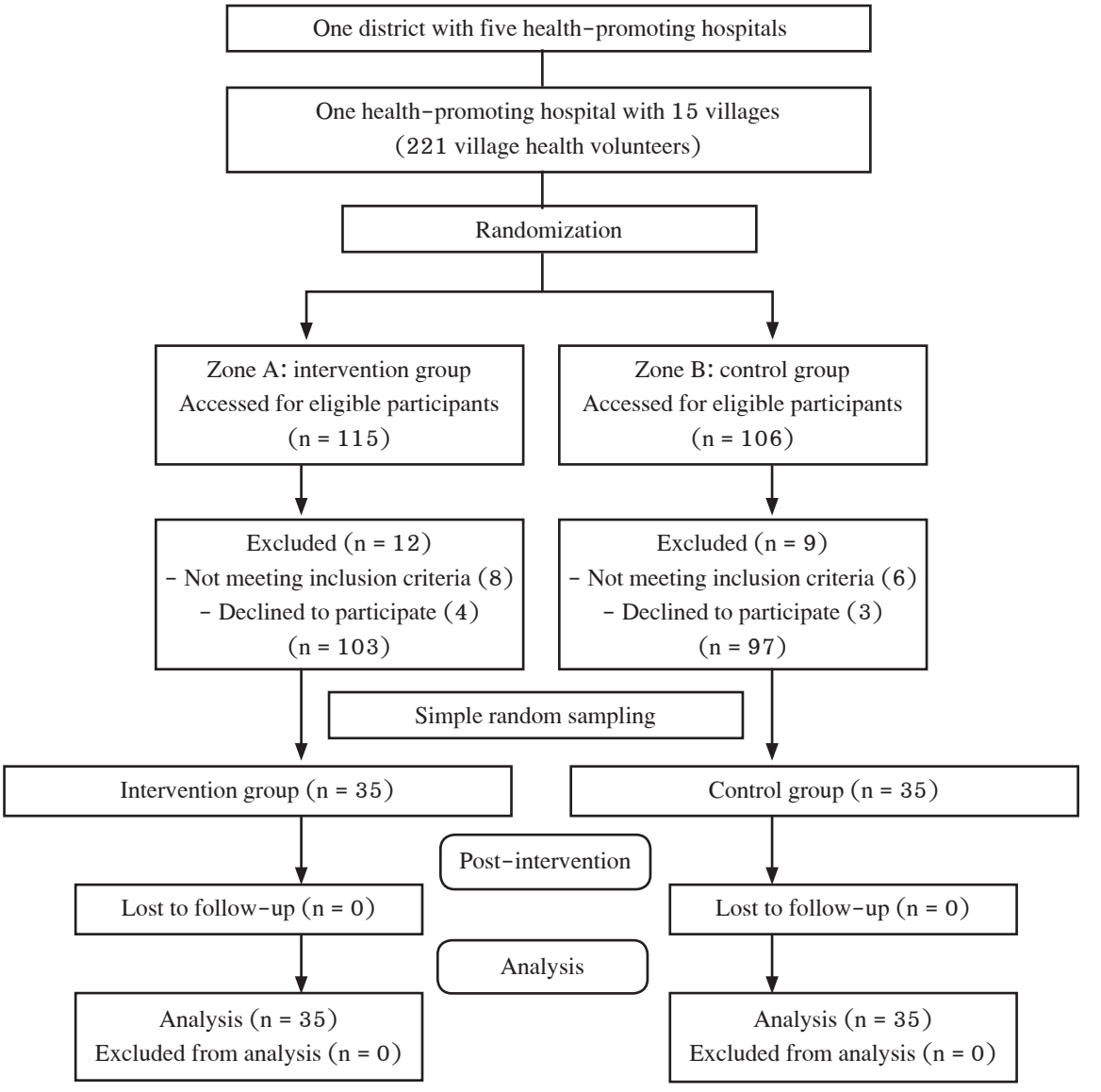

Figure 1. Flowchart of participant progression throughout the study

Ethical Considerations: This research was approved by the Human Research Ethical Committee of Vongchavalitkul University (Project Code No. VU.HREC.273/2023). Before data collection, participants were informed about the study's objectives, the data collection process, the protection of human rights, and the potential risks and benefits involved. They were also made aware of measures to maintain confidentiality. Upon agreeing to participate, written consent forms were obtained. There were no anticipated harms or risks associated with participation in this study. The study was conducted in accordance with the Declaration of Helsinki.

Research Instruments:

A Demographic Questionnaire was developed by the principal investigator (PI) to collect participant information on gender, age, highest education level, occupation, health conditions, and duration of service as a village health volunteer.

The Health Literacy Scale for Thai Adults, developed by the Health Education Division of the Ministry of Public Health in Thailand,[21] was used to assess health literacy. The cognitive and social abilities that allow people to obtain, comprehend, and apply knowledge to support and preserve good health are known as health literacy. The FEESA framework (Food, Exercise, Emotions, Smoking, and Alcohol consumption) was used to evaluate health literacy. The questionnaire consists of six domains:

Domain 1: Health knowledge and understanding (6 items). Participants are scored on a 0-1 scale for each item to assess their understanding of health-related FEESA principles. The possible score ranges from 0 to 6, with higher scores indicating greater health knowledge and understanding.

Domains 2-5: Scoring Scale. A 5-point scale is used: "Always" (5), "Often" (4), "Sometimes" (3), "Rarely" (2), "Never" (1). Domain 2: Accessing health information and services (2 items). Example: "How often do you verify information from multiple sources to ensure its accuracy?" The possible score ranges from 2 to 10, with higher scores indicating greater ability to access health information and services.

Domain 3: Communicating for professional skills (3 items). Assesses participants' ability to understand, share, and persuade others about the FEESA framework. The possible score ranges from 3 to 15, with higher scores reflecting a higher level of communication skills in professional contexts.

Domain 4: Ability to manage health conditions (3 items). Evaluates participants' ability to manage their diet, emotions, and environment to adhere to the FEESA framework. The possible score ranges from 3 to 15, with higher scores indicating a greater ability to manage health conditions effectively.

Domain 5: Media and information literacy (2 items). Assesses participants' ability to verify product information and analyze pros and cons before making decisions based on media. The possible score ranges from 2 to 10, with higher scores indicating a greater level of media and information literacy.

Domain 6: Making appropriate health decisions (3 items). Decision-making is assessed with a score range of 1-4 based on appropriateness. Example: "When offered high-fat sweets, the response is scored as follows: A) "Eat immediately" (1), B) "Eat slowly" (2), C) "Choose healthier options" (4), D) "Decline" (3)." The possible score ranges from 3 to 12, with higher scores reflecting a higher capacity for making appropriate health-related decisions.

A score of less than 60% of the total or individual domain scores indicates poor health literacy; a score between 60% and 79% indicates moderate health literacy; and a score of 80% or above indicates good health literacy. The total possible score for health literacy ranges from 13 to 68, with higher scores reflecting greater levels of health literacy. Accordingly, scores between 13-40 are classified as poor health literacy, 41-54 as moderate health literacy, and 55-68 as good health literacy. In prior studies with the Thai population, Cronbach's alpha coefficients ranged from 0.75 to 0.92.[16] For this study, the Cronbach's alpha coefficient was found to be 0.76.

The Project-Based Learning Program to Promote Health Literacy (PjBL-HL):

The project-based learning approach aimed to enhance VHVs' understanding and application of their knowledge in real-world contexts. Interactive courses and pertinent examples were used to introduce VHVs to the 5-week PjBL-HL curriculum and the elements required to acquire project abilities. After informed consent was obtained from the participants, they collaborated in groups, employing group dynamics to outline their projects with guidance from PI. The main steps in the PjBL-HL approach are detailed in **Appendix, Table A1.**

Data Collection: All participants completed the health literacy questionnaire after providing written informed consent. The assessment utilized self-reported measures through a paper-based pretest and posttest of the health literacy scale, which took approximately 30 minutes to complete. The researchers arranged a convenient measurement schedule for the participants and ensured minimal disruption to their daily routines.

Data Analysis: Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) version 23.0. Descriptive statistics were calculated to summarize the participants' demographic characteristics and background information. A two-way ANOVA assessed differences in health literacy scores between groups and across the pretest and posttest periods. Regarding the statistical assumptions for the two-way ANOVA, we ensured that the data met the assumptions of normality, homogeneity of variances, and independence of observations. The Shapiro-Wilk test was used to determine normality, and Levene's test was used to look at homogeneity of variances. Both assumptions were satisfied, thereby justifying the use of two-way ANOVA for the analysis.

Results

Seventy participants completed the questionnaires, and data analyses were conducted using this sample. At baseline, no significant differences were observed between the intervention and control groups regarding gender, age, highest education level, occupation, health conditions, or duration of service as village health volunteers (**Table 1**) and health literacy scores (**Table 2**).

Table 1. Comparison of general characteristics between the intervention and control groups (n = 70)

Demographic data	Intervention group (n = 35)		Control group (n = 35)		χ^2, t or Fisher's exact test	p-value
	Number	Percent	Number	Percent		
Gender						
Male	1	2.9	1	2.9	0.00[c]	1.000
Female	34	97.1	34	97.1		
Age (years) (mean ± SD)	51.89 ± 6.54		50.89 ± 6.76		0.629[b]	0.532
Working period (mean ± SD)	15.77 ± 10.72		12.26 ± 10.91		1.360[b]	0.178
Highest Education						
Primary school	12	34.3	10	28.6	0.293[a]	0.864
Junior high school	17	48.6	19	54.3		
Higher	6	17.1	6	17.1		
Occupation						
Farmer	23	65.7	20	57.1	1.019[c]	0.843
Trader	2	5.7	3	8.6		
Hired	7	20.0	7	20.0		
Housewife work	3	8.6	5	14.3		

Table 1. Comparison of general characteristics between the intervention and control groups (n = 70) (Cont.)

Demographic data	Intervention group (n = 35)		Control group (n = 35)		χ^2, t or Fisher's exact test	p-value
	Number	Percent	Number	Percent		
Health conditions						
Yes	21	60.0	18	51.4	0.521[a]	0.631
No	14	40.0	17	48.6		
Health literacy						
Poor (13-40)	1	2.9	1	2.9	0.586[c]	0.886
Moderate (41-54)	27	77.1	25	71.4		
Good (55-68)	7	20.0	9	25.7		

Note. [a] = Chi-square test, [b] = t-test, [c] = Fisher's exact test

Table 2. Comparison of health literacy between groups at baseline (n = 70)

Health literacy	Intervention group	Control group	t	p-value
	Mean (SD)	Mean (SD)		
Health knowledge and understanding	4.11 (0.80)	4.06 (1.24)	0.230	0.819
Accessing health information and services	7.51 (1.36)	7.51 (1.27)	0.000	1.000
Communicating for professional skills	10.49 (1.62)	10.49 (1.25)	0.000	1.000
Ability to manage health conditions	10.69 (1.81)	11.28 (1.79)	-1.393	0.168
Media and information literacy	7.11 (2.23)	6.63 (2.47)	0.862	0.392
Making appropriate health decisions for good practice	9.63 (1.29)	10.20 (1.18)	-1.935	0.057
Total health literacy score	49.54 (4.92)	50.17 (5.81)	-0.488	0.627

The results revealed significant differences between groups in health knowledge and understanding, media and information literacy, and total health literacy. Significant changes were observed over time, with scores improving from pretest to posttest. Furthermore, a significant interaction effect between group and time indicated that the changes varied by group, suggesting the intervention had a differential impact on these outcomes (**Table 3**).

There was no significant difference between groups in terms of accessing health information and services; however, a significant change was observed in scores from pre- to post-intervention with no interaction effects, indicating that the change in scores over time was similar across both groups. The intervention had an equally consistent effect regardless of group membership. Regarding communication for professional skills, there were no significant main effects of either group or time (**Table 3**).

No significant difference was observed between the groups regarding the ability to manage health conditions and make appropriate health decisions for good practice. However, significant changes were observed over time, indicating that both groups improved in their ability to manage health conditions and make appropriate health decisions. The interaction effect was also significant, indicating that although both groups showed improvement, the change in scores was greater in the intervention group than in the control group. These findings suggest that the intervention had a larger impact on the intervention group regarding managing health conditions and making appropriate health decisions over time (**Table 3**).

Table 3. Changes in health literacy between groups over time (n = 70)

Variables	Group	Possible range	Actual range		Mean (SD)		Group	Time	Group x Time
			Pretest	Pretest	Posttest	Posttest	F (p-value)		
Health knowledge and understanding	Intervention	0-6	3-6	6-6	4.11 (0.80)	6.00 (0.00)	48.09 (< 0.001)	45.343 (< 0.001)	42.677 (< 0.001)
	Control	0-6	2-6	2-5	4.06 (1.24)	4.09 (0.82)			
Accessing health information and services	Intervention	2-10	6-10	8 - 10	7.51 (1.36)	8.71 (0.67)	3.057 (0.083)	17.024 (< 0.001)	3.057 (0.083)
	Control	2-10	4-10	5-10	7.51 (1.27)	8.00 (1.39)			
Communicating for professional skills	Intervention	3-15	7-14	9-13	10.49 (1.62)	10.94 (0.97)	3.256 (0.073)	0.035 (0.852)	3.256 (0.073)
	Control	3-15	8-13	7-13	10.49 (1.26)	10.11 (1.51)			
Ability to manage health conditions	Intervention	3-15	8-15	8-15	10.69 (1.81)	12.00 (1.61)	0.066 (0.797)	5.384 (0.022)	5.873 (0.017)
	Control	3-15	8-14	8-14	11.28 (1.79)	11.26 (1.29)			
Media and information literacy	Intervention	2-10	2-10	9-10	7.11 (2.23)	9.97 (0.17)	14.638 (< 0.001)	50.297 (< 0.001)	5.016 (0.027)
	Control	2-10	2-10	5-10	6.63 (2.47)	8.11 (1.41)			
Making appropriate health decisions for good practice	Intervention	3-12	8-12	9-11	9.63 (1.29)	10.89 (0.404)	0.049 (0.825)	11.083 (0.001)	10.120 (0.002)
	Control	3-12	7-12	6-12	10.20 (1.18)	10.23 (1.42)			
Total health literacy score	Intervention	13-68	40-58	53-63	49.54 (4.92)	58.09 (2.13)	9.927 (0.002)	48.964 (< 0.001)	15.655 (< 0.001)
	Control	13-68	40-62	40-63	50.17 (5.81)	52.54 (4.75)			

Discussion

Implementing PjBL-HL approaches resulted in significant improvements in total health literacy scores among VHVs, demonstrating the effectiveness of this educational model. This outcome reflects key adult learning principles, particularly the importance of collaborative learning, which fosters empowerment and enhances community health promotion.[29]

Health knowledge and understanding demonstrated a significant interaction between group dynamics and time, indicating that the PjBL-HL approach effectively promoted health knowledge among VHVs. This finding aligns with previous studies that suggest that collaborative learning methods contribute to an increased understanding of health concepts and practices.[17,21] Similarly, media and information literacy also showed a notable interaction between group and time.

This suggests that the PjBL-HL approach enhanced VHVs' ability to access, evaluate, and apply health information effectively. Health literacy has been recognized as a critical factor in promoting equity through enhancing people's access to and proficiency with health information.[15] The result indicates that PjBL-HL had a more significant impact on the intervention group regarding their ability to manage health conditions and make appropriate health decisions over time.

This indicates that PjBL successfully involves learners in real-world situations, improving their

ability to deal with problems and make decisions in healthcare. This finding accords with earlier research that emphasizes the role of health literacy in improving information-seeking behaviors and decision-making.[21,22]

The ability to access health information and communicate for professional skills did not show an improvement effect of the intervention. This suggests that developing skills in accessing and effectively using health information, persuading and reviewing health information with the public, requires a more targeted program. The PJBL integrated a collaborative approach so that participants worked with their peers on the project.[30] Improving communication skills in a professional context can be challenging, as it requires individuals to convey professional health information clearly. Developing communication strategies for health promotion and enhancing the roles of VHVs, who must lead health information, public health communication, and health information dissemination, is essential. These strategies are beyond the PjBl-HL but involve providing, presenting, and disseminating accurate health information to influence and raise public awareness, skills, and confidence in self-care. Therefore, improving VHVs' health literacy, particularly in health communication and self-management according to the healthy FEESA framework, is crucial. This is congruent with a previous study that emphasized the benefit of using the PjBL approach to develop information literacy skills, including accessing health information.[26]

The effectiveness of the PjBLHL method was further supported by the evidence that the intervention group's post-intervention health literacy scores were significantly higher than the pre-intervention and the control group. This result supports prior research on the importance of involving community members in health education, especially in underserved areas and elderly care. It shows that project-based learning enhances the capacity of VHVs to deliver health information and care.[27,30,31] The findings also confirm that the PjBL approach can significantly improve health literacy, enabling VHVs to manage their health effectively.

Limitations and Future Research

Despite the positive outcomes observed, several limitations must be considered. The study focused on a specific group of VHVs in one region, restricting the findings' capacity to be applied to different groups or environments, primarily urban or culturally different contexts. Additionally, while health literacy improvements were observed immediately post-intervention, the study did not assess the long-term sustainability of these gains. Without long-term follow-up, it is unclear whether improvements are maintained and how VHVs apply them in real-world contexts.

Moreover, although health literacy improved in several domains, the intervention did not significantly enhance VHVs' communication skills, particularly in persuading or reviewing health information with the public. This suggests that communication skills may need more focused training within the PjBL-HL framework to ensure effective information dissemination and influence on health behaviors.

Future research should explore whether the PjBL-HL approach yields similar results across different geographic and cultural contexts. Long-term studies are necessary to assess health literacy improvements' sustainability and real-world application. Additionally, incorporating targeted communication skills training within the PjBL-HL framework could enhance VHVs' engagement with the public. Research should also investigate whether improved health literacy leads to measurable health outcomes in the communities served. Lastly, studies should incorporate objective measures to reduce bias in self-reported data and explore how the approach can be adapted for low-resource settings.

Conclusions and Implications for Nursing Practice

The implementation of PjBL-HL has shown significant improvements in health literacy among VHVs. This highlights PjBL-HL as an effective

educational strategy that enhances VHVs' knowledge and skills and empowers them to share vital health information within their communities. The collaborative and experiential nature of PjBL promotes active engagement, enabling VHVs to address real-world health challenges effectively.

After further testing, nurses can incorporate the Project-based Learning for Health Literacy (PjBL-HL) approach into their educational practices by supporting VHVs with training, resources, and guidance for health literacy initiatives. This approach can foster a more informed, engaged community and strengthen the role of VHVs in promoting health literacy. Additionally, nurses can advocate for the broader integration of PjBL-HL in community health programs, emphasizing its potential to enhance health literacy, improve decision-making skills, and ultimately contribute to better health outcomes in community settings.

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Appendix

Appendix Table 1. Details and implementation of the PjBL-HL program

Session/week	Objective	Activities
First Week **Day 1:** Session 1: Goal setting and review of the knowledge and understanding of health literacy Session 2: Motivating the creation of meaningful problems for project design	1. To enhance health literacy by using driving questions to motivate learning 2. To develop meaningful problems for designing a motivating project for VHVs	1. Introduction to health literacy 2. Enhancing understanding of health literacy through driving questions to motivate learning: "Why is it important to promote health literacy for people?" 3. Facilitate a group discussion to address the driving questions 4. Provide learner reflection and researcher feedback opportunities to encourage deeper consideration of their work and its connection to broader concepts outlined in the learning goals 5. VHVs were tasked with assessing health literacy among the elderly in the community. This activity developed their skills in health literacy assessment and the use of assessment tools.
Day 2: Session 1: Defining the problem, brainstorming, researching, and generating ideas	3. To clarify the problem and prepare the project to address a challenging issue	1. Preparing the project by teaching general principles of community project development, project processes, and evaluation. Researchers carried out a preliminary study centered on problems related to low health literacy in the community. 2. Researchers assessed the interests of VHVs and motivated them to engage in the learning process. 3. Researchers guided VHVs in brainstorming the potential impacts of low health literacy, resulting in a list of health literacy issues affecting the elderly in the community. 4. VHVs ranked the concerns according to the most urgent requirements of the elderly population in their area.
Second Week **Day 1:** Session 1: Forming the Project	1. To promote knowledge construction: engaging learners in building knowledge through in-depth inquiry, problem-solving, collaboration, and critical thinking skills	1. The process began with designing a community- based project to enhance health literacy among older adults, involving identifying key topics and formulating learning objectives. VHVs engaged in collaborative and creative problem-solving activities throughout the planning stage.

Appendix Table 1. Details and implementation of the PjBL-HL program (Cont.)

Session/week	Objective	Activities
Day 2: Session 1: Critique and Revision	2. To sustain inquiry	2. The VHVs systematically articulated project objectives, formulated guiding research questions, and proposed initial hypotheses to frame the inquiry. The research team provided methodological support in structuring task execution and optimizing collaborative processes among participants. 3. VHVs participated in project planning alongside community networks and stakeholders. As the VHVs worked on their projects, researchers advised them to assess their interaction, communication, and technical aid utilization on an ongoing schedule. 4. The VHVs conducted a literature review to explore relevant processes, intervention strategies, methodologies, and practical tools to enhance health literacy among community older adults. In addition, they selected appropriate instruments and materials for use in project evaluation.
Third Week Implementing	1. To implement the project and enhance the engagement of VHVs in promoting community health care	1. The project scope was operationalized by identifying specific activities and responsibilities, developing appropriate data collection methods, and delineating timelines for implementation. 2. VHVs collaborated on group projects and convened regularly to address a series of predefined objectives. 3. VHVs implemented the project and were encouraged to consult with one another, researchers and community health care professionals.
Fourth Week Reflection and Feedback	1. To provide opportunities for VHVs to reflect and receive feedback	1. VHVs collaborated on group projects and subsequently presented the progress of their work. 2. Researchers guided the VHVs and facilitated discussions. 3. Both formative and summative evaluations of the project were conducted through the VHVs' presentations. 4. Researchers provided coaching to the VHVs in the preparation and delivery of their project presentations.

Appendix Table 1. Details and implementation of the PjBL-HL program (Cont.)

Session/week	Objective	Activities
Fifth Week Evaluation and Public Deliverables	1. To evaluate the project-based learning initiative and present the results to the public	1. VHVs presented the project results to the public community. 2. Upon program completion, VHVs were tasked with producing a comprehensive final report that documented the project's developmental phases, implementation strategies, and achieved outcomes. 3. Their project-based learning experience was evaluated using pre- and post-intervention assessment tools, as well as evaluations conducted by peers and researchers.

ประสิทธิผลของโปรแกรมการเรียนรู้โดยใช้โครงการเป็นฐานต่อความรอบรู้ด้านสุขภาพของอาสาสมัครสาธารณสุขประจำหมู่บ้าน : การศึกษาแบบกึ่งทดลอง

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บทคัดย่อ : ความรอบรู้ด้านสุขภาพเป็นปัจจัยกำหนดสุขภาพที่สำคัญและนับเป็นปัจจัยหลักในการเสริมสร้างพลังอำนาจและความเท่าเทียมด้านสุขภาพ อย่างไรก็ตาม ความรอบรู้ด้านสุขภาพในระดับต่ำยังคงเป็นปัญหาสำคัญ โดยเฉพาะในพื้นที่ชนบทของประเทศไทย รวมถึงกลุ่มอาสาสมัครสาธารณสุขประจำหมู่บ้าน (อสม.) ซึ่งมีบทบาทในการให้บริการสุขภาพขั้นปฐมภูมิและเผยแพร่ความรู้ด้านสุขภาพแก่ประชาชน การศึกษานี้ดำเนินการในจังหวัดนครราชสีมา ซึ่ง อสม. ทำหน้าที่เป็นกลไกเชื่อมโยงระหว่างระบบบริการสุขภาพกับประชาชนในชุมชน การศึกษาประสิทธิผลของโปรแกรมการเรียนรู้โดยใช้โครงการเป็นฐานต่อความรู้รอบด้านสุขภาพของอาสาสมัครสาธารณสุขประจำหมู่บ้านนี้ มีรูปแบบการศึกษาแบบกึ่งทดลอง กลุ่มตัวอย่างสองกลุ่มวัดผลเปรียบเทียบคะแนนเฉลี่ยความรอบรู้ด้านสุขภาพก่อนและหลังการทดลอง ผู้เข้าร่วมวิจัยจำนวน 70 คนจะได้รับการสุ่มให้เข้าเป็นกลุ่มทดลอง (n = 35) และกลุ่มควบคุม (n = 35) โปรแกรมการเรียนรู้โดยใช้โครงการเป็นฐาน 5 สัปดาห์ ได้มีการให้ผู้เข้าร่วมมีส่วนร่วมในการกำหนดปัญหาที่เกี่ยวข้องกับสุขภาพ การสร้างและปรับปรุงโครงการ การออกแบบและดำเนินการแก้ไขปัญหา รวมถึงการสะท้อนผลลัพธ์ที่ได้ ประเมินผลโดยใช้แบบสอบถามความรอบรู้ด้านสุขภาพ วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา สถิติความแปรปรวนสองทางเพื่อเปรียบเทียบคะแนนเฉลี่ยของความรอบรู้ด้านสุขภาพระหว่างกลุ่มและระหว่างก่อนและหลังการเข้าร่วมโปรแกรม

ผลการศึกษาชี้ให้เห็นว่า คะแนนเฉลี่ยในด้านความรู้และความเข้าใจ การรู้เท่าทันสื่อและข้อมูลข่าวสาร รวมถึงคะแนนเฉลี่ยรวมความรอบรู้ด้านสุขภาพของกลุ่มทดลองมีค่าสูงกว่าคะแนนก่อนการทดลองและสูงกว่ากลุ่มควบคุมอย่างมีนัยสำคัญทางสถิติ ผลลัพธ์ดังกล่าวแสดงให้เห็นถึงประสิทธิผลของโปรแกรมการเรียนรู้ผ่านโครงการในการเสริมสร้างความรอบรู้ด้านสุขภาพแก่อาสาสมัครสาธารณสุขประจำหมู่บ้าน กลยุทธ์การเรียนรู้ที่เน้นผู้เรียนเป็นศูนย์กลางนี้ มีศักยภาพต่อการบูรณาการเข้ากับกิจกรรมส่งเสริมความรอบรู้ด้านสุขภาพ ซึ่งดำเนินโดยพยาบาลอนามัยชุมชน อย่างไรก็ดี ยังจำเป็นต้องมีการศึกษายืนยันเพิ่มเติมในพื้นที่ที่มีความหลากหลาย ทั้งเขตเมืองและชนบท เพื่อประเมินความเหมาะสมในการนำไปใช้และความเป็นไปได้ในการขยายผลในวงกว้าง

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คำสำคัญ : ความรอบรู้ด้านสุขภาพ การเรียนรู้โดยใช้โครงการเป็นฐาน อาสาสมัครสาธารณสุขประจำหมู่บ้าน

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