

EVALUATING A SAFETY LITERACY BASED HOME SAFETY PROGRAMME TO IMPROVE KNOWLEDGE, ATTITUDES, AND BEHAVIOUR AMONG OLDER ADULTS IN THAILAND

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Abstract

Background: Home related injuries and falls among older adults are a major public health issue, especially in ageing societies. Safety literacy, defined as the ability to access, understand, evaluate, and apply safety information, is essential for promoting safe living and ageing in place. This study evaluated the effectiveness of a community-based, safety literacy-driven home safety programme among older adults in Thailand. **Methods:** A quasi-experimental, two-group pretest-posttest design was conducted among 68 community-dwelling older adults (≥ 60 years) in Thailand, equally assigned to experimental and control groups ($n = 34$). The eight-week intervention was guided by the Safety Literacy Model and the PAOR (Planning, Action, Observation, Reflection) framework. It included participatory workshops, home hazard assessments, fall-prevention exercises, and follow-up counseling. Validated tools assessed knowledge, attitudes, safety behaviour and safety literacy. Data were analyzed using paired and independent t-tests ($p < 0.05$). **Results:** Post-intervention, the experimental group showed significant improvements in knowledge, attitudes, and safety behaviour compared with baseline and the control group (all p -values < 0.001). Mean safety literacy scores increased from 2.60 to 2.92 ($t = 7.05$, $p < 0.001$), and participants reported high satisfaction (mean = 2.88 ± 0.33). **Conclusion:** The safety literacy-based programme effectively enhanced multiple domains of safety competence among older adults. Integrating participatory learning

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with environmental modification promotes independent risk management and supports safe ageing in place. Future studies should integrate technological innovations (e.g., mobile applications for home risk assessment and self-monitoring) to enhance accessibility and engagement.

Keywords: safety literacy, home accidents, ageing, health promotion, community health

Introduction

The global population is ageing rapidly, creating substantial challenges for public health systems worldwide. According to the United Nations (2022), the proportion of adults aged 60 years and older continues to rise, with projections suggesting this demographic will double to approximately 2.1 billion by 2050 (United Nations, 2022). This shift is accompanied by a corresponding increase in the burden of injuries and chronic diseases. Among these, falls and home-related injuries have emerged as critical public health issues; Falls alone account for over 684,000 fatal accidents annually, making them leading causes of morbidity, disability, and mortality in older adults (James et al., 2022; Petridou et al., 2021). Most falls occur within the home environment, where structural and behavioral factors intersect to create risks. Preventing such injuries requires a comprehensive approach that integrates education, behavior modification, and environmental adjustment (Tiedemann et al., 2022).

In Thailand, the demographic transition toward an ageing society has intensified these concerns. Older adults living in rural and peri-urban areas face heightened vulnerability due to unsafe housing, limited access to assistive devices, and low awareness of risk prevention. This is supported by Tangcharoensathien et al. (2023). Conventional health education alone has shown limited long-term behavioral change, emphasizing the need for innovative, participatory, and literacy-oriented approaches to empower older adults in maintaining home safety.

Safety literacy, a relatively new concept derived from health literacy, refers to the ability to access, understand, evaluate, and apply safety-related information in daily life. Liu et al. (2021). It functions as a behavioral determinant that strengthens self-efficacy and supports informed decision-making regarding risk prevention. According to Bandura's (1997) self-efficacy theory, individuals with higher levels of literacy and confidence are more capable of translating knowledge into action. Therefore, enhancing

safety literacy may bridge the gap between knowledge acquisition and consistent safety behavior among older adults. Recent studies also highlight that safety literacy correlates with reduced home hazards and improved fall-prevention behaviour. Lektip et al. (2023).

The Safety Literacy Model proposed by Liu et al. (2021). This is consistent with provides a conceptual framework linking knowledge, attitudes, and safety behavior to individual capacity for safety management. Building upon this model, participatory learning approaches such as the PAOR cycle (Planning, Action, Observation, Reflection). Kemmis & McTaggart (1988) offer structured processes for developing, implementing, and evaluating community-based programme. The PAOR framework promotes reflective practice, stakeholder engagement, and co-learning which are key elements for empowering older adults to recognize and address hazards in their living environments. Evidence from Thai community-based interventions demonstrates that participatory action research can effectively improve self-efficacy and home safety behaviour. Somjintana & Eiamsripanpong (2023).

Despite growing global evidence, few studies in Thailand have integrated safety literacy within participatory home safety promotion programme for older adults. Most existing interventions emphasize knowledge transfer rather than active engagement or literacy enhancement (Nutbeam, 2000, 2008). Consequently, the relationship between safety literacy, behavioral change, and environmental modification remains underexplored in the Thai context.

Therefore, this study aimed to evaluate the effectiveness of a safety literacy-based home safety promotion programme guided by the PAOR framework in improving knowledge, attitudes, safety behaviour, and overall safety literacy among community-dwelling older adults in Ubon Ratchathani Province, Thailand. The findings are expected to contribute evidence-based insights for developing sustainable, community-centered strategies to promote safe ageing in place.

Materials and Methods

Study Design

Study design and setting. A quasi-experimental, two-group pretest–posttest design was implemented in community settings in Ubon Ratchathani Province between July and September 2025. The intervention development was guided by the Safety

Literacy Model and Ageing-in-Place principles and implemented using the PAOR (Planning, Action, Observation, Reflection) participatory cycle. Details PAOR: Figure 1.

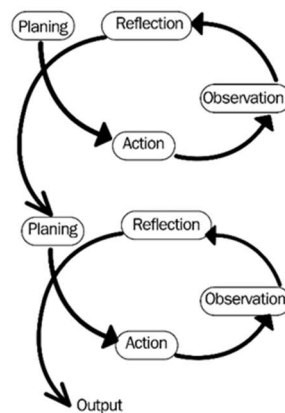


Figure 1 The PAOR participatory cycle (Adapted from Kemmis & McTaggart, 1988).

Planning (P1): Conducting a situational analysis to explore and identify existing problems, followed by a planning meeting.

Action (A1): Organizing a workshop to design and develop the programme in collaboration with researchers, representatives from the Subdistrict Administrative Organization, the Health Promoting Hospital, public health officers, elderly school caregivers, and older adults. Representatives, of the elderly population.

Observation (O1): Reviewing and verifying the programme development process by research advisors and experts in gerontology.

Reflection (R1): Reflecting on and communicating the outcomes of the programme development after expert review.

Planning (P2): Conducting a meeting to plan the implementation of activities according to the developed programme.

Action (A2): Implementing the safety promotion programme through eight core activities.

Observation (O2): Observing and evaluating the implementation of the safety promotion programme.

Reflection (R2): Summarizing and disseminating the finalized programme.

A total of eight participatory sessions were delivered through interactive workshops, environmental risk assessments, home safety inspections, and follow-up

counseling, aiming to enhance participants' knowledge, attitudes, and behaviour related to accident prevention in home environments.

Participants and Sampling

Community-dwelling adults aged ≥ 60 years who were able to communicate and perform basic daily activities were eligible. Exclusion criteria included significant cognitive/hearing impairment or severe illness preventing participation. Using Cohen's (1998) formulation for paired t-test by G* Power software (version 3.1) with $\alpha = 0.05$, power = 0.80, and effect size = 0.7, the sample size was set at 68 (34 per group). Participants were recruited with the help of village health volunteers (VHVs) and randomly allocated to experimental or control groups (n = 34 each).

Intervention

The eight-week safety literacy-based home safety promotion programme consisted of eight participatory sessions organized around the PAOR cycle. Components included the following Interactive educational workshops on home hazards, fall prevention, and safety literacy concepts. Home environment assessments and tailored recommendations for modifications based on a 30-item checklist adapted from Department of Health guidelines (Department of Health, 2021). Cognitive and physical (balance/strength) exercise sessions were conducted to promote fall prevention. Personalized counseling, motivational activities, Follow-up home visits were conducted four times by researchers and VHVs to support behavior change and implement of modifications. Details are presented Figure 2.

Measures and instrument validation

Two instruments were used: Structured questionnaire sections for demographics, knowledge of home safety (15 items), attitudes (10 items), and safety behaviour (15 items) using 3-point scales appropriate to each domain. Home environment safety was assessment a 30-item checklist covering structural and environmental domains (e.g., lighting, walkways, bathrooms). Content validity (IOC mean = 0.71) was evaluated by three (subject-matter experts. Reliability was tested in 30 similar older adults: KR-20 (knowledge) = 0.82; Cronbach's α (attitude) = 0.85; Cronbach's α (behavior) = 0.87.

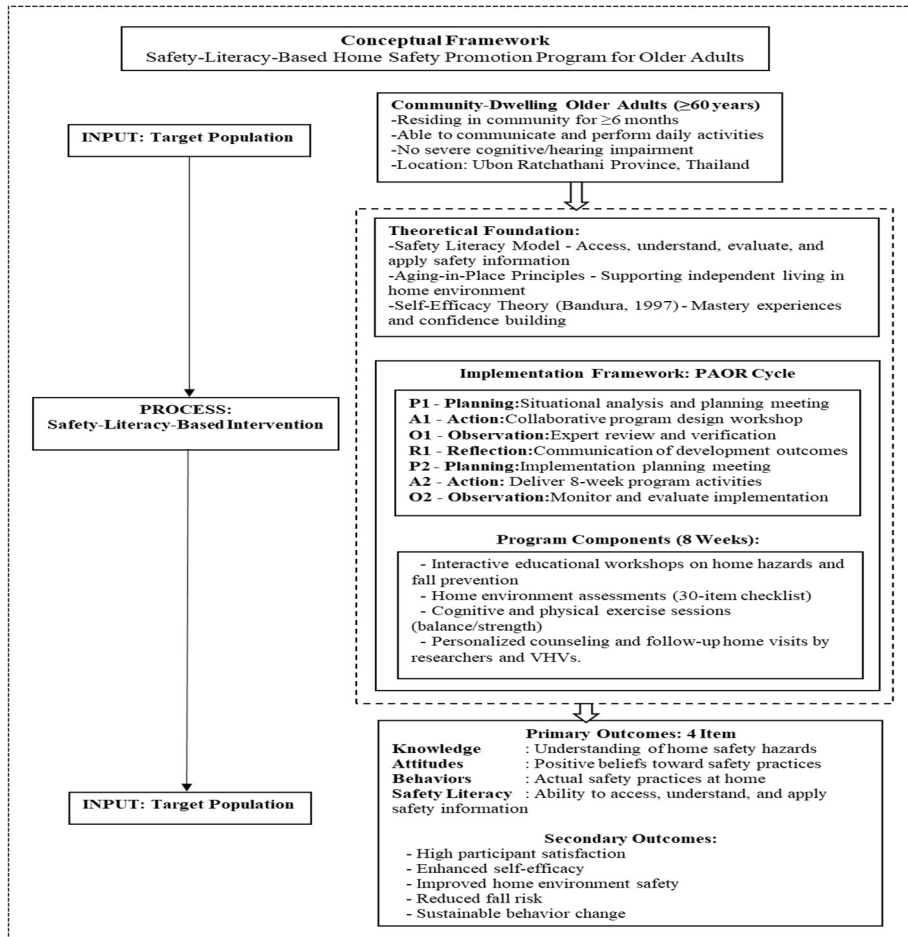


Figure 2 Conceptual Framework.

Data collection and analysis: Baseline (pretest) data were collected before intervention and posttest data were collected four weeks after programme completion. Descriptive statistics described participant characteristics and outcome variables. Within-group pre-post differences were examined using paired-sample t-tests; between-group comparisons of posttest scores were conducted (independent-sample t-tests test or equivalent non-parametric tests). Statistical significance was set at $p < 0.05$. IBM SPSS Statistics was used for analysis. All participants were informed about the study's objectives, procedures, potential risks, and benefits. Written informed consent was obtained prior to participation. Confidentiality was strictly maintained, and participants

were assured of their right to withdraw from the study at any time without repercussions to their access to healthcare services.

Ethical considerations: The study received approval from the Human Research Ethics Committee of Ubon Ratchathani University (Approval Code: HE-6720045). All participants provided written informed consent; confidentiality was maintained and right to withdraw was emphasized.

Results

Participant characteristics. A total of 68 elderly individuals were randomly divided into an experimental group and a control group, with 34 participants in each group. (The participants had a mean age of approximately 69.2 years and were predominantly female. Many reported chronic illnesses and low household incomes, which are associated with increased insecurity and health problems. Programme satisfaction Participants in the experimental group reported high satisfaction with the programme: 31 of 34 (91.2%) rated satisfaction as high on a 3-point scale; mean satisfaction = 2.88 ± 0.33 (Table 1).

Table 1 Levels of Satisfaction with the Home Safety Promotion Programme Among Older Adults.

Satisfaction Level	Frequency (n)	Percentage (%)	Interpretation
Low (1.00–1.66)	0	0.0	Low
Moderate (1.67–2.33)	3	8.8	Moderate
High (2.34–3.00)	31	91.2	High
Mean $\pm$ SD = 2.88 ± 0.33			

Remark * (n = 34) Interpretation based on a 3-point Likert scale (1 = low, 2 = moderate, 3 = high).

Overall satisfaction was rated at a high level.

Comparison of Knowledge, Attitude, and Behavior Scores Before and After the Home Safety Promotion Programme. After participating in the programme, the experimental group demonstrated statistically significant increases in mean scores for knowledge (increased 11.94), attitudes (increased 2.70), and safety behaviour (increased 2.73) (p -values < 0.001 for all comparisons). In contrast, no significant differences were observed in the control group (p > 0.05). These findings indicate that the programme was clearly effective in enhancing the knowledge, attitude, and safety behavior of the

older adults. There were no significant differences in baseline characteristics between the experimental and control groups. Detail are presented in Table Table 2.

Table 2 Comparison of Knowledge, Attitude, and Behavior Scores Before and After the Home Safety Promotion Programme. By pair- sample t-test.

Group	Variable	Mean		Mean Difference	95% CI	<i>t</i>	<i>p</i> -value
		(Before)	(After)				
Experimental Group	Knowledge	6.68	11.94	5.26	3.85-6.68	7.56	< 0.001**
	Attitude	1.89	2.70	0.81	0.70–0.90	17.87	< 0.001**
	Behavior	2.07	2.73	0.66	0.60–0.73	20.07	< 0.001**
Control Group	Knowledge	6.94	7.00	0.07	0.09-0.21	0.81	0.422
	Attitude	1.93	1.94	< 0.01	.001-.003	0.83	0.414
	Behavior	2.17	2.18	0.01	0.01-0.02	1.00	0.325

Remark *Statistical analysis was performed using paired-sample *t*-test. *p* < 0.05 indicates statistical significance.

Comparison of Programme Literacy Scores Before and After the Intervention, the experimental group's mean safety literacy score increased from 2.603 before participation to 2.921 after participation, with a mean difference of 0.451, which was statistically significant (*t* = 7.05, *p* < 0.001). Meanwhile, the control group's scores showed no significant change (*p* = 0.124). This result suggests that participation in the programme effectively enhanced the safety literacy of the older adults detail are shown in Table 3.

Table 3 Comparison of Programme Literacy Scores Before and After the Intervention in the Experimental group and Control group. By Pair Sample *t* test.

Variable	Mean		Mean Difference	95% CI	<i>t</i>	<i>p</i> -value
	(Before)	(After)				
Experimental group	2.603	2.921	0.318	0.226–0.410	7.05	< 0.001**
Control group	2.601	2.603	0.001	0.001-0.004	1.57	0.124

Remark *Statistical analysis was performed using paired-sample *t*-test. *p* < 0.01 indicates statistical significance.

Comparison of Safety Literacy Scores Between the Experimental and Control Groups, before the implementation of the programme, there was no significant difference in safety literacy scores between the experimental and control groups (*p* = 0.390). However, after the intervention, the experimental group had a significantly higher mean score than the control group (*p* = 0.001). This finding indicates that the home safety

promotion programme had a clear and statistically significant effect on improving the safety literacy of older adults compared with those who did not participate (Table 4.)

Table 4 Comparison of the difference in mean safety Literacy scores between the experimental group with the control groups by paire-sample t-test.

Variable	Mean		Mean Diff.	95%CI	t	p-value
	Experimental group	Control group				
Before Literacy	2.603	2.603	<0.001	0.002-0.005	0.87	0.390
After Literacy	2.921	2.601	0.318	0.227-0.410	7.06	0.001**

Remark * $p < 0.05$ indicates statistical significance.

Discussion

This quasi-experimental study found that a safety literacy-based home safety promotion programme significantly improved older adults' knowledge, attitudes, safety behaviour, and safety literacy, while yielding high participant satisfaction. These findings reinforce the importance of integrated and participatory interventions in promoting home safety among community-dwelling older adults.

First, the significant improvements in knowledge, attitudes and behaviour among the experimental group align with evidence that multifactorial, education-based, good attitudes and environmental interventions can effectively reduce risks and promote safe practices among the elderly. Recent evidence indicates that home fall-hazard interventions significantly reduce both the rate of falls and the number of fallers among community-dwelling older adults. Barnes & Lawler (2021), particularly when programme that include education, behavioral modification, and environmental adjustments. Similarly, Guirguis-Blake et al. (2024) confirmed that comprehensive fall-prevention programme that integrate education with environmental support show the greatest effect in promoting safety behaviour.

Second, the significant increase in safety literacy observed in this study supports previous findings indicating that tailored safety education combined with home modification improves awareness, risk perception, and self-management capacity among older adults. This is supported by the National Statistical Office of Thailand (2023). This pattern underscores the role of safety literacy as a determinant of effective accident-

prevention behavior, enabling participants to identify, evaluate, and control hazards in their daily environment. Stark et al. (2021) also reported that home-hazard removal programme significantly reduced falls among older adults,

Third, the use of a participatory learning framework based on the PAOR cycle (Planning, Action, Observation, Reflection) likely enhanced the effectiveness of the intervention. This approach encouraged older adults to actively engage in identifying risks and designing solutions, consistent with the principles of participatory health promotion. Such engagement aligns with Bandura's (1997) self-efficacy theory, which emphasizes that mastery experiences and self-reflection strengthen confidence in performing health-related behaviour. Previous research in Thailand also supports participatory models in community health promotion; for example, Somjintana & Eiamsripanpong (2023) found that community-based safety programme significantly increased self-efficacy and reduced fall risks within eight weeks.

Fourth, the programmer's high satisfaction scores (mean = 2.88 ± 0.33) indicate strong acceptability and relevance. Programme satisfaction contributes to sustainability because older adults who perceive an intervention as useful are more likely to maintain safety behaviour. This finding is consistent with evidence that older adults prefer interactive, contextually tailored interventions over lecture-based education. Pynoos & Steinman (2020).

Fifth, safety literacy itself is an emerging determinant of healthy ageing. Wang et al. (2022) found that digital and health literacy are directly associated with improved engagement in safety and self-care behaviour among older populations. Therefore, enhancing safety literacy through educational interventions may strengthen the ability of older adults to maintain home safety independently and sustainably.

Overall, these findings emphasize that community-based, safety literacy-driven programmers are effective for improving older adults' safety knowledge, attitudes, and behaviour, particularly when delivered through participatory and context-appropriate approaches. The results also demonstrate that partnerships between researchers, village health volunteers, and community stakeholders enhance programme success and sustainability (World Health Organization, 2021).

Conclusion

The safety literacy-based home safety promotion programme significantly improved older adults' knowledge, attitudes, safety behaviour, and safety literacy, and achieved a high level of participant satisfaction. The findings suggest that a multifaceted, participatory intervention based on the second cycle of the PAOR process is effective in empowering older adults to enhance home safety and prevent accidents. Collaboration among older adults, community health volunteers, and local authorities contributes to long-term sustainability and community-wide safety promotion. Future randomized controlled trials with long-term follow-up are recommended to validate these outcomes and further strengthen the evidence base for safety literacy-oriented health promotion in ageing populations.

Limitations

This study has some limitations. First, the relatively small sample and quasi-experimental design limit the ability to generalize findings and infer causality. Second, data were self-reported, which may introduce recall or social desirability bias. Third, the short follow-up period did not allow evaluation of long-term behavioral maintenance or fall reduction. Future research should employ randomized controlled designs with larger and more diverse samples. The intervention should be sustained over time and include measurable outcomes (e.g., observed hazards, fall accident rates), along with longer follow-up periods. The results may vary when used with target groups who are homebound or bedridden.

Implications for Future Research

Future studies should integrate technological innovations (e.g., mobile applications for home risk assessment and self-monitoring) to enhance accessibility and engagement. Additionally, the inclusion of cost-effectiveness analysis could provide valuable evidence for policymakers and community health systems considering programme adoption at scale.

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