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Article

# Fall Prevention and Related Factors among Older Adults in Samutprakarn Province, Thailand

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**Abstract: Background and Objectives:** Falls are a significant cause of mortality and disability among older adults globally, affecting individual health and society. Addressing preventable factors, such as physical health and environmental conditions, is essential. This cross-sectional study aims to understand the factors that influence fall prevention behaviors among older adults in semi-urban community. **Methods:** A total of 440 older adults were randomly selected from six districts in Samutprakarn Province, Thailand. Well-trained data collectors conducted individual interviews with the participants in community-based setting. **Results:** Multiple logistic regression analysis was conducted, revealing that 96.3% of older adults demonstrated good fall prevention behaviors. The factors significantly associated with these behaviors included being female (OR = 4.39, 95% CI: 1.42-13.52), having good knowledge of fall prevention (OR = 9.19, 95% CI: 2.78-30.38), and perceiving the severity and susceptibility of falls, along with the benefits and barriers to prevention (OR = 11.25, 95% CI: 3.36-37.69). Additionally, sufficient access to health information (OR = 4.94, 95% CI: 1.61-15.16) and strong social support (OR = 4.06, 95% CI: 1.30-12.71) were also significant factors. **In conclusion,** a high percentage of older adults practiced good fall prevention behaviors, influenced by factors such as gender, knowledge, perception of fall risks, access to health information, and social support. Policy makers should prioritize enhancing health education on fall prevention, improving access to health information, and strengthening social support systems for older adults to further reduce fall-related risks and disabilities.

**Keywords:** fall prevention; older adults; community-based; policy recommendations

## 1. Background

Falls are among the most common and serious issues that contribute to disability, particularly in older adults. Each year, approximately 26.5% (23.4% - 29.8%) of older adults experience a fall, with 10% falling at least twice annually<sup>(1,2)</sup>. These incidents often result in serious injuries, including fractures, joint dislocations, sprains, strains, and concussions, occurring in roughly 10% of falls<sup>(2)</sup>. A previous study indicated that the lifetime costs associated with falls were substantial, ranging from 50 million to 2.3 billion for hospitalizations and 15 – 450 million for emergency department-treated and related falls across U.S. states. This substantial financial burden highlights the importance of fall prevention efforts, especially older adults. To reduce healthcare costs and improve quality of life<sup>(3)</sup>. Thailand has the second-highest proportion of older adults in ASEAN region following Singapore<sup>(4)</sup>. As an upper-middle-income country, as ranked by World Bank, this demographic shift poses a significant financial burden to Thai society, particularly for family with older adults. Previous studies have reported that the proportion of falls in Thailand ranges from 7.5% to 17.6%<sup>(5,6,7)</sup>, with this trend expected to increase. This rise in fall incidents contributes to a financial strain on individuals, families, and society as a whole, further emphasizing the need for effective fall prevention strategies.

Falls can be prevented through the effective coordination of normal gait, which involves the basal ganglia, brainstem system, regulated muscle tone, and sensory processing including vision,

hearing, and proprioception <sup>(8)</sup>. In addition, proper attire, such as wearing appropriately sized clothing for ease of movement and slip-resistant shoes, can help reduce the risk of falls <sup>(8,9)</sup>. Ensuring a safe environment is equally important—this includes providing adequate lighting in the home, keeping pathways clear of obstacles, and maintaining dry, non-slippery floors <sup>(8,9,10)</sup>. These measures collectively contribute to fall prevention and promote safety for older adults.

The literature review highlights that an individual's knowledge <sup>(11,12)</sup> and perceptions significantly impact their behaviors, with notable variations across gender <sup>(13,14)</sup> and social support <sup>(15,16)</sup>. Moreover, Health Belief Model <sup>(14)</sup> explains that people who perceive the severity of a disease and their personal susceptibility, combined with their views on the benefits and barriers of preventive behaviors, are more likely to engage in those behaviors. Previous studies <sup>(17-19)</sup> have shown that health education plays a crucial role in improving fall prevention behaviors. In the current era, health education has evolved beyond traditional methods such as classroom instruction or printed materials to include e-education through online platforms, such as group chats or social media posts. Consequently, in an urban industrial community like Samutprakarn, residents may have better access to health information and an increased level of knowledge, potentially leading to more effective behavior changes, particularly regarding fall prevention. Therefore, to develop effective fall prevention strategies, it is essential to understand the factors influencing fall prevention behaviors. This a cross-sectional study aims to assess fall prevention behaviors and identify the associated factors, including knowledge, perceptions, access to health information, and social support, among older adults in the urbanized community of Samutprakarn Province, Thailand.

## 2. Methods

### 2.1. Participants

The study population comprises elderly individuals aged 60 and above, both male and female, who are registered in the population registry of Samut Prakan Province, totaling 374 people. To determine the sample size from this known population, the formula provided. The total number of elderly people in Samut Prakan Province is 233,560 as of 2022. Additionally, the proportion of elderly individuals exhibiting high fall prevention behavior, based on the study by Kanokwan Muangsiri, is 33.2%. The calculation also considers a maximum allowable margin of error of 0.05. In Samut Prakan Province, six districts were selected, and within each district, six municipalities were randomly chosen. Following this, the study population was randomly selected from each area according to the sample size calculated.

### 2.2. Measurement Tool

The study employs a comprehensive assessment tool for elderly individuals in Samut Prakan Province, consisting of eight sections. It starts with collecting general demographic and health-related information through 9 questions. Next, it assesses knowledge on fall prevention with 21 questions, scoring responses as "Yes" (1 point) or "No/Not Sure" (0 points). The tool then evaluates perceived fall risk, severity, benefits, barriers, with 15 questions using a 3-point Likert scale. Social support is measured through 10 questions across 5 domains, utilizing a 4-point Likert scale. Finally, it examines fall prevention behaviors with 17 questions, scored as "Always" (3), "Sometimes" (2), and "Never" (1).

### 2.3. Statistical Analysis

Descriptive statistics were calculated to assess the proportions of various factors, including gender, education, history of illness, history of falling, knowledge of fall prevention, perceived severity and susceptibility, benefits and barriers, access to health information, social support, and fall prevention behaviors. These factors were reported as both numbers and percentages. Additionally, binary logistic regression was then employed to evaluate the impact of these variables on fall prevention behaviors. The analysis provided odds ratios, 95% confidence intervals, and p-values to determine the significance of each variable. A p-value of less than 0.05 was considered statistically significant. The variables analyzed included gender, education, history of illness, history of falling,

knowledge of fall prevention, perceived severity and susceptibility, benefits and barriers, access to health information, and social support.

### 3. Results

#### 3.1. Sample Description

In a study involving 374 respondents, 82.6% were female, and 17.4% were male. Most participants (85.3%) had completed only primary school education, with the remainder having completed secondary school, high school, or higher education, as shown in Table 1. Approximately 65% of respondents had been diagnosed with at least one non-communicable disease. Additionally, nearly one-third (32.1%) reported a history of falling.

Over 90% of the participants demonstrated good knowledge of fall prevention and had positive perceptions regarding the severity and susceptibility of falls, as well as the benefits and barriers to prevention, as detailed in Table 1. Nearly 80% of the respondents indicated that they had sufficient information on fall prevention, and 70.6% reported having strong social support. Lastly, 96.5% of the participants exhibited good fall prevention behaviors as shown in Table 1.

**Table 1.** characteristics of participants in the study.

Variables	Female (n=309)	Male (n=650)	All (n=374)
<b>Education</b>			
- Primary school	178 (57.6%)	40 (61.5%)	218 (58.3%)
- Secondary school	42 (13.6%)	10 (15.4%)	52 (13.9%)
- High school	54 (17.5%)	10 (15.4%)	64 (17.1%)
- Higher than high school	35 (11.3%)	5 (7.7%)	40 (0.7%)
<b>History of illness</b>			
- no	107 (34.6%)	21 (32.3%)	128 (34.2%)
- having NCD	202 (65.4%)	44 (67.7%)	246 (65.8%)
<b>History of falling</b>			
- no	204 (66.0%)	50 (76.9%)	254 (67.9%)
- Having failing	105 (34.0%)	15 (23.1%)	120 (32.1%)
<b>Knowledge of fall prevention</b>			
- good	287 (92.9%)	59 (90.8%)	346 (92.5%)
- Fair and poor	22 (7.1%)	6 (9.2%)	28 (7.5%)
<b>Perceived severity</b>			
- good	289 (93.5%)	61 (93.8%)	350 (93.6%)
- Fair and poor	20 (6.5%)	4 (6.2%)	24 (6.4%)
<b>Perceived susceptibility</b>			
- good	289 (93.5%)	61 (93.8%)	350 (93.6%)
- Fair and poor	20 (6.5%)	4 (6.2%)	24 (6.4%)
<b>Perceived benefits</b>			
- good	289 (93.5%)	61 (93.8%)	350 (93.6%)
- Fair and poor	20 (6.5%)	4 (6.2%)	24 (6.4%)
<b>Perceived barriers</b>			
- good	289 (93.5%)	61 (93.8%)	350 (93.6%)
- Fair and poor	20 (6.5%)	4 (6.2%)	24 (6.4%)

<b>Sufficient information</b>	253 (81.9%)	45 (69.2%)	298 (79.7%)
<b>Good social support</b>	228 (73.8%)	36 (55.4%)	264 (70.6%)
<b>Fall prevention behaviors</b>			
- Good	302 (97.7%)	59 (90.8%)	361 (96.5%)
- Moderate and poor	7 (2.3%)	6 (9.2%)	13 (3.5%)

### 3.2. Factors Association to Fall Prevention Behaviors among Older Adults in Dwelling Community

Multiple logistic regression analysis revealed several factors significantly associated with fall prevention behaviors among older adults. Being female was strongly associated with better fall prevention behaviors compared to males, with an odds ratio (OR) of 4.39 (95% CI: 1.42-13.52). Additionally, older adults with good knowledge of fall prevention were nine times (95%CI: 2.78-30.38) more likely to engage in good fall prevention behaviors than those with moderate or poor knowledge as shown in Table 2.

Using the Health Belief Model, the analysis showed that older adults who perceived the severity and susceptibility of falls, along with the benefits and barriers to prevention (OR = 11.25 [95%CI: 3.36-37.69]), as high, were more likely to practice good fall prevention behaviors compared to those with moderate or poor perceptions. Moreover, having sufficient access to health information (OR= 4.94 [95%CI: 1.61-15.16]) significantly increased the likelihood of engaging in good fall prevention behaviors compared to those with insufficient information. Finally, strong social support (OR= 4.06 [95%CI: 1.30-12.71]) was also positively correlated with good fall prevention behaviors as shown in Table 2.

In contrast, the analysis found no statistically significant association between a history of falling or the presence of non-communicable diseases and fall prevention behaviors. Similarly, education level was not associated with fall prevention behaviors, as demonstrated in Table 2.

**Table 2.** factors association to fall prevention behaviors among older adults in dwelling community.

variables	Fall prevention behaviors		OR (95%CI)	P-value
	good	fair/poor		
<b>Gender</b>				
- male	59 (90.8%)	6 (9.2%)	ref.	
- female	302 (97.7%)	7 (2.3%)	4.39 (1.42-13.52)	0.01*
<b>Education</b>				
- Primary school	213 (97.7%)	5 (2.3%)	ref.	
- Higher than Primary school	148 (94.9%)	8 (5.1%)	0.43 (0.14-1.35)	0.15
<b>History of illness</b>				
- no	123 (96.1%)	5 (3.9%)	0.83 (0.27-2.58)	> 0.05
- having NCD	238 (96.7%)	8 (3.3%)	ref.	
<b>History of falling</b>				
- no	244 (96.1%)	10 (3.9%)	1.60 (0.43-5.92)	> 0.05
- Having failing	117 (97.5%)	3 (2.5%)	ref.	
<b>Knowledge of fall prevention</b>				
- good	338 (97.7%)	8 (2.3%)	9.185 (2.78-30.38)	<0.01*
- Fair and poor	8 (2.3%)	5 (17.9%)	ref.	
<b>Perceived severity</b>				
- good	342 (97.7%)	8 (2.3%)	11.25 (3.36-37.69)	<0.01*

- Fair and poor	19 (79.2%)	5 (20.8%)	ref.	
<b>Perceived susceptibility</b>				
- good	342 (97.7%)	8 (2.3%)	11.25 (3.36-37.69)	<0.01*
- Fair and poor	19 (79.2%)	5 (20.8%)	ref.	
<b>Perceived benefits</b>				
- good	342 (97.7%)	8 (2.3%)	11.25 (3.36-37.69)	<0.01*
- Fair and poor	19 (79.2%)	5 (20.8%)	ref.	
<b>Perceived barriers</b>				
- good	342 (97.7%)	8 (2.3%)	11.25 (3.36-37.69)	<0.01*
- Fair and poor	19 (79.2%)	5 (20.8%)	ref.	
<b>Information sufficiency</b>				
- Sufficient information	292 (98.0%)	6 (2.0%)	4.94 (1.61-15.16)	<0.01*
- Insufficient information	69 (90.8%)	7 (9.2%)	ref.	
<b>Good social support</b>				
- Good	259 (98.1%)	102 (92.7%)	4.06 (1.30-12.71)	0.02*
- Moderate/poor	5 (1.9%)	8 (7.3%)	ref.	

Notes: \* p-value < 0.05, ref. = reference.

#### 4. Discussion

As mentioned in the introduction above, this study was conducted in an urban community within an industrial economic zone near Bangkok. The study found that the majority of older adults exhibited good fall prevention behaviors, with nearly half having an education level higher than primary school. This higher level of education may contribute to better access to health information. The urban setting of the study area likely played a role in the relatively better access to information on fall prevention practices among older adults, as compared to other studies <sup>(6,7)</sup>. This information may have been sourced from healthcare professionals and various online media platforms, among others.

The study's findings reinforce the significance of knowledge, perceived severity, susceptibility to falls, benefits, barriers to prevention, and sufficient access to health information in influencing fall prevention behaviors among older adults in urban communities. These results align with previous research, which has shown that healthcare behaviors are strongly affected by an individual's knowledge <sup>(11,12)</sup> and perceptions <sup>(12)</sup>. Moreover, adequate access to health information plays a crucial role in empowering individuals to acquire the knowledge necessary to make informed decisions about changing their behaviors and lifestyle <sup>(17-19)</sup>.

This finding supports the concept of health literacy <sup>(20)</sup>, which emphasizes the importance of accessible health information. When individuals have sufficient access to health education—whether through direct communication with healthcare providers, health news, or social media—they are more confident in discussing their health care, verifying information, and making informed choices. For those who are motivated to improve their health outcomes or prevent health risks, access to reliable information is critical in fostering positive behavioral changes, which ultimately leads to better health outcomes.

Moreover, social support also plays a crucial role in reinforcing health information and behaviors, as this study found a significant association between social support and fall prevention behaviors among older adults, consistent with other studies <sup>(15,16)</sup>. Social support theory encompasses four dimensions: informational support, emotional support, instrumental support, and appraisal support. Although this support can influence behavior change throughout the entire process, this study was unable to pinpoint the specific stages where social support is most impactful. Therefore, further research could explore at which stage of behavior change—whether it's the intention to

change, information gathering, behavior modification, or lifestyle adjustment—social support is most influential.

This cross-sectional study is limited in establishing causality between factors and fall prevention behaviors, as it captures data at a single point in time, making it challenging to determine the direction of relationships. The small sample size may reduce the generalizability of the findings, and the unusually high proportion of reported good fall prevention behaviors could suggest response bias or unique population characteristics, raising concerns when comparing with other studies. Additionally, the study did not explore the underlying mechanisms or sequence of behavior change processes, indicating a need for further research to better understand these interactions over time.

## 5. Conclusion

This study was conducted in an urban community within an industrial economic zone near Bangkok, Samutprakarn Province, Thailand, reveals that a significant proportion (96.3%) of older adults exhibit good fall prevention behaviors. Key factors contributing to these behaviors include being female, having good knowledge of fall prevention, perceiving the severity and susceptibility of falls along with understanding the benefits and barriers to prevention, having sufficient access to health information, and receiving strong social support. The findings underscore the importance of targeted educational programs and supportive interventions in promoting effective fall prevention strategies. Specifically, older adults with comprehensive knowledge and awareness of fall risks, alongside robust social support networks, are more likely to engage in preventive behaviors. These insights highlight the need for policies that enhance health education, improve access to relevant information, and strengthen social support systems to better support older adults in managing fall risks and reducing related disabilities.

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