# Factors associated with Falls among the Thai Elderly in Pathum Thani Province
# ปัจจัยที่มีความสัมพันธ์ต่อความเสี่ยงจากการหกล้มของผู้สูงอายุในชุมชนจังหวัดปทุมธานี

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## Abstract

This analytical cross-sectional study aimed to investigate the factors associated with falls among the Thai elderly in Pathum Thani province. The sample group consisted of 90 elderly people selected by purposive random sampling from three sub-district health-promoting hospitals. Questionnaires were used to collect data on physical health, mental health, daily activities, and the risk of falling. Data were analyzed by descriptive statistics: Frequency, percentage, mean, standard deviation, and chi-square test, with a level of significance of .05. The results showed that age and the fall risk conditions leading to falls were significantly related to the falls of the elderly (p-value .001*). For the health conditions in the community, physical health, mental health, activities of daily living, risky behavior leading to falling, living environment, gender, occupation, income, chronic diseases, and BMI were found not to be associated with the falls of the elderly. The results of the research can be used to set up a policy for sub-district health-promoting hospitals that is focused on the importance of falls in the elderly, especially for enhancing the health of adults in physical aspects and building knowledge on health care for the elderly whose body mass index is higher than normal.

**Keywords**: falls, Thai elderly, risky behavior

**บทคัดย่อ**

การศึกษาครั้งนี้เป็นการศึกษาแบบภาคตัดขวาง มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีความสัมพันธ์กับการหกล้มของผู้สูงอายุ จังหวัดปทุมธานี กลุ่มตัวอย่าง คือ ผู้สูงอายุ จำนวน 90 คน สุ่มตัวอย่างแบบเจาะจง จากโรงพยาบาลส่งเสริมสุขภาพตำบล จำนวน 3 แห่ง เก็บรวบรวมข้อมูลด้วยแบบสอบถาม ด้านสุขภาพทางกาย สุขภาพทางใจ การปฏิบัติกิจวัตรประจำวัน และภาวะเสี่ยงต่อการหกล้ม วิเคราะห์ข้อมูลด้วยสถิติพรรณนา ได้แก่ ความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และทดสอบความสัมพันธ์ด้วยสถิติไคสแควร์ กำหนดค่านัยสำคัญทางสถิติที่ระดับ .05 ผลการวิจัย พบว่า อายุและภาวะเสี่ยงต่อการหกล้มมีความสัมพันธ์กับการหกล้มของผู้สูงอายุอย่างมีนัยสำคัญ (p-value<.001*) สำหรับตัวแปรสภาวะสุขภาพในชุมชน สุขภาพทางกาย สุขภาพทางใจ การปฏิบัติกิจวัตรประจำวัน พฤติกรรมเสี่ยง สภาวะแวดล้อมที่อยู่อาศัย เพศอาชีพ รายได้ โรคเรื้อรัง และค่าดัชนีมวลกาย พบว่า ไม่มีความสัมพันธ์กับการหกล้มของผู้สูงอายุ ผลการวิจัยสามารถนำไปใช้กำหนดนโยบายโรงพยาบาลส่งเสริมสุขภาพตำบลที่ให้ความสำคัญกับการหกล้มในผู้สูงอายุ โดยเฉพาะการสร้างเสริมสุขภาพผู้ใหญ่ด้านกายภาพการสร้างความรู้ด้านการดูแลสุขภาพและผู้สูงอายุที่ ดัชนีมวลกายสูงกว่าปกติ

**คำสำคัญ**: หกล้ม ผู้สูงอายุไทย พฤติกรรมเสี่ยง

## Introduction

Falling is a prominent public health problem found mostly in the elderly. It can cause accidents and injuries, leading to mental impairment, broken bones dislocated joints or muscle pain in various parts of the body. (Assantachai, 2003) Around 20.00–40.00% of the elderly experience falling at least once per year (National Institute for Clinical Excellence, 2004). Falling can be attributed as the cause of most injuries in the elderly with 40.40% of incidences of falls occurring in the elderly in the Thai community being 18.7% and are found 3.4 times more in men than in women. (Department of Disease Control, 2018)

Falling is the reason for various accidents, injury, disablilties, death, and even trauma9. Studies have found that 90% of broken hip joints in the elderly are cause by falling, which hospitalized the elderly for double the period when compared to other injuries10. The more injuries that occur in the elderly, the more funds the government needs to accommodate the increasing medical expenses. Therefore, the department of public health has conducted a study and estimated that there will be an increase in medical expenses for the elderly which will be increased from 14,340.9 million Thai baht in BE 2540 to 35,549.7 million Thai baht in BE 2554 (an estimation of medical costs before the “30 baht” project)

In 2020, Thailand had a total population of 66.5 million persons, and the number is increasing at a decelerating pace. Just 50 years ago, the Thai older persons aged 60 years and over totaled 2 million persons. By 2020, that number had increased six-fold to 12 million, reaching nearly 1 in 5 Thais (18%). Thailand is expected to become a “completely aged society” by the year 2022. The “Million Birth Cohort,” or those Thais born between 1963 and 1983, are equivalent to a demographic “tsunami”, that will be gradually flooding Thai society with each passing year (Foundation of Thai Gerontology Research and Development Institute (TGRI), 2022)

Currently, based on the statistics on the seniors of Thailand on the 31st of December BE 2562, there are roughly 11,136,059 citizens who are aged 60 and above (4,920,297 male and 6,215,762 female) from a total of 66,215,762 citizens of Thailand where 16.73% are seniors. (Department of Elderly Affairs, 2019) Death from falling is as high as 1,600 cases per year, attributed as the second highest cause of unintentional death after car accidents. One-third of those who are aged 60 and above have an increased risk of injury the older they are. (Bangkok Hospital, 2019)

There was a study on the fall prevention policy and implementation in Thailand BE 2563. The results showed that among factors related to accidental falls in the elderly, those living in rural areas, working, and those who could not see had an increased risk of falling from an accident. As for the elderly who were married and lived together with their spouse, the risk of falls was reduced. As for health behavior, it was found that the elderly who exercised were associated with falling compared with the elderly who did not exercise. For the environmental factors, it was found that for the elderly who had toilets outside the house, the risk of falling increased. (Ketpitchayawattana & Kongboon, 2020)

As previously mentioned, the main causes of falling consist of internal and external factors. Internal factors may include age, history of falling, chronic diseases, hearing problems, balance difficulties, walking difficulties, depression, anxiety and different types of medication. External factors may include environmental risks like broken pathways and risky behaviors like wearing shoes that do not fit, wearing a sarong (a length of fabric worn wrapped around the waist), or skirts that are too long. This study conducted an analytical cross-sectional study with the purpose to investigate the factors associated with falls among the Thai elderly in in Pathum Thani Province.

## Methods

This analytical cross-sectional study was designed to collect data from December 2019 to February 2020. The sample study was the 90 Thai elderly. The researcher used convenient sampling from 3 Tambon Health Promoting Hospitals in Pathum Thani Province because the data collection period was during the severe COVID-19 outbreak. A purposive sampling method was used as follows inclusion criteria: Step 1: Pathum Thani Provincial Public Health Office selected three different tambon health promotion hospitals, Step 2: random sampling, cluster random sampling, and simple random sampling was used to gather information. The targeted participants included seniors who were aged 60 and above and were further categorized into early elderly people (ages 60-69), middle elderly (aged 70-79), and the late elderly (aged 80 and above) elderly people who were not bedridden, not disabled, did not have amnesia, or who had no specific symptoms or disease. exclusion criteria: who refuses to participate in the project.

### Data instruments and data collection procedure

The research instrument is comprised of a set of interview questionnaires to collect data by using checklists and open-ended questions. The questionnaire was divided into the following: Part 1: Demographic characteristics, the research made this section to record the general information of the interviewed elderly, Part 2: Falling of Thai elderly people comprised 10 items to choose to

have or not to have various choices, Part 3: Fall risk condition is made up of five factors. (Thiamwon, 2008; Papol & Khlueinak, 2021), Part 4: Health conditions of Thai elderly people in the community consist of: Physical health-nine questions were adapted from Maitri Tiyarattanakun. (Tiyarattanakun, 1993) These factors were determined through a rating scale divided into five categories ranging from never to always. There were 11 questions on the mental health of the elderly (Department of Medical Services, 2019; Department of Mental Health, 2019), A total of 11 questions were a yes or no type for two questions and a rating scale for the other nine questions. Activities of Daily Living: ADL was based on Barthel's Activities of Daily Living Index, Barthel ADI. The instrument was comprised of 10 items covering personal care and mobility, with a full score of 20 indicating functional independence (Barthel Activities of Daily Living Index, 2019), Part 5: Risky behavior leading to falling with a total of six questions comprised of two choices, yes or no (Muangsiri, Maharachpong & Rodjarkpai, 2017), and Part 6: The living environment consisted of seven factors that determined the factors that may contribute to the falling of the elderly.

The content of the questionnaires was validated by a qualified committee (IOC=0.85), and it was also tested for reliability before its administration to the participants. The questionnaire was tested for reliability with a similar group of 30 Thai elderly individuals aged 60 and above. Cronbach's Alpha of 0.689, 0.846, 0.789, and 0.679 were obtained for the reliability of the physical health, mental health, activities of daily living, and risky behavior leading to falling. The investigators explained the complete details of the research project and assured their participants' confidentiality. The participants were asked to give their written informed consent forms before the administration of the questionnaire and data collection. The researchers checked for completeness of answered questionnaires at the end of the interview sessions.

The data were analyzed using the SPSS version 18. Descriptive statistics were calculated to describe the sample and occurrence of falls including distribution, frequency, percentage, mean, and standard deviation. The chi-square test was used to explain the relationship between health condition, demographic characteristics, risky behavior leading to falling, living environment, and fall risk conditions among the falls of Thai elderly people in the community in Pathum Thani Province at a confidence level of 0.05.

## Ethics

The present research has been approved by the Pathum Thani Medical and Sanitary Human Ethics Committee for research ethics (Certificate of Approval: PPHO-REC 2562/014). The participants were provided with detailed research information and written informed consent was obtained from each recruited participant. The confidentiality of respondents in this present research was fully provided with the concealment of their identities.

## Results

This analytical cross-sectional study was conducted with the participants who were aged 60 years and above, both male and female. The age group was divided into early elderly people (ages 60-69), middle elderly people (aged 70-79), and the late elderly people (aged 80 and above). The interview questionnaires were checked for

completeness and the 90 returned survey forms were analyzed.

The demographic characteristics of the sample of 90 elderly showed that 76.67% were females, 23.33% were aged between 60-69 years with a mean age of 73.68 years. The most common occupations were staying at home, employee, and trader (49.14%, 27.06%, and 23.53% respectively). Sources of income were mainly from elderly subsistence welfare and others (71.76% and 28.24% respectively). Common ways for the treatment of illnesses and injuries used by the elderly in the community were get treatment from a Promotion Hospital/Tambon Health, using drugs from the drug store, and do not have treatment/let the injury heal (62.12%, 27.27%, and 10.61% respectively). Investigating the most common activities around the house, 82.02% were activities done inside the house. The calculated average BMI of the elderly community was 64.44% with the under to normal weight and the overweight to severely obese 35.56%. The falls of Thai elderly people in Pathum Thani Province have found that in the past 12 months, 46.67% of the elderly experienced falling. For the past 12 months, the elderly in the community experienced falling, with 40.00% experiencing it one to two times, 3.33% experiencing it three to four times, and 1.11% experiencing it more than six times. Based on the interview, 36.24% of the participants were more cautious while walking to avoid falling.

Table 1 Health condition of Thai elderly people is related to falling where it shows no statistical significance (p-value>.05). Therefore, it can be concluded that different health conditions of Thai elderly people do not affect falling. Moreover, the elderly who had moderate health concerns fell more than those with more serious health conditions.

Demographic characteristics such as gender, occupation, income, chronic diseases, and treatments related to falling are not statistically significant (p-value>.05). Therefore, the demographic characteristics and falling are not different.

**Table 1**

*The relationship between health condition, demographic characteristics, risky behavior leading to falling, living environment, and falls risk conditions among the falls of Thai elderly people in the community, Pathum Thani Province (n=90)*

| | The Falls | | | | Total | % | Chi-Square | p-value |
|---|---|---|---|---|---|---|---|---|
| | Had never fallen | % | Have fallen | % | | | | |
| **Health condition of Thai elderly people in the community** | | | | | | | | |
| Healthy at a moderate level | 38 | 61.29 | 24 | 38.71 | 62 | 100.00 | 5.602 | 0.061 |
| Have many to most health problems | 10 | 35.71 | 18 | 64.29 | 28 | 100.00 | | |

**Table 1** (continue)

| | The Falls | | | | Total | % | Chi-Square | p-value |
|---|---|---|---|---|---|---|---|---|
| | Had never fallen | % | Have fallen | % | | | | |
| **Physical health** | | | | | | | | |
| Have little awareness of their health | 31 | 63.27 | 18 | 36.73 | 49 | 100.00 | 5.234 | 0.155 |
| Have low to moderate awareness of their health | 20 | 48.78 | 21 | 51.22 | 41 | 100.00 | | |
| **Mental health** | | | | | | | | |
| Moderate to Low level of depression | 16 | 64.00 | 10 | 36.00 | 26 | 100.00 | 2.571 | 0.276 |
| No depression | 32 | 50.00 | 32 | 50.00 | 64 | 100.00 | | |
| **Activities of Daily Living** | | | | | | | | |
| Slightly dependent | 8 | 50.00 | 8 | 50.00 | 16 | 100.00 | 0.081 | 0.768 |
| Independent | 40 | 54.05 | 34 | 45.95 | 74 | 100.00 | | |
| **Risky behavior leading to falling** | | | | | | | | |
| No risky behavior | 6 | 23.07 | 20 | 76.92 | 26 | 100.00 | 1.032a | 0.309 |
| Have risky behavior | 46 | 54.76 | 38 | 45.24 | 64 | 100.00 | | |
| **Living environment (Home/Outdoor environment in the home)** | | | | | | | | |
| Safe | 8 | 57.14 | 6 | 42.85 | 14 | 100.00 | 0.323 | 0.571 |
| Unsafe | 39 | 51.32 | 37 | 48.68 | 76 | 100.00 | | |
| **Fall risk conditions leading Thai elderly to fall** | | | | | | | | |
| Have lower risks of falling | 29 | 96.67 | 1 | 3.33 | 30 | 100.00 | 33.951a | <.001 |
| Have risks of falling | 19 | 31.67 | 41 | 68.33 | 60 | 100.00 | | |
| **Demographic Characteristics** | | | | | | | | |
| **Age group (Years)** | | | | | | | | |
| 60-69 | 7 | 22.58 | 24 | 77.42 | 31 | 100.00 | 17.972 | <.001 |
| 70-79 | 20 | 68.97 | 9 | 31.03 | 29 | 100.00 | | |
| > 80 | 21 | 70.00 | 9 | 30.00 | 30 | 100.00 | | |
| **Gender** | | | | | | | | |
| Male | 12 | 57.14 | 9 | 42.86 | 21 | 100.00 | 0.163 | 0.689 |
| Female | 36 | 52.17 | 33 | 47.83 | 69 | 100.00 | | |

**Table 1** (continue)

| | The Falls | | | | Total | % | Chi-Square | p-value |
|---|---|---|---|---|---|---|---|---|
| | Had never fallen | % | Have fallen | % | | | | |
| **Occupation** | | | | | | | | |
| Staying at home | 24 | 57.14 | 18 | 42.86 | 42 | 100.00 | 6.842 | 0.654 |
| Employee (government/ private) | 9 | 32.14 | 19 | 67.86 | 28 | 100.00 | | |
| Trade | 13 | 65.00 | 7 | 35.00 | 20 | 100.00 | | |
| **Income** | | | | | | | | |
| Elderly subsistence welfare | 35 | 57.38 | 26 | 42.62 | 61 | 100.00 | 1.454 | 0.694 |
| other than welfare for the elderly | 12 | 41.37 | 17 | 58.63 | 29 | 100.00 | | |
| **Chronic diseases** | | | | | | | | |
| Do not have | 8 | 57.14 | 6 | 42.86 | 14 | 100.00 | 0.092 | 0.756 |
| Have | 40 | 52.63 | 36 | 47.37 | 76 | 100.00 | | |
| **BMI** | | | | | | | | |
| Under-normal weight | 30 | 60.00 | 28 | 40.00 | 58 | 100.00 | 1.990 | 0.737 |
| Overweight-Severely obese | 18 | 62.50 | 14 | 37.50 | 32 | 100.00 | | |

Note. $p<.05$ using the chi-square test indicates a statistically significant fall risk across each explanatory variable.

## Discussion

The research results revealed that 46.67% of the elderly experienced falling in the past 12 months with only 6.67% never experiencing falling. The number of falling cases that have occurred during the past 12 months were those who experienced falling at least 1 to 2 times, mostly during daytime. Once fallen, most of the elderly were able to support themselves. The health condition of the elderly makes them more susceptible to falling, with over half of the elderly having moderate health problems, meaning that the overall health of the elderly community is fair. However, almost all of the participants had risky behaviors that could lead to falling.

From the result found that the health conditions and falling had no relationship (p-value=.064). The reason may be that overall, their health condition both physical and mental, as well as their behavior are all at a moderate level. Characteristics such as gender, occupation, income, chronic diseases, treatment of illness, BMI, and risky behavior leading to falling had no relationship (p-value=.689, .654, .694, .756 and .737 respectively). This may be from

the fact that both male and female elderly had similar experiences with falling. Elderly women who wore large pants, skirts/sarongs, and shoes that are not slip-resistant may fall easily. The elderly with chronic diseases had experienced falling, with those who were overweight experiencing it the most. The elderly who were either underweight or overweight also had similar experiences with falling. These factors are not consistent with the study of Vipavee Kitkumhang, Nipat Kittimanon, and Supasit Pannarunothai. (Kitkumhang V, 2006) However, results that are related to the age group of the participants had a strong relationship to falling and were significant (p-value≤.001*). This may be from the fact that the elderly had similar numbers of those who have experienced and those who have not. Based on the interview, the elderly in the community were more careful while walking to prevent falling. The elderly from ages 60 to 69 were considered early elderly people and still had strong bodies and were more careless than other age groups, which was similar to the study of Jitapunkul et al. (1998) Risky behavior and living environment are correlated with falling as a p-value≥.05 show no significant difference. This may be from the fact that the elderly who experience falling do not exhibit risky behavior. This is associated with the study of Huang et al. (2003) who examined the risks of the elderly who are aged 65 and above and found that they had experienced falling.

However, fall risk conditions were associated with falling in the Thai elderly (p-value≤.001*). This may be from the fact that over half of the elderly in the community are at risk of falling with overall female participants having no difficulties with sight, walking, and balancing. These findings contradict the study of Jitapunkul et al. (1998); Susilowati (2020) have found that the factor that is highly related to falling in the elderly were problems with sight, walking, and balancing.

## Recommendations

An important risk factor that was associated with falls of Thai elderly people in the community was the age group and the fall risk conditions leading to falling (p-value≤.01). The results of the research will help provincial and district levels of public health to create policy for tambon health promotion hospitals to focus on the dangers of falling, especially on maintaining a healthy body condition in adults, raising awareness of bodily changes, exercising, diet, and encouraging annual health check-ups. The local administration should have plans to improve the environmental conditions to suit the elderly in both residential and public spaces as well as provide walking aids to low-income elderly who live in a high-risk environment. It is recommended for future researchers to have a universal scale to measure the eyesight of the participants which is the Snellen Chart with is comprised of numbers with varying sizes to determine the capability of sight of the participants.

## Limitations of the study

This study had several limitations that are worthy of mention. First, data collection through a questionnaire interview might be subject to recall bias. Second, the sample used in this study was purposive sampling and because the data collection period was during the severe COVID-19 outbreak and the elderly group was a vulnerable group, the provincial public health office selected districts and sub-district health promotion hospitals to collect the data. Therefore, the number of the sample group is limited. Furthermore, this study

was based on cross-sectional data, and we can therefore not ascribe causality to any of the associated factors in the study. Circumstances of the falls and consequences in terms of the type of injury were not assessed and should be evaluated in future studies.


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