

THE EFFECT OF A MULTICOMPONENT INTERVENTION AND EXERCISE  
CALENDER FOR FALLS PREVENTION AND IMPROVE QUALITY OF LIFE  
AMONG THE ELDERLY IN NAKORNNAYOK THAILAND

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บทคัดย่อและแฟ้มข้อมูลฉบับเต็มของวิทยานิพนธ์ตั้งแต่ปีการศึกษา 2554 ที่ให้บริการในคลังปัญญาจุฬาฯ (CUIR)  
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ประสิทธิผลของโปรแกรมสหปัจจัยและปฏิทินการออกกำลังกายเพื่อป้องกันการหกล้มและส่งเสริม  
คุณภาพชีวิตในผู้สูงอายุในจังหวัดนครนายก ประเทศไทย



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาวิทยาศาสตรดุษฎีบัณฑิต

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ศิปภา ภูมิรักษ์ : ประสิทธิภาพของโปรแกรมสหปัจจัยและปฏิทินการออกกำลังกายเพื่อป้องกันการหกล้มและส่งเสริมคุณภาพชีวิตในผู้สูงอายุในจังหวัดนครนายก ประเทศไทย (THE EFFECT OF A MULTICOMPONENT INTERVENTION AND EXERCISE CALENDER FOR FALLS PREVENTION AND IMPROVE QUALITY OF LIFE AMONG THE ELDERLY IN NAKORNNAYOK THAILAND) อ.ที่ปริกษาวิทยานิพนธ์หลัก: รศ. ดร. รัตนา สำโรงทอง, 69 หน้า.

การหกล้มในผู้สูงอายุมีสาเหตุมาจากหลายปัจจัยและหลายสาเหตุร่วมกัน นักวิจัยได้ทำการศึกษารวบรวมปัจจัยต่างที่ส่งผลให้เกิดการหกล้มในผู้สูงอายุ และสามารถจำแนกได้เป็น 2 กลุ่มใหญ่ คือ ปัจจัยภายใน(ที่เกี่ยวข้องกับตัวของผู้สูงอายุเอง เช่น มีประวัติการหกล้มในอดีต ความกลัวการหกล้ม กล้ามเนื้ออ่อนแรง การทรงตัวไม่ดี รวมถึงภาวะสูงอายุ) และปัจจัยภายนอก (อื่นๆ นอกเหนือจากตัวของผู้สูงอายุ เช่น สิ่งแวดล้อมที่เป็นอันตราย การใช้ยาร่วมกันมากกว่า 4 ชนิด เป็นต้น) อีกทั้งผู้สูงอายุที่หกล้ม อาจได้รับบาดเจ็บ พิการ ส่งผลต่อคุณภาพชีวิตของผู้สูงอายุ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาผลของโปรแกรมสหปัจจัยและปฏิทินการออกกำลังกาย เพื่อป้องกันการหกล้มและส่งเสริมคุณภาพชีวิตในผู้สูงอายุในจังหวัดนครนายก ประเทศไทย เป็นการศึกษาแบบกึ่งทดลอง โดยมีผู้สูงอายุเข้าร่วม จำนวน 100 คน ผู้สูงอายุ 50 คน จากตำบลป่าชะ อำเภอบ้านนาเป็นกลุ่มทดลอง และผู้สูงอายุกลุ่มควบคุม จำนวน 50 คน จากตำบลทรายมูล อำเภอองครักษ์ จังหวัดนครนายก กิจกรรมของโปรแกรมฯ ใช้เวลา 6 เดือน ประกอบไปด้วย 4 ส่วน โดยส่วนแรก ดังนี้ 1) การให้ความรู้ เพื่อการรับรู้ปัจจัยเสี่ยงของการหกล้ม, การป้องกันการหกล้ม, การออกกำลังกายเพื่อเพิ่มความแข็งแรงของกล้ามเนื้อ การฝึกการออกกำลังกาย 2) เป็นการประชุมกลุ่ม เพื่อแลกเปลี่ยนประสบการณ์การป้องกันการหกล้มจากผู้สูงอายุและครอบครัว 3) การออกกำลังกายด้วยตนเองที่บ้าน และบันทึกการออกกำลังกายด้วยตนเองลงในปฏิทินการออกกำลังกาย และ 4) เป็นการเยี่ยมบ้าน เพื่อติดตามการปฏิบัติตัวในการออกกำลังกาย, ปัญหาจากการออกกำลังกาย, การปรับเปลี่ยนสิ่งแวดล้อมที่บ้าน

ผลจากการศึกษาพบว่า ความแข็งแรงของกล้ามเนื้อและการทรงตัว การรับรู้ความเสี่ยงของการหกล้ม และคุณภาพชีวิตของผู้สูงอายุหลังการดำเนินกิจกรรม เพิ่มมากขึ้น ความกลัวการหกล้มลดลง อย่างมีนัยสำคัญในกลุ่มทดลองเมื่อเทียบกับกลุ่มควบคุม และอัตราการหกล้มในระหว่างดำเนินกิจกรรมในกลุ่มทดลองน้อยกว่ากลุ่มควบคุม สรุปการศึกษาพบว่า ผลของโปรแกรมสหปัจจัยและปฏิทินการออกกำลังกายช่วยป้องกันการหกล้มและส่งเสริมคุณภาพชีวิตในผู้สูงอายุได้

สาขาวิชา สาธารณสุขศาสตร์

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ลายมือชื่อนิติต .....

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SIPAPA PUMMARAK: THE EFFECT OF A MULTICOMPONENT INTERVENTION AND EXERCISE CALENDER FOR FALLS PREVENTION AND IMPROVE QUALITY OF LIFE AMONG THE ELDERLY IN NAKORNNAYOK THAILAND. ADVISOR: ASSOC. PROF. RATANA SOMRONGTHONG, Ph.D., 69 pp.

Falls among the elderly caused by many factors and situations. The researcher has identified falls risk factors, and these were commonly grouped as either intrinsic factors (related to the elderly themselves, such as a history of fall, fear of falling, muscle weakness, poor balance) and extrinsic (outside of the individual, hazard environmental, polypharmacy use). Elderly who had fallen may suffer, injuries, disability affecting the quality of life of the elderly. This study aimed to evaluate the effects of a multicomponent and exercise calendar to prevent falls and improve quality of life among the elderly people in Nakornnayok province, Thailand. This study was a quasi-experimental study among 100 elderly people. Fifty from Tambon Paka, Banna District, Nakornnayok Province were in the intervention group and 50 elderly people from Tambon Saimoon, Ongkarak District, Nakornnayok Province were in control group. Six months intervention program included 1) health education regarding risk of falling, how to prevent falls, exercise to improve muscle strength and balance, 2) community meeting for sharing experience of falls prevention among elderly people and family, 3) home-based exercise and record in exercise calendar, and 4) home visiting for following exercise at homes, barriers to exercise, and home & environment modification. The results revealed that muscle strength and balance, falls risk perception, and quality of life increased and fear of falling decreased significantly among the intervention group. Moreover, falls rate among the intervention less than the control group after intervention. The study found that the multicomponent and exercise calendar can prevent falls and improve quality of life among the elderly people.

Field of Study: Public Health

Student's Signature .....

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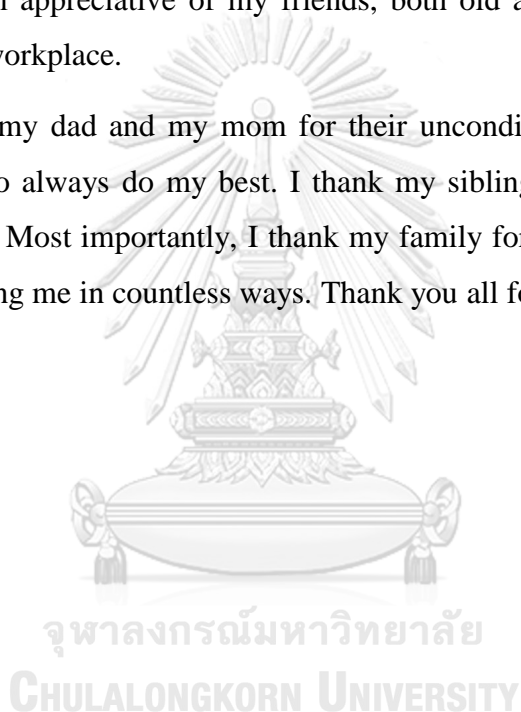
Advisor's Signature .....

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## CHAPTER I

### INTRODUCTION

#### Background and rational

Global trends in the number of the elderly population are increasing and average life expectancy has risen dramatically. The elderly people aged 65 and over in developed countries found approximately 20% of the population and are the fastest-rising segment of the population (1) Thailand also has been engaging ageing population, life expectancy of the populations includes older people has been increasing that health problems of the elderly people mainly due to the worsening of chronic condition and poor physical performance, which increases with age (2). The World Health Organization (WHO) (2007) mentioned that falls exponentially increase with age-related biological change. Facing aging societies, prevention fall is a critical public health problem, and falls arise in more than one third of people aged over 65 every year, leading to physical and psychological problem such as fear to fall, functioning problem, and mortality (3). According to the study of Alamgir (2015), 17.6% of the participants (n = 1055) reported falling 1 to 5 times in the previous 3 months. History of falls and fair general health (relative risk [RR] 2.39, 95% confidence interval [CI] 1.55–3.68) were related to falls. Moreover, regular physical activity was negatively correlation (RR 0.59, 95% CI 0.42–0.82) with falls. (4) The study of Charters (2013) reports that injury from falls, the hip fractures annually, are the highest cause of accident-related mortality in the elderly people. WHO (2007) mentioned that falls increase with age-related biological change. (5) Moreover, the impact of falling are physical problem such as

wound, muscle pain, bone fracture, disability, psycho-social problems, and involve treatment costly (6). The elderly people who had experienced falls also being the burden of their family, community and affect the overall economic loss to society and the elderly people who fell will lose confidence in their daily activities or fear of falling and affected ability of working, the less social role and lead to falls again (7).

Falls cause by an interaction between one or more risk factors and situations. Myers et al (1996) has identified more than 130 different falls risk factors and these are commonly grouped as either intrinsic factors (within the individual) or extrinsic (outside of the individual, usually environmental and other) (8). According to the Guideline for the Prevention of Falls in Older Persons (2001) of American Geriatrics Society classified the risk factors of falls into 3 types: the intrinsic risk factor (such as advance aged, being female, muscle weakness, balance problem, functional and cognitive impairment, visual deficits) and extrinsic risk factors (used of certain medications such as antihypertensive drugs, benzodiazepines) and environmental factors (poor building design, poor lighting, slippery surface) (9). Moreover World Health Organization (2007) categorized 4 dimensions of main risk factors including biological for instance, age, gender , physical, cognitive and affective capacities) behavioral (use of multiple medications, physical inactivity, alcohol use) , environmental (home and their environment hazards) and socioeconomic factors (lack of education, homeless, limited to access social service interaction, living alone) (5). In the overall, in term of the major fall risk factors among the elderly in community setting either Thailand and in other are similar (intrinsic and extrinsic factors (10).

Furthermore, many previous studies show factors related to falls, the elderly who had fall experience may conceal a fear of a repeat fall. WHO (2007) reports that

fear of falling is one of consequence of falling frequently reported by the elderly people. They are usually faced with the fear again, hurt, social embarrassment, social isolation, loss of confidence and fear may lead to a decline in the overall quality of life (5). Fear of falling is a weighty psychological concern of the elderly people who have falls experience (11). Moreover, fear from falls induce to escaping of some activities and sometime their limit the daily activities for improve their safety. Fear can lead to maladaptive changes in restrictive, avoid activities, and become sedentary behavior. Besides, these results affect to self-confidence, self-efficacy of elderly people.

Preventing falls is very crucial which can be done by finding a resolve and prevent risks associated risk factors. Many studies have been conducted on the risk, prevention, and management of falls and those studies shown clear evidence that falls in the elderly can be prevented with appropriately designed intervention programs. Yet many falls can be prevented by encouraging physical activity and modifying risk factors. There are many trials and systematic review shown clear evidence that falls in the elderly people can be prevented with suitably designed intervention programs. For instance, systematic review of Sherrington (2011) stated that exercise interventions can reduce the risk and rate of falls. The updated American Geriatric Society/British Geriatrics Society Clinical Practice Guideline for prevention of falls in older persons (2010) mentioned about exercise recommendations in the 2010 guidelines specify programs for the elderly in communities that include balance, gait and strength training. Many organizations have developed group and/or individualized exercise programs for the elderly people that improve strength and balance (12). Since balance is the most important component of physical functioning and performance of daily activities. Falls prevention exercise with balance and muscle strength training are the principle of falls

prevention program which counter the effects of muscle deterioration, especially those that keep the elderly upright and enable them to walk without swaying. Therefore, all falls prevention exercise must focus on strengthening leg and ankle muscles and challenging balance (Kenny et al., 2011). According to Piphatvanitcha (2006) studied the effect of a fall prevention program on gait and balance of community-dwelling elders. The results showed that after participating in a Fall Prevention Program, the experimental group had significantly increased their mean score of the Berg Balance Scale ( $p < .05$ ), and had significantly lower or better mean score of the Time up and Go test than before participation the program ( $p < .05$ ). The finding indicated that a Fall Prevention Program in this study is effectively on improving gait and balance in the elders and can be an effective care for promoting gait and balance for preventing falls in elders especially who have a high risk of falls. (13) Moreover, Pruksasri (2008) studied the effects of social-dance exercise program on balance among the fall-risk elderly. The subjects were equally divided into an experimental and a control group with similar characteristics (age, body weight, height, body mass index, education, exercise, disease, Berg Balance Score and perceived risk of falling). The results indicate that the social-dance exercise program enhanced balance and confidence in balancing of the elderly persons. In addition, a systematic review and meta-analysis of 40 randomized clinical trials for the prevention of falls in the elderly searched up to 2002 concluded that only exercise program interventions, both general physical activities (such as walking, cycling, and aerobic movements) and specific physical activities (training targeted towards balance, gait, and strength such as a Tai Chi training), had a statistically significant beneficial effect on lowering the risk of falls (14). There were many strategies have been promoted to reduce falls.

Falls are also one of the major health problems that affect the quality of life among the elderly people because falls accident harm to the elderly people. Its impact can lead to physiological and psychological problem such as injuries, lose self-confidence, and limit their activities life. The study by Scheffer (2008) mentioned the main consequences were identified as a decline in physical and mental performance, an increased risk of falling and progressive loss of health-related quality of life. By reason of this interaction, the relationship of falls and the quality of life becomes significant.

(15)

WHO provides WHO Falls Prevention Model (2007) which designed to enhance the health, reduce the burden of the important cause of age-related such falling. The WHO Falls Prevention Model consists of three modes 1) building awareness of the importance of falls prevention, 2) the assessment of the risk factors of falling and 3) facilitating the design and implementation of appropriated evidence based interventions that will significantly reduce the number of falls. A multicomponent was designed from fundamental of the WHO Falls Prevention Model (2007) that aims to integrate several components together make up a whole system for falls prevention. This study applied WHO Falls Prevention Model (2007) guide a multicomponent intervention.

Nakornnayok is one of eastern province of Thailand. There are approximately 257,300 populations residing in Nakornnayok province comprising of elderly population about 41,544 elderly people about 16.14% of all population (Nakornnayok Provincial Social development and Human Security Office, 2014). Nakornnayok province was the top eight of high mortality rate of the elderly cause from falls in 2011 (MOPH, 2013). Based on the existing data, the report of Bureau of Non Communicable Disease, Ministry of Public Health, the mortality rate of elderly cause from falls are

10.39 and 17.29 in 2012 and 2013 respectively (MOPH, 2014). With the rapid increase in the number of the elderly, the problem of falls must be taken into account. Tambon Paka is located in Banna district, Nakornnayok province. The number of elderly people in Tambon Paka is about 16 % of the total population. The pilot study by the researcher reported 30% of the elderly have had experience of fall last year. In addition, 72.4% of the elderly fear to falls particularly around their house. Moreover, results from community assessment from Faculty of Nursing, Srinakarinwirot University reported that falling among the elderly is the most concern problem in this community. Based on a review of literature, this study was designed to evaluate the effect of a multicomponent intervention to prevent falls and improve quality of life among elderly people in Tambon Paka, Nakornnayok Province.

#### Research Questions

Does a multicomponent intervention and exercise calendar prevent falls and improve quality of life among elderly people in Nakornnayok Province?

#### Objectives

##### **General Objective**

- To assess effects of a multicomponent intervention and exercise calendar to prevent falls and improve quality of life among elderly people in Nakornnayok Province

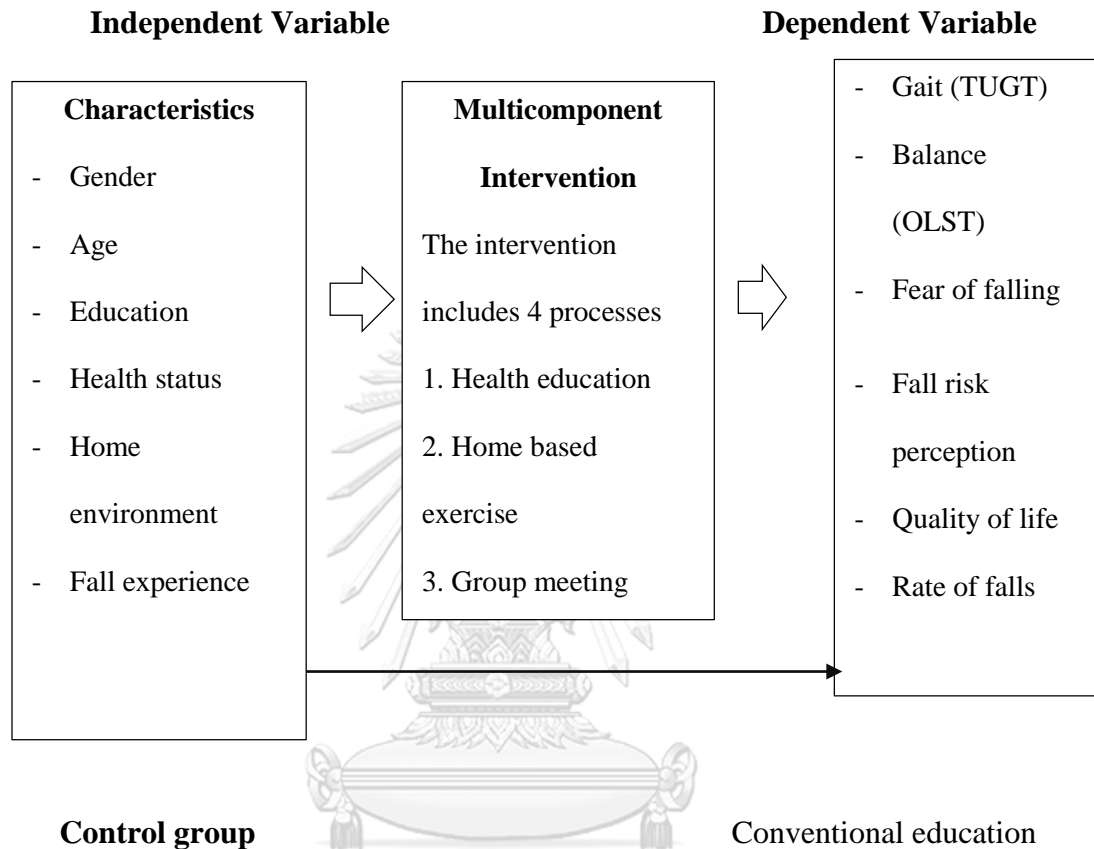
##### **Specific Objective**

- To compare gait & balance, fear of falling score, falls risk perception score and quality of life among the elderly before and after implementing a multicomponent and exercise calendar intervention.

- To compare gait & balance, fear of falling score, falls risk perception score and quality of life between intervention group and control group.



## Conceptual Framework



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Figure 1.1 Conceptual Framework



### Operational definitions

For the purpose of the study, the following terms are operationally defined:

- The elderly people mean people who are 60 years of age and over.
- Falls means unintentionally coming to rest on the floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects (WHO, 2007).
- The multicomponent intervention means 6 months' activities which aim to improve gait and balance, fear of falling, risk perception of falls, quality of life and reduce the number of falls among the elderly people who live in Tambon Paka, Nakornnayok province. The program includes:
  - 1) Health education about risk factors of falls, identification risk area in their home, how to prevent falls, and how to practice exercise to improve gait and balance.
  - 2) Manual use; 'how to prevent fall'
  - 3) Home visits by community nurse and village health volunteer each month in 1<sup>st</sup> -3<sup>rd</sup> month.
  - 4) Community Group meeting once a month; to share experience related to falls or nearly falls from the elderly, caregivers or their family, and learn together from the group.
- Fear of falling means the level of the elderly's concern about falling during social and physical activities both inside and outside their homes.
- Fall risk perception means the judgment of the elderly make when they are asked to characterize and evaluate hazardous activities.

- Quality of life means state of complete physical, mental and social well-being of individuals and societies include physical health domain, psychological health, social relationship, and environment domain.
- Rate of falls means the number of falls among the elderly in 6 months.
- Exercise calendar means exercise manual for the elderly report amount of exercise each week themselves.
- Health status is defining as history of any symptoms includes vision problem, hearing problem, and urinary incontinence that relate to falls in last one year.
- Home environment means environment inside and surrounding elderly's homes or place where an elderly life (and, at minimum, sleeps and keep most of his/her belongings).

## CHAPTER II

### LITERATURE REVIEW

The study about effect of a multicomponent intervention program, aims to improve gait, balance, fall risk perception, quality of life and reduce fear of falling and the rate of falls. This chapter provides the concepts related to these topics as follows:

#### 2.1 Concepts of the elderly

##### The Definition of Elderly

The World Health Organization (2000) defined elderly as a person over 60 years old or more according to ages. This meant that the age of sixty is likely to be a realistic expression of older age among people who are not having the advantage in earlier life.

Elderly means the person who is ages from middle-aged over the age of 60 years (16).

The results from in-depth interview and focus group discussion found that the elderly definition is 1) age by calendar, 2) physical appearance such as gray hair, 3) health decline 4) decreasing work ability, 5) emotional change, and 6) changing status to grandmother/ grandfather(17).

So far the definition of elders was defined, most meaning of the elderly based on age as the research factor. Throughout this study, elderly means people who are 60 years old or older, men or women.

##### Classification of the elderly

The World Health Organization (2000) classified the older people into three phases such as elder person—between 60-74 years old age, old person—between 75-90 years of age, and the very old person—90 years old and above.

The National Statistical Office Thailand (2008) divided the elder people into three groups as follows: (1) Older adult person: aged 60-69; (2) Old-old person: aged 70-79; and (3) Oldest person: aged 80 over.

In summary, the classifications of elder people establish by an organization or institute is quite similar. Therefore, in this study, the research would like to use criterion specified by the National Statistical Office Thailand, which cut off old person at 60 years old above.

## **2.2 Falls**

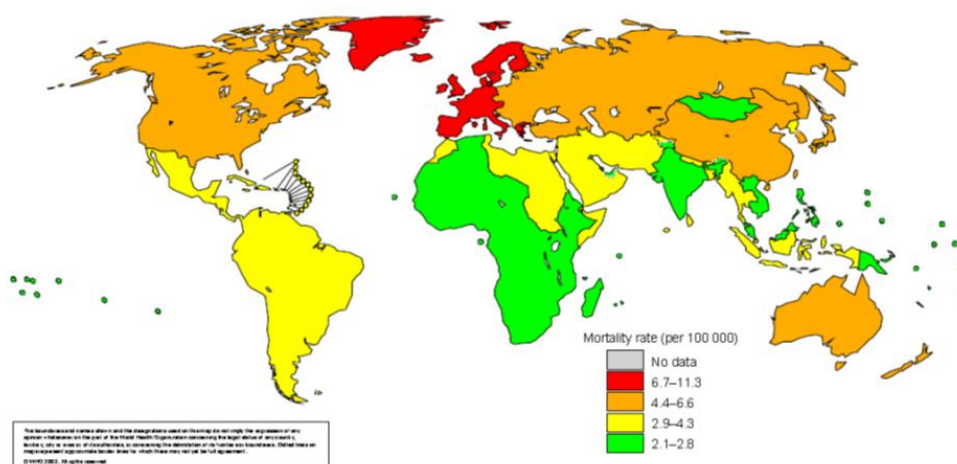
### **2.2.1 The Definition of falls**

The World Health Organization defined falls is “inadvertently coming to rest on the ground, floor or other lower level, excluding intentional change in position to rest in furniture, wall or other objects” (5).

### **2.2.2 Incidence of falls**

WHO(2002) shown the information that a quarter of all deadly falls happened in the high-income countries and the cause of death was predicted that 283,000 people died caused by falls in 2000.

### **Global Fall-related Mortality**



**Figure 2.1** shows mortality rates cause by fall (per 100,000 population) in WHO regions, 2000

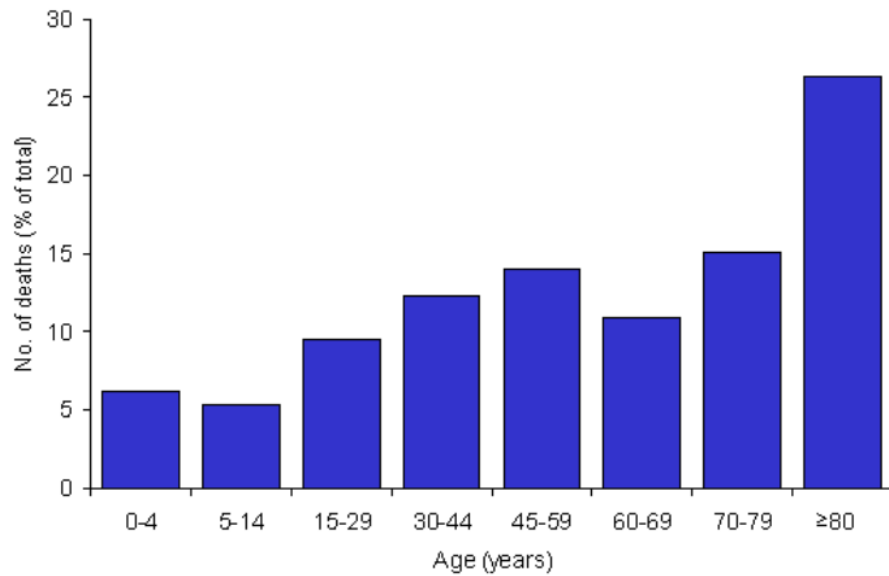
Source :The injury chart book (2002)(18)

Age group (years)	World		Africa		Americas		South-East Asia		Europe		Eastern Mediterranean		Western Pacific		
	Both Sexes	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
All ages	4.7	5.6	3.8	3.4	2.0	5.7	4.1	3.6	1.4	9.0	8.5	5.0	3.6	6.5	3.9
0-4	2.8	2.9	2.8	1.4	1.9	1.8	0.9	2.3	1.4	1.8	1.2	4.9	8.5	4.5	4.1
5-14	1.2	1.4	1.0	1.1	1.0	0.7	0.3	1.1	1.0	1.0	0.4	2.8	2.2	1.6	1.3
15-29	1.7	2.8	0.7	1.1	0.3	2.3	0.3	2.4	0.5	2.8	0.6	2.9	1.0	4.0	1.0
30-44	2.8	4.4	1.1	3.1	1.3	3.8	0.5	3.4	0.7	5.5	1.0	3.3	1.7	5.3	1.4
45-59	5.0	7.7	2.2	6.5	2.8	6.2	1.2	6.0	1.4	10.0	2.1	7.2	3.0	8.4	2.9
60-69	9.1	13.5	5.1	27.8	6.8	11.4	4.2	10.9	3.8	14.0	4.7	13.8	6.2	13.1	6.0
70-79	21.7	27.3	17.5	47.5	26.0	26.9	17.6	17.5	10.0	28.2	20.0	40.0	25.0	26.5	16.3
≥ 80	107.8	103.8	110.0	52.5	94.6	132.0	122.2	24.3	15.0	142.8	155.6	72.0	65.1	85.7	91.7

**Figure 2.2** shows the mortality rates regarding falling (per 100,000 population) in WHO regions by age group and sex, 2000. Source: The injury chart book (2002)(18)

From the figure 2.2 : Overall , the elder who the age over 70 years, mainly females, have significantly higher mortality rates regarding falling than younger people.

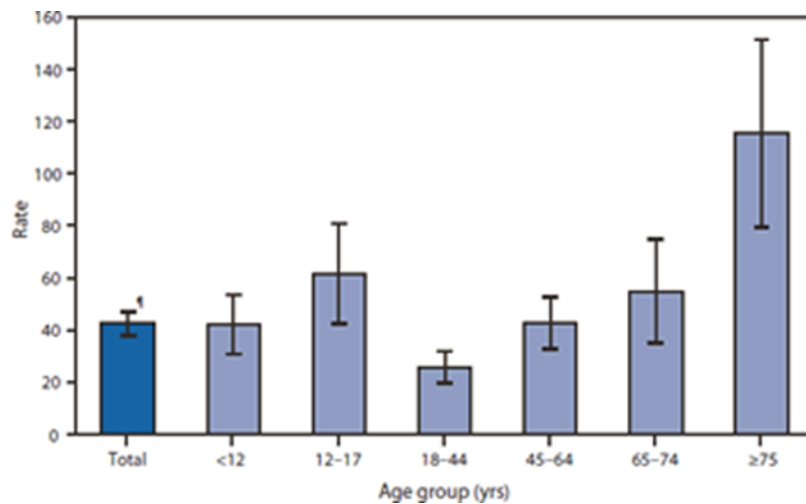
**Age distribution of global fall-rated mortality, 2000**



**Figure 2.3** shows the global mortality rate age regarding falling, 2000

Source; The injury chart book (2002)(18)

WHO (2002) reported that nearly half of the mortality rate caused by falling among the elder aged 70 years and over.



**Figure 2.4 Rate of Nonfatal, Medically Consulted Falls Injury Episodes, by Age**

Group

Source: MMWR Quickstats, 02/03/2012

(<http://www.cdc.gov/HomeandRecreationalSafety/Falls/index.html>)(19)

The Centers for Disease Control and Prevention (CDC) (2012) reveals that in 2010, the global nonfatal fall injury rates which contacted to health professional was 43 per 1,000 population. The highest rate was the elder aged  $\geq 75$  years. (19)

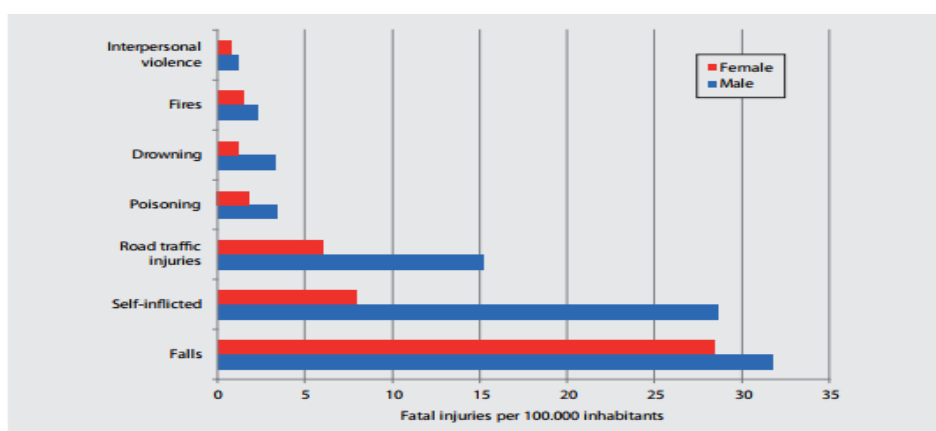
**Situation of falling in Thailand**

In very recent year, the National Statistical Office (2012) reported the percentage of falls among the elderly during 6 months prior to the interviewing that 8.6% fell and 91.4% never fall. The 80 years old and above group was the highest percentage of falls during 6 months prior to the interviewing. Moreover, mostly the elderly falls in their home (40%) more than the other place (32.1%). The 1st phase elderly group falls mainly in the other place. There are many studies regarding risk factors of falling in the elderly but the results are varies like other country. A study of by Assuntachai et al. (1999), the elder in communities found risk factors frequently related to falls consists of female gender, vision problem, hearing problem, sedentary people, lack of perceived related to own health, kyphoscoliosis, chronic disease particularly hypertension, tachycardia and nutrition problem. The study by Jitapunkul et al (1998) found the prevalence of one or more falls is nearly 19%, and female fell 21.5% than male (14.4%). Most of the elderly falls outside of their home (65%).(20) In 2003, Assuntachai revealed the prevalence of falls among Thai women is about 24% (21). Thiamwong (2008) mentioned that style house had effected to accident falls especially the elevated floors of Thai style house.(22)

## 2.3 Consequence of falls

### Mortality

Falls are very dangerous for elderly people. Falls can have a variety of outcomes ranging from no injury or minor injury, to serious injury or death. EuroSafe (2013) reported that every year 123,000 people aged 60 and above die from the consequences of injuries, which represents 53% of all injury deaths.(23)



**Figure 2.5 Fetal injuries amongst elderly people by causes of death and gender**

**Source: WHO MDB, Eurostat COD, EuroSafe (2013)(23)**

This figure shows the highest injury mortality rates relate to people at age 60 and above, falls being a major cause of these deaths. Fall injuries also account for a higher than average hospitalisation rate and an excess share in the direct medical cost due to injuries in this age group (24).

### Injuries

Falls are a major contributor to the over one-half million hip fractures that occur each year in the United States (US). Other fractures of the upper and lower extremities and pelvis are often linked to falls. Falls are a major source of head injury, and head-injury-related falls account for almost half of all deaths from falls (25). In



2009, the study by Gelbard (2014) (26) reported 3,885 patients with fall-related injuries were admitted to the Los Angeles County and University of Southern California medical center. Moreover, falls are a major contributor to the over one-half million hip fractures that occur each year in the United States (US).

### **Fear of falling (FOF)**

For many elderly people, the psychological effects of falls are far more damaging than the physical effects. Fear of falling has been identified as an independent risk factor for reduced quality of life, activity restriction, loss of independence, and fall-risk; a leading cause of injury, morbidity, and mortality (27). Fear can cause the elderly people to restrict mobility with the assumption that if they are not move, then they will not fall. Consequence of fall can also be embarrassing and painful, and can lead to restriction and loss of activities and independence or to a loss of confidence (7). There are a diversity of opposing psychosocial problems allied to falling, with nervousness, fear, loss of confidence, and impaired perception of ability to walk safely without falling. Psychological and behavioral consequences of falls take account of fear of falling, restricted activity, social isolation and functional decline. Falls evoke significant anxiety and fear, causing social separation and functional decline with later cognitive deterioration, depression and reduced quality of life (28).

### **Falls impact the family at large**

Fall related injuries are a serious public health issue. When the elder falls and loss confidence it impacts their family as well. Family members may have to take care the elderly all the time. Some of them have to off from work to help and support the elderly or some have to employ somebody to take care the elderly. Moreover, financial resource may need to spend for improvement safely environment.

The economic from falls problem is critical to family and community. The increasing rate of falls is correlated with high cost of falls (5). The cost of falls to society has direct and indirect components. In the US, direct costs for all falls in the 1990s was predictable to be near \$20 billion annually or over \$7,000 per injured faller (29). Major sources of costs were hospitalization and nursing home care. With the expected growth in the older adult proportion of the population throughout the world, fall-related costs are projected to increase three-fold in the coming decades. Although injurious falls clearly lead to high healthcare costs, non-injurious falls are also expensive, with an increased risk of nursing home admission and ancillary home services.

#### **Decrease quality of life**

The socio-demographic characteristics influence to the quality of life for example age, education level, economic status, and health status in the elderly people. Falling is one of the most important health concerns that affect the quality of life in the elderly people. The study by Ozcan et al (2005), they studied 116 elder aged 65 or older who living in the T.C. Emekli Sandigi Narlidere nursing home. The results show strong positive association with Physical Health Component of quality of life (SF-12), General Health Perception and Berg Balance Scale (BBS) reveal that the raising of quality of life associated with the raising of balance score. (30) In 2008, A systematic review by Scheffer show 28 studies with the elderly in the community. Those were identified a physical and mental decline, a higher risk factors of falling and more adverse health-related quality of life. The study by Intarakamhang and Chintanaprawasee (2012) was to evaluate the effect of Dao De Xin Xi exercise on balance and quality of life in Thai elderly people. The results revealed that the Single-Leg Stance Timed test and Time Up and Go test improved significantly (before versus after exercise) and improve 4 major

domains in quality of life such as physical health, psychological, social relationship, and environment. (31)

## **2.4 Risk factors of falls**

Falls in the elderly are related to many factors. Identifying the risk is the first step to plan for preventing falls. According to literature reviews of falling among the elderly from western and other countries, they presented that those many risk factors classified in intrinsic and extrinsic factors (32, 33) as follows;

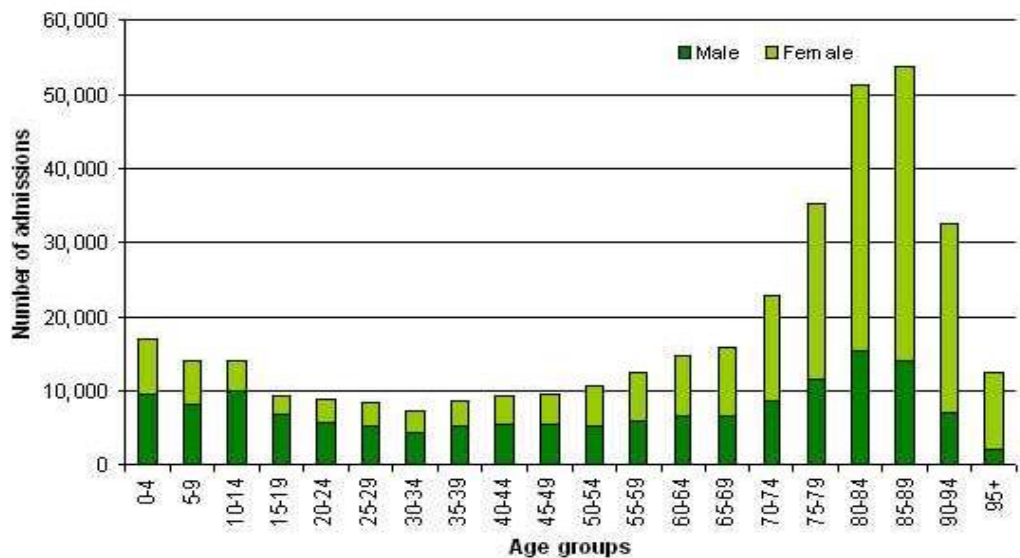
### **2.4.1 Intrinsic factors**

Intrinsic factors mean risk factors of falls that related to a person's behavior or condition includes age-related causes such as neurological disease, degenerative joint and muscle disease, muscle weakness, and diseases that affects function and/or gait and balance; cognitive impairment which cause problems for balance and mobility.

#### **Increasing age**

There is much physiological and psychological change in aging such as loss of motor neurons, loss of muscle mass, cognitive & sensory impairment that may lead to the risk of falls. The numbers of falls are increasing in magnitude as a number of the elderly people are increasing in the other countries in the world (5). Increasing age is associated with higher rate of falls. The Injury Chart Book from WHO (2002) reveal the mortality rate form falls in the age group over 80 years old is the highest rate from the other age groups. WHO Global Report on Fall Prevention in Older Age (2007) reported that the oldest segment (age 80 and over) especially likely to falls. The Thai National Statistical Office (2011) shows the highest rate of falls in the last age group

during 6 months before the survey. There are some documents show that falls rates vary greatly depending upon age. It is noteworthy that the raising number of elderly people related to raising fall rate. This table shown the example in the Hospital Episode Statistics, UK that falls rates are increasing with age.(34)



**Figure 2.6** The number of admissions to hospital for falls in 2007-2008

Source from: <http://www.physio-pedia.com/Falls>

### Gender; Being female

The distinction in gender-related factors of falls, being female gender were important predisposing factors for falling for instance, female's muscle mass declines faster than male, particularly after menopause period. The WHO injury chart book (2002) reveal that the elderly who over the age of 70 years, particularly females, have significantly higher fall-related mortality (18). The prevalence rate of falls in Thai older female was higher than male 1.5 times, yet the mortality rate in Thai older male was higher than female 3.5 times (MOPH, 2012). Kahirunyaratn et al (2013) stated that the elderly female fell more often (21.5%) than male counterparts (14.4%). (35)

### **History of falls**

The elderly who had experience of falling seems to be a sign of weakness, health impairment, and mobility problem. The Systemic Review and Meta-Analysis of Deandrea (2010) reported that the significant difference reported regarding history of falls OR = 2.8 for all fallers; 3.5 for recurrent fallers.(36) The case-control study by Thiamwong (2009) was conducted among 132 Thai elderly people in the long-term institutional care. The Odd ratio of the elderly with history of falls were 38.398. (22) Furthermore, the prospective cohort study by Sherrington (2011) shown 34% fell in 3 months after discharge from aged care rehabilitation inpatients (n = 442). The study by Karlsson (2013) mentioned that “a history of falling” is the strongest risk factors for falls. (37)

### **Impaired balance and mobility**

There are many causes and risk factors for poor balance and mobility. Ageing process related to the multiple physiological systems that contribute to decreased muscle flexibility and strength, reduced central processing of sensory information, and slowed motor responses(9). Balance impairs with aging and may cause mobility limitations and functional decline. The greatest risk factors for falls are not only a history of falling but also evidence of problems with balance and mobility(38). The study by Thiamwong (2009), a case-control study was conducted among 132 Thai older adults in the long-term institutional care. The results revealed that: balance impairment and mobility impairment were 3.604 times more likely to falls. (22) Those elderly were 1.65 times more likely to falls. Moreover, the result from the study by Silvia et al (2010) showed that the elderly with gait problems OR = 2.1 for all fallers; 2.2 for recurrent fallers. The meta-analysis of RCT by Huss (2008) report that the most important of these

risk factors are muscle weakness and problems with gait and balance. The summary of the 16 controlled studies showed the mean RR-OR of balance deficit and gait deficit were 3.2 and 3.0 respectively (39)

### **Fear of falling**

Fear of falling in elderly people is both risk to fall and consequence of fall. The Division of Aging and Seniors (2005) reported that the elderly who fear to fall also be likely to absence self-confidence to manage and prevent falls, and lead to falls again. Fear of falling is frequently reported that is a weighty psychological concern of the elderly people who have falls experience (11). Fear of falling lead to escaping some activities and sometime their limiting their activities for improves their safety. This is important because it can limit physical and social activities. Yet, fear can lead to misappropriate changes in physical balance, body control, decline the quality of life that may increase a risk of falls. This feeling can be expressed in the elderly people both who had experienced fall and also in the elderly people who never fall. The result from the study by Deandrea (2010) showed that fear of falling OR = 1.55 for all fallers; 2.51 for recurrent fallers (36) . Systematic reviews by Scheffer (2008) show 28 studies, the participants were the elderly in the community. The at least one fall is the main risk factors for developing fear to falls(15).

### **Visual problem**

Visual impairment is an important risk factor for falls. There are many aspects of vision that are important for monitoring the environment, including acuity, peripheral vision, depth perception and dark adaptation. The study by Pattaramongkolrit (2013) conducted 278 Thais, 60 years and over who living in Bangkok, and attending the eye clinics at three tertiary hospitals. The results revealed that only their physical

performance significantly predicted a fall occurrence ( $p < .001$ ; adjusted OR = 0.96; CI: 0.93-.99), with those with poorer physical performance having a higher risk of falls (40).

### **2.5.2 Extrinsic factors**

Extrinsic factors refer to outside of the individual, usually environmental hazards, and inappropriate activities (41) such as lack of stair railings, poor fitting footwear or cloths, and medications use (42).

#### **Medication**

Falls risk can also be increased if the elderly person takes four or more medications. Deandrea (2010) mentioned that multiple medications use may be viewed as an indicator of health problem condition. There is raising empirical evidence that multiple medication use may lead to falls because an adverse drug reaction to one or more medications (36). Using anti-anxiety drugs were associated with falls as supported by a study done in Great Britain, they found that hypnotics and anti-anxiety drugs was related to an increased about 50% in the odds of falling (43). Moreover, use of certain medications such as benzodiazepines, sedative-hypnotic drugs, antihypertensive drugs, antiseizure medication and diuretic drugs are often classified as extrinsic risk factors (41), (44).

#### **Environment**

The household environment influences the health of the elderly. WHO (2007) mentioned physical environment is related to falls in the elderly people such as home hazards, poor lighting, slippery floor, and no stair handrail (5) . The first step in preventing a fall knows what risk factors exist in and around own home. Sophonratanapokin et al (2012) studied home hazards and living arrangements and their

association with falls among the elderly in Thailand (45) . The study found that the factors associated with a chance of falls were: a slippery floor in the first stair of the house (OR 1.39; 95% CI 1.21-1.59,  $p=0.000$ ), a slippery floor in the bathroom or toilet (OR 1.32; 95%CI 1.16-1.49,  $p=0.000$ ) and bathroom or toilet located outside the house (OR 1.23; 95%CI 1.12-1.35,  $p=0.000$ ). The environment and home modification for minimized the risk can reduce the rate of falls in daily activities in their home. The first step in preventing a fall knows what risk factors exist in and around the elderly's home (45).

### **Conclusion**

From many literature reviews, factors related to falls in the elderly people can categorize into two types. One type is intrinsic factor including increasing age, history of falls, being female, impaired balance and mobility, physical inactivity & sedentary behavior, visual problem and neurological disorder. The other type consists of poly medication use and environment. Significant evidence occurs that most falls in the elderly people are linked to identifiable risk factors and modifiable risk factors. The applicable prevent falls program for the elderly people are needed.

### **2.6 How to prevent falls**

There are many substantial increases in the past in research on the prevention falls among the elderly people. The important evidence now exist that most falls in the elderly are associated with identifiable and modifiable risk factors (46); similarly, World Health Organization (2007) mentioned that prevention factors for falls in the elderly are associated with behavior adjustment and environmental modification (5) .



Behavioral adjustment to a healthy lifestyle is a strategy to encourage healthy elderly people and preclude falls such as stop smoking, no drinking alcohol, control body weight, exercise regularly, and eating healthy food. The prevention is the best protection for falling. Reduction of risk factors and promote safer situations is the one strategy to prevent falling. A variety of fall prevention program targeting the elderly people who are living in the community or the elderly at home have been established and critically evaluated. There were many strategies have been promoted to reduce falls. Some have used one strategy or single intervention (education, exercise practice, vitamin D, or withdrawal of psychotropic drugs); and more strategies or multicomponent intervention programs (integrate several strategies) for preventing falls (47).

Falls prevention studies or guidelines show the following evidence based strategies are effective in decreasing the incidence and prevalence of falls as follows

#### **Physical activity & Exercise for preventing falls**

According to WHO (2007) mentioned about participating in moderate physical activity regularly is important to good physical and psychological health (5). The study of Viravan (2012) found that (15 minutes  $\times$ 4/week  $\times$  12 weeks) exercise program among the elderly in Bangkok can improve Time Up and Go and Berg balance Scale after participated in the program (48). This quasi-experimental by Pruksasri, Kongin and Jittanoon (2008) shown the effects of social-dance exercise program on balance among the fall-risk elderly that after 6 and 8 weeks of social-dance exercise program had a significantly increased mean score of balance (49). In addition, the results of the study by Amatachaya, Yuenyong and Siritaratiwat (2010) revealed that the participants who exercise regularly had better balance performances and quality of

life with a lower incidence of fall than non-regular exercise participants (50) . Suttijit (2010) reported that the mean of the body balance (static and dynamic) of the participants who participated in 12-weeks exercise program different from the control . The study by Sangworakan (2008) found that the elderly who participated in 12-week Ram-Kra-Bi training exercise had body mean difference from the elderly who were control group(51).

In a very recent Thai study by Intarakamhang and Chintanaprawasee (2012) examine the effect of Dao Xin Xi exercise (or short Tai Chi) on balance in Thai elderly women. The results shown that the elderly who participate in the 3/week × 12-weeks exercise improve both static and dynamic balance (31). Sherrington et al. (2008) reported that balance impairment, or lower extremity weakness are a risk factor for falls. The result from the study by Deandrea (2010) showed that the physical disability OR = 1.6 for all fallers; 2.4 for recurrent fallers. Gillespie et al. (2009) stated that individualize exercise programs for home training utilizing in the intervention studies of the elderly in community can reduce the fall rate. Lord et. al (2007) reported that the limitation in mobility and basic activities of daily living (ADL) impairment are associated with double or triple risk of falls. Since exercise is very essential to reduce the rate of falls, previous systematic reviews and empirical evidence have mentioned that exercise can apply for the strong one strategy for each intervention or single intervention to prevent fall (44). A variety of exercise for fall prevention among the elderly have been established and critically evaluated. Some studies provide clear evidence that falls in the elderly can be prevented with appropriately designed intervention program such as balance training, stretching, walking, aerobic movement and Tai Chi (10, 52). Robertson (2001) stated that the home based programs of muscle

strengthening, balance retraining, and walking, which target people at higher risk, are effective. The updated meta-analysis and best practice (2011) concluded that the exercise intervention can reduce risk of falls and rate of falls. The meta-analysis by Sherrington et al (2008) revealed that up to 42% of falls can be prevented by well-designed exercise program. In the same way, the recommendation from meta-analysis (2011) stated 5 recommendations for exercise for fall prevention as follows; 1) exercise must be a moderate or high challenge to balance, 2) exercise must be of sufficient dose to have an effect, 3) ongoing exercise is necessary, 4) fall prevention exercise should be targeted at the general community as well as those at increased risk of falls, and 5) fall prevention exercise may be undertaken in a group or home-based setting (Sherrington, 2011). Promoting appropriate physical activities to improve strength and balance is the one of the most feasible to prevent falls (5).

### **Environment modification**

Factors related to the physical environment are the most common cause of falls in the elderly. Sherrington (2014) state that fall can happen to people with good physical function in a challenging environment. Environment screening and modification are shown to be very effective intervention for the elderly with the history of falling (44). The CDC (2008) recommended that environment modification is the strategy to reduce dangers in their home and reduce rate of falls such as home assessment and removing risks of home and environment in community; non-slip surface, suitable stairs with railings, and curb ramps; removing cords, wide doorways. For instance, the environmental modification is home modification. It prevents the elderly from hidden dangerous of falls in daily activities at home such as provide slip-resistant surfacing in the bathroom and provision of lighting and handrails (53) .

## **Education**

Education is an important strategy for prevent fall. The AGS/BGS (2010) recommend about the intervention that should include a knowledge complementing and addressing specific issues regarding preventing falls (53). WHO (2007) determines as examples include informing the elderly, family and local health volunteers about risk, health promotion activities campaigns. Moreover, to be effective, knowledge or education must be part of a large strategy for falls prevention that reflects current evidence, adult learning principle and integration of learning to practice.

### **Medication management:**

Medications have consistently been associated with risk of falls. The AGS/BGS (2010) indicated that there is the strongest evidence supports withdrawal of psychotropic medications, as a single intervention and as a component of multifactorial and multicomponent intervention. Moreover, WHO recommended that advisement the doctor for minimizing polypharmacy for reduce adverse drug reaction from not necessarily medication are needed (5).

### **2.6.2 Fall Prevention Study in Thailand**

From the literature review, seventeen previous studies of falls prevention program in Thailand in form of group and home based exercise consist of gait, balance, strength training exercise to enhance strength of body and promote health of the elders resulted in a significant improvement in the intervention group (49) (13) (49) (52) (31) .There were 10/17 studies used multiple intervention to prevent falls which included education session, exercise training, the results show that the mean score of knowledge in the intervention group are better than control group in all studies. Moreover, there

are two action research studies (54) (55) to develop the community based fall prevention program which included fall prevention education, discussing and identifying environmental risks that existed within the community; and, identifying strategies addressing fall prevention, resulted fall incidence reduced, the elderly and community stakeholders in community were highly satisfied, but the fall incidence was reduced nearly 25% (54).

Poramuthakorn (2010) studied the effectiveness of the programmed interdisciplinary assessment for older people who have a risk group in terms of further falls. The study compares muscle strength and movement degree of the joints for walking, balance testing found that the intervention group was significantly changed in the way of better and differences with the control group (95% CI,  $p < 0.05$ ).

Lap-anontasin (2009), conducted a 4 weeks' balance training by group exercise program and balance training in Thai elderly women. Thirty healthy elderly aged  $70.93 \pm 7.74$  years were randomized into 3 groups; 1) balance training by the designed group exercise program (GE), 2) balance training with the computerized balance training device (CD), 3) no training (control). The results revealed that after training, the TUG (time up to go test) in the 2nd and 4th week of both group exercise program (GE) and the computerized balance training device (CD) were less than controls ( $p < 0.05$ ). Only CD showed longer FR test compared to controls in the 4th week ( $p < 0.05$ ).

Pruksasri (2008), studied the effects of social-dance exercise program on balance among the fall-risk elderly. The results indicate that the social-dance exercise program enhanced balance and confidence in balancing of the elderly persons. The

social-dance exercise should be implemented for health promotion, rehabilitation and improved health among the elderly.

Piphatvanitcha (2006) studied effect of a fall prevention program on gait and balance of community-dwelling elders. The results showed that the elderly people after participating in a program had significantly increased their mean score of the Berg Balance Scale ( $p < .05$ ) and mean score of the Time up and Go test were lower than before participated the program.

Pootong (2002), studied the effect of risk reduction program on fall prevention behaviors of elderly at home. This study compares fall prevention behaviors of elderly between before receiving risk reduction program, 2 and 4 weeks after receiving the intervention. The results were as follows 1) Fall prevention behaviors of elderly before receiving the risk reduction program, 2 weeks and 4 weeks after receiving the program was significantly different. ( $p < .05$ ). 2) Two weeks after receiving the program, fall prevention behaviors of the elderly were significantly higher than those of the elderly before receiving the intervention as well as 4 weeks after ( $p < .05$ ). Fall prevention behaviors of elderly after participating in the program 4 weeks was also significantly higher than those of elderly before participating in the intervention ( $p < .05$ ).

The study of Khongprasert et.al (2011), they used a series of 36 Thai dance sessions. The participants were divided into Thai dance group (TG) and control group (CG) by voluntary enrollment. The patients with TG attended the Thai dance exercise program 3 times/ week for 12 weeks whereas the CG did not attend the Thai dance exercise program. The results in study 2 (only 20 completed patients, TG=11 and CG=9), There were significant improvements in all parameters of the Thai dance group (on time) after participating in specifically designed Thai dance exercise program and

there were also significant differences in UPDRS subscale III, Time Up and Go, Berg Balance Scale, PDQ8, stride length (Lt.) and gait velocity at 2 months' follow-up while step length (Rt.) was decreased significantly from post-test value.

The study of Pankong (2009); she studied the effects of Ram Thai Prayuk on muscular strength, activity daily living and well-being with elderly persons. The program is Ram Thai Prayuk exercise 30 minutes  $\times$  3 times/week in 6 weeks. The results found that the elderly participated in the program reported muscle strength and well-being mean score the experiment were significantly higher than before the experiment ( $p < .01$ ).

## **2.7 Theoretical Model of falls prevention program**

The development of a multicomponent intervention was guided by WHO falls prevention model. This model provide overall of the integrative of multi-disciplinary to reduce falls problem among the elderly (5). Applying constructs of WHO falls prevention model into a multicomponent program can be valuable. This conceptual framework model is coordinated, and designed to minimize falls, because falling is the burden of elderly, caregiver, and community. The aim of this model are 1) raise awareness of the important of falls prevention, 2) able to assess the elderly who are risk, environment hazard and 3) provide the suitable program.

### **2.7.1 WHO Falls Prevention Model**

The WHO falls prevention model indicates the integrative approach to prevent falls from the WHO Active Ageing Policy Framework. This model provides the similar perspective for decrease falls and injuries from falls among the elderly(5).

### **1. Prevention of falls is important.**

There is very important to raise awareness about prevention falls particularly in community that are impacted by falls. Awareness building is not only individual knowledge, but also enhancing responsibility of social sector in the community to reduce risk of falls.

The elderly: Most of them are unaware that falls are preventable. This model provides basic-health education and health literacy about risk factors of falls and how to prevent falls.

Family (or caregiver): Family member or caregiver have important to raise awareness of falls and falls prevention. Training for identifiable the risk and communicate with family member or caregiver should provide them for minimize the falls accident.

Community: Most the elderly living in own community. Ageing friendly community is an optimize strategy for the elderly well-being. Preparation for safety and suitable area for the elderly and building awareness regarding falls prevention is very significant for community level.

Health system: Enhancing, raising awareness, identifying risk and changing the attitudes to prevent falls are principle feature of health and social-service provider.

Media: The media for promote the falls prevention concept is one strategy, particularly easy access positive media for related group of the elderly (family,



caregiver and family member). Media is another channel to disseminate information and knowledge of falls prevention.

## **2. Identification and assessment of risk factors**

Assessment the people who are risk to falls should be exist in the standard or guidelines in healthcare service, and the healthcare staff should be trained to use this tool. Since this can help to identify the elderly people who are at the greatest risk.

Behavioral: there are many elders believe that today is too late to modify their lifestyle or behavior in old age, but these believes are wrongly. Healthy lifestyle can start anytime when they are ready. Identifiable risks and adjustment appropriately for the safety are needed for reducing falls.

Personal: In the individual level, the screening and identify the risk may help to properly manage falling.

Social: social support in the elderly who had experienced fall to participate in society can reduce suffered from falls. Mental management of falls by friend, family members is also important for them.

## **3. Identifying and applying the effective interventions**

Falls caused by a combination of variety of intrinsic and environmental hazards or extrinsic factors. Assessment and identification in individual level about the risk help to plan or create the suitable prevention falls program among the elderly people in community.

There is much evidence that combining behavioral change strategy and environment modification into interventions designed to enhance healthy people and environment. The behavioral strategies have been shown to develop a new behavior are including: family, peers and social support. Empowering, promoting self-efficacy and

perceived competence, providing the appropriate need for the elderly people, encouraging the elderly people to constrain to the intervention by developing health for reach the optimal goal. In additional, environmental modification: the systematic of assessment home and environment risk also conform to “Ageing friendly environment” concept. This from WHO is one strategy to helps cities and communities become more supportive of the elderly people by addressing their needs. The appropriate home and environment modification for the elderly people in community are needed.

### **2.7.2 Applying WHO Falls Prevention Model**

This study applies the WHO Falls Prevention Model to guide the program. The program comprises of 1) raising awareness, 2) identification and assessment the risk, and 3) identifying and applying the effective interventions.



**Figure 2.7 Applying the WHO Falls Prevention Model**

## Chapter III

### Methodology

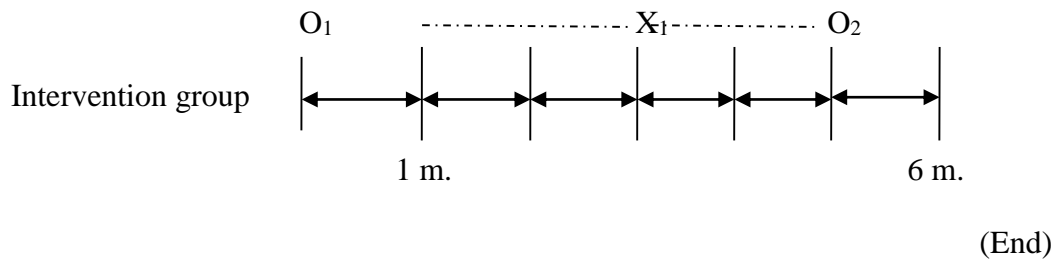
#### 3.1 Research design

This is a Quasi-Experimental Research with pretest-posttest design on intervention and control group. The intervention group is elderly people from Tambon Paka, Banna District, Nakornnayok Province. The control group is elderly people from Tambon Saimoon, Ongkarak District, Nakornnayok Province. One group has home based and group exercise, community meeting, and home visiting though at 6 months of intervention.

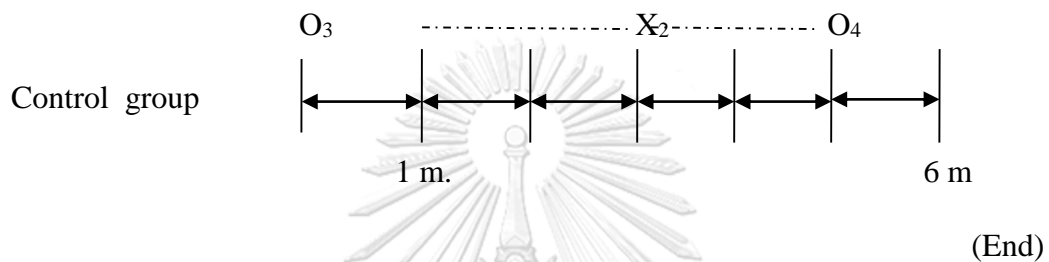
Tambon Saimoon, Ongkarak district, Nakornnayok province is the area of the control group to compare with Tambon Paka because the elderly people's lifestyle is similar to the elderly people in Tambon Paka.

The primary outcomes measurement as rate of falls at the end of the program. Gait (Time Up-and-Go test, balance (One legged stance test), fear of falling scores, fall risk perception and quality of life, and, are being evaluated before and 6<sup>th</sup> month or at the end of the program.

**Intervention group** (Group of Intervention in Tambon Paka)



**Control group** (Conventional education in Tambon Saimoon)



O<sub>1</sub>, O<sub>3</sub> refer to evaluation of gait & balance, fear of falling score, fall risk perception, and quality of life by the intervention and control group before the experiment.

O<sub>2</sub>, O<sub>4</sub> refer to evaluation of gait & balance, fear of falling score, fall risk perception, and quality of life by the intervention by and control group after the experiment.

X<sub>1</sub> refer to the group of elderly in the intervention group.

X<sub>2</sub> refer to group of in the elderly in the control group.

### **3.2 Research setting**

The research will recruit the participants who are the elderly people that live in Tambon Paka, Banna District, and Tambon Saimoon, Nakornnayok Province.

The multicomponent intervention session will have conducted at the Community Meeting Hall of Tambon Paka, Banna District, Nakornnayok Province, where are completely facilities for organization the health education and exercise session throughout 6 months' intervention.

### **3.3 Population**

Eligible populations in this study are the elderly who had experienced at least one fall within the 12-months prior and living in Tambon Paka, Banna District, and Tambon Saimoon, Nakornnayok Province to participate in this study.

#### **Inclusion criteria**

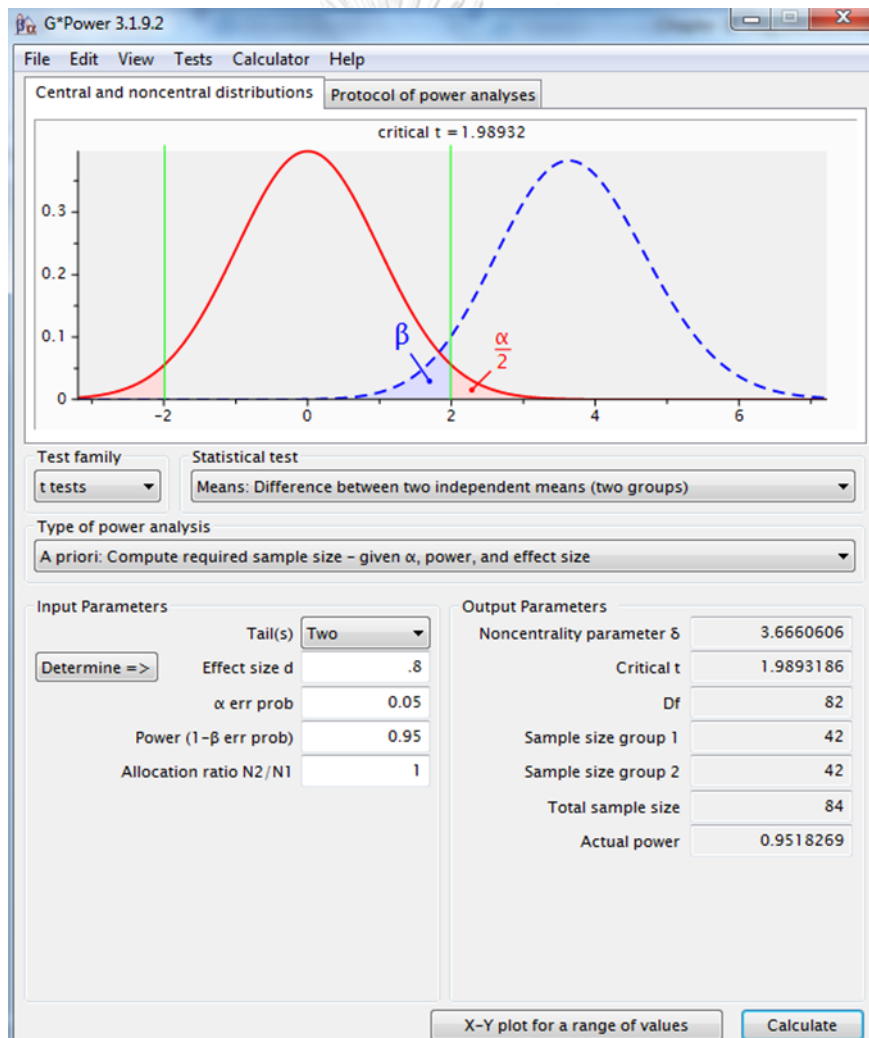
1. Male and female age 60 – 74 years
2. Living in Tambon Paka and Tambon Saimoon over 6 months
3. Able to speak with no hearing problem and can understood Thai
4. Willing to join in this study and able to provide written informed consent
5. Experience fall at least once in the past 12 months
6. No movement problems
7. Receive permission from their doctors to enroll this research project.

#### **Exclusion criteria**

1. Participants currently participating in the other exercise or fitness program in one year before.
2. Not an available for measurements or intervention or knowing in advance to miss one time of the meeting during 6 months (eighty percent).

### 3.4 Sample size

The sample size of this study will calculate by power-analysis, which the population  $r$  is of large size (effect size =  $d = .80$ ), the  $t$  test of the difference between mean was to be performed with two-sides, when the power of this test is .80, an alpha of .05, the elderly who had fallen were divide into 2 groups: experimental and control group. The sample size should be at least 42 subjects in each group and the total number of subjects in this study are 84 subjects (56).



### 3.5 Sampling procedures

The assessable populations include the elderly people who had experience falls in the 12-months before participating in this study, expressed willingness to participate in the study. Purposive sampling will use for choosing Tambon Paka, and Tambon Saimoon Nakornnayok province because the population are similar characteristics. The participants are randomly assign, matches participants on age, gender, the number of falling in the past 12 months, and randomly assigns matched pairs (one of each pair to each group) to the intervention and control group. The elderly people from Tambon Paka will receive the intervention program and the elderly people from Tambon Saimoon will receive the conventional education.

The following sampling procedures are used for the recruitment of the samples.

1. The researcher proposes the document from College of Public Health Science, Chulalongorn University about the purpose of the research and ask the permission and cooperation for the recruitment of the samples in community to the head of Ban krang pra too wang Health Promotion Hospital, Tambon Paka for intervention group and Tambon Saimoon, Onhkarak Disrtict Nakornnayok province for the control group.
2. Asking the key contact for cooperation in the community for community survey, in order to find out the elderly people to participation in the study.
3. The elderly of each setting were contacted. The elderly who are interested in this study and who met the inclusion and exclusion criteria will get the information regarding the objectives of study.



### 3.6 Instrumentation

The questionnaire was divided into 6 parts. There are details as follows:

**Part I:** General demographic characteristics questionnaire, consisting of gender, age, education level, family member and cause of previous falling. (11 items)

**Part II:** Question assessing house living place. (20 items)

**Part III:** Question assessing health status and tobacco and alcohol drinking history. (4 items)

**Part IV:** Question assessing falls risk perception. This set was developed from the researcher. This questionnaire set consists of 2 parts: The first part regards intrinsic risk factors (related to a person's behavior or health condition) and extrinsic factors (related to environment). (23 items)

Domain	Score
Low risk perception of falls	1-7.66
Moderate risk perception of falls	7.67-15.32
High risk perception of falls	15.33-23

Table 3.1 Falls risk perception score

**Part V:** Question assessing fear of falling, questionnaire was being adopted by Tinetti (1990). The Falls Efficacy Scale (FES) (Tinetti, 1990) was measured fear of falling or falls efficacy. There is a 10-item scale measuring confidence in one's ability to avoid falling during the performance of activities of daily living (ADL). Each item is rated from 1 ("very confident") to 10 ("not confident at all"), and the per item ratings are added to generate a summary total score. Total scores can range from 10 (best possible) to 100 (worst possible). Thus, lower scores indicate more

confidence and higher scores indicate lack of confidence and greater fear of falling.

(10 items)

Cut-off Scores : > 80 increased risk of falling, > 70 indicates a fear of falling

(57)

#### **Part VI:** Question assessing quality of life

The World Health Organization Quality of Life (WHOQOL) project was originated in 1991. There is 26 items in WHOQOL-BREF instrument. The Department of Mental Health, Ministry of Public Health, Thailand (Suwat M et.al., 1997) developed the short form questionnaire (WHOQoL-BREF). This instrument contained 26 questions, comprising one item from each of the 24 facets plus one item to measure “overall quality of life” and another to measure “general health” (WHOQoL Group, 1998b). In addition, the six domains of the WHOQoL-100 have been reduced to four, which consist of 1) physical health (incorporating level of independence), 2) psychological (incorporating spirituality), 3) social relationships, and 4) environment.

<b>Domain</b>	<b>Low Quality of life</b>	<b>Moderate Quality of life</b>	<b>High Quality of life</b>
Physical health	7-16	17-26	27-35
Psychological health	6 – 14	15-22	23-30
Social relationships	3-7	8-11	12-15
Environment	8-18	19-29	30-40
Overall Quality of life	26-60	61-95	96-130

Table 3.2 Quality of life score

**Physical testing (gait and balance)** composed of 2 tests:

**a) Time up and go Test (TUGT)**

This tool is a simple test used to evaluate elderly people's walk ability. It uses the time that a person takes to rise from a chair, walk three meters, turn around, walk back to the chair, and sit down (58).

1. Begin the test with the subject sitting correctly (hips all of the way to the back of the seat) in a chair with arm rests. The chair should be stable and positioned such that it will not move when the subject moves from sit to stand. The subject is allowed to use the arm rests during sit – stand and stand – sit movements.

2. Place a piece of tape or other marker on the floor 3 meters away from the chair so that it is easily seen by the subject.

3. Instructions: “On the word GO you will stand up, walk to the line on the floor, turn around and walk back to the chair and sit down. Walk at your regular pace.”

4. Start timing on the word “GO” and stop timing when the subject is seated again correctly in the chair with their back resting on the back of the chair.

5. The subject wears their regular footwear. There is no time limit. They may stop and rest (but not sit down) if they need to.

6. The subject should be given a practice trial that is not timed before testing.

### Cut-off Values Predictive of falls by group (59)

Group	Time in seconds
Community Dwelling elderly people	> 14 associated with high fall risk

Table 3.3 TUGT; Cut-off Values Predictive of falls by group

#### b) One legged stance test (OLST)

This gold standard assessment tool evaluates elderly people's balance ability, monitor functional balance over time and to assess participants' responses to the intervention. To perform the test, the elderly is instructed to stand on one leg without support of the upper extremities or bracing of the unweight leg against the stance leg. The elderly begins the test with the eyes open, practicing once or twice on each side with his gaze fixed straight ahead. The number of seconds that the elderly is able to maintain this position is recorded. Termination or a fail test is recorded if 1) the foot touches the support leg; 2) hopping occurs; 3) Normal range with open eyes are: 60-69 years/ $22.5 \pm 8.6$  s, 70-79 years/ $14.2 \pm 9.3$ s. (60).

#### A multicomponent intervention program

The intervention in this study is a multicomponent intervention program aimed at improving fall risk perception, gait and balance, quality of life and reduce fear of falling, and the number of falls among the elderly people. This program is based on WHO falls prevention Model (2007).

The program consists of four parts developed by the researcher as follows:

**Part I:** Community based education program; its objectives are 1) to develop risk perception of falls, identify risk home and environment hazard, how to prevent falls, the exercise for improve balance, gait, and muscle strength, and 2) practice

exercise in exercise session. Exercise session will be provided by physical therapists. The training will be done in the group, by physical therapists. There is a manual of exercise instruction of how to exercise will be provided to elderly people. The elderly will be using this instrument for the individual home based exercise.

**Part II** Community Group meeting its objectives is to share experience related to falls or nearly falls from the elderly, caregivers or their family, and learn together from the group.

**Part III** Individual home based exercise and skill training exercise program – the objects of home based exercise are to train how to exercise for how to exercise for improve balance, gait, and muscle strength and how to practice at their home.

**Part IV** Enhancing the elderly and caregiver maintain of their concerning about practice exercise and risk home and environment hazard at their homes. The community nurse practitioner or researcher would visit the elderly at their home once a month in the 1<sup>st</sup> – 3<sup>rd</sup> month. To discuss with the elderly, caregivers and village health volunteers about the progress of home and environment modification and exercise.

When the elderly people participate in this project activity, they have good health from homes base exercise regularly. They have awareness to prevent falls and change risk behaviors. Moreover, they might fear to fall less and increase confidence for activities daily living. All of these are enhance quality of life of the elderly.

**Table 3.4 Intervention program**

Step	Timeline	Activities	Method	Accountability
1 <sup>st</sup> week	Day 1 8.00- 12.00 am	Orientation Physical assessment (gait and balance) Falls Risk perception assessment Fear of falling assessment Quality of life assessment	Tool TUGT, OLST Fall risk perception Fear of falling scale (Falls efficacy scale) QoL	Researcher and team
	Day 2	Health education 1. Risk of falls at home 2. home & environment hazard area 3. identifiable home & environment hazard area 4. Modification home & environment hazard	Lecture, Explain VDO Brainstorms Learn, share and exchange experience	Researcher and team
	Day 3	Health education 1. How to prevent falls 2. Practice exercise 3 How to use Manual	Lecture, Explain VDO Brainstorms Learn, share and exchange experience	Researcher Physiotherapist
2 <sup>nd</sup> week		Home based exercise (at least 3 days per week)	Self-Report	
3 <sup>rd</sup> week		Home based exercise (at least 3 days / week) Home visits Home and environment modification advice & evaluation Home based exercise follow-up and evaluation	Self-Report Home visiting report	Researcher and team

4 <sup>th</sup> week		Home based exercise (at least 3 days / week)	Self-Report	
5 <sup>th</sup> week		Group activities or Community meeting - Practice exercise -Refresh risk perception -Learn, share and exchange experience from who had falls experience -Lesson learn from the group	Brainstorms Learn, share and exchange experience	Researcher and team
6 <sup>th</sup> week		Home based exercise (at least 3 days /week)	Self-Report	
7 <sup>th</sup> week		Home based exercise (at least 3 days /week) Home visits Home and environment modification advice & evaluation Home based exercise follow-up and evaluation	Self-Report Home visiting report	Researcher and team
8 <sup>th</sup> week		Home based exercise (at least 3 days / week)	Self-Report	
9 <sup>th</sup> week		-Group activities or Community meeting - Refresh risk perception & home modification - Practice exercise -Identified home hazard area in their home - Lesson learn from the group (falls experience from the elderly, caregiver or family)	Brainstorms Learn, share and exchange experience	Researcher and team

10 <sup>th</sup> week		Home based exercise (at least 3 days / week)	Self-Report	
11 <sup>th</sup> week		Home based exercise (at least 3 days / week) Home visits Home and environment modification advice & evaluation and Home based exercise follow-up and evaluation	Self-Report Home visiting report	Researcher and team
12 <sup>th</sup> week		Home based exercise (at least 3 days / week)	Self-Report	
13 <sup>th</sup> week		-Group activities or Community meeting - Practice exercise - Home and environment modification advice & evaluation		Researcher and team
14-24 week		Home based exercise (at least 3 days / week)	Self-Report	
25 <sup>th</sup> week		F/U	TUGT, OLST Falls Risk perception Fear of falling scale TUGT, OLST QoL Rate of falls	Researcher and team



### **3.7 Data collection**

The data collection method of this study conducts as follows:

- The researcher submits letter of request from the Dean of the College of Public Health, Chulalongkorn University, to the Director of Provincial Health Office in Nakornnayok Province, the Director of the Health Promotion Hospital for permission to collect data.
- The researcher contacts and coordinates with the Director of the Tambon Administration Organization, the Director of the community Hospital, the Director of the Health Promotion Hospital, community leaders, and village health volunteers to find out the address of the respondents.
- The researcher collects the data from the respondents in the selected study area. The researcher checks the completeness of the questionnaires after each study.
- Data collection continues until the information is obtained. The questionnaires were then verified for data analysis.

### **3.8 Ethical Considerations**

This study is approved by The Ethics Review Committee for Research Involving Human Research Subjects, Health Science Group, Chulalongkorn University. Participants will receive both written and verbal information before they agreed to participate. They have to right to refuse to participate in the study. It is making it clear that participants can withdraw from the study at any time. Their information will be kept confidential.

### **3.9 Data Analysis**

The researcher will analyze the data by using SPSS for windows version 17.0

**Descriptive analysis**

Part I Descriptive statistics including percentage, minimum, maximum, mean and standard deviation will be used for analysis of demographic data.

Part II Comparison the extraneous variables between the intervention and control group by Independence t-test

Part III The TUG test, OLS test, fear of falling, fall risk perception, and quality of life will be used mean scores between and within groups by pair t-test.



### 3.10 Time Schedule

**Table 3.6 Time Schedule**

Activities	Time Frame (Month)											
	1	2	3	4	5	6	7	8	9	10	11	12
Literature review	←→											
Tool development for data collection	←→											
Ethical consideration		←→										
Field preparation , intervention and data collection			←→									
Data Analysis										←→		
Report Writing											←→	

## CHAPTER IV

### RESULTS

This chapter includes the results and the interpretation of the data from the study. This study was a quasi-experimental study aim to assess the effectiveness of the effects of a multicomponent intervention and exercise calendar to prevent falls and improve quality of life among elderly people. The study purposively selected the study area from Tambon Paka, Banna district, Nakornnayok province was an intervention area, which received the 6 months' multicomponent intervention and used the exercise calendar and Tambon Saimoon, Onkarak district, Nakornnayok province was a control area, which received conventional education. This study included the elderly who are 60 - 74 years old. A total of 100 elderly people were enrolled in the study both in intervention and control group (50 elderly people each group). During the program three samples was dropped out from the intervention group and two samples was dropped out from the control group. Therefore, there were 47 participants remaining in the evaluations after the program for the intervention group and 48 participants remaining in the control group as shown in the flow chart of the participants (figure 4.1).

The results of data analysis are presented in the following order:

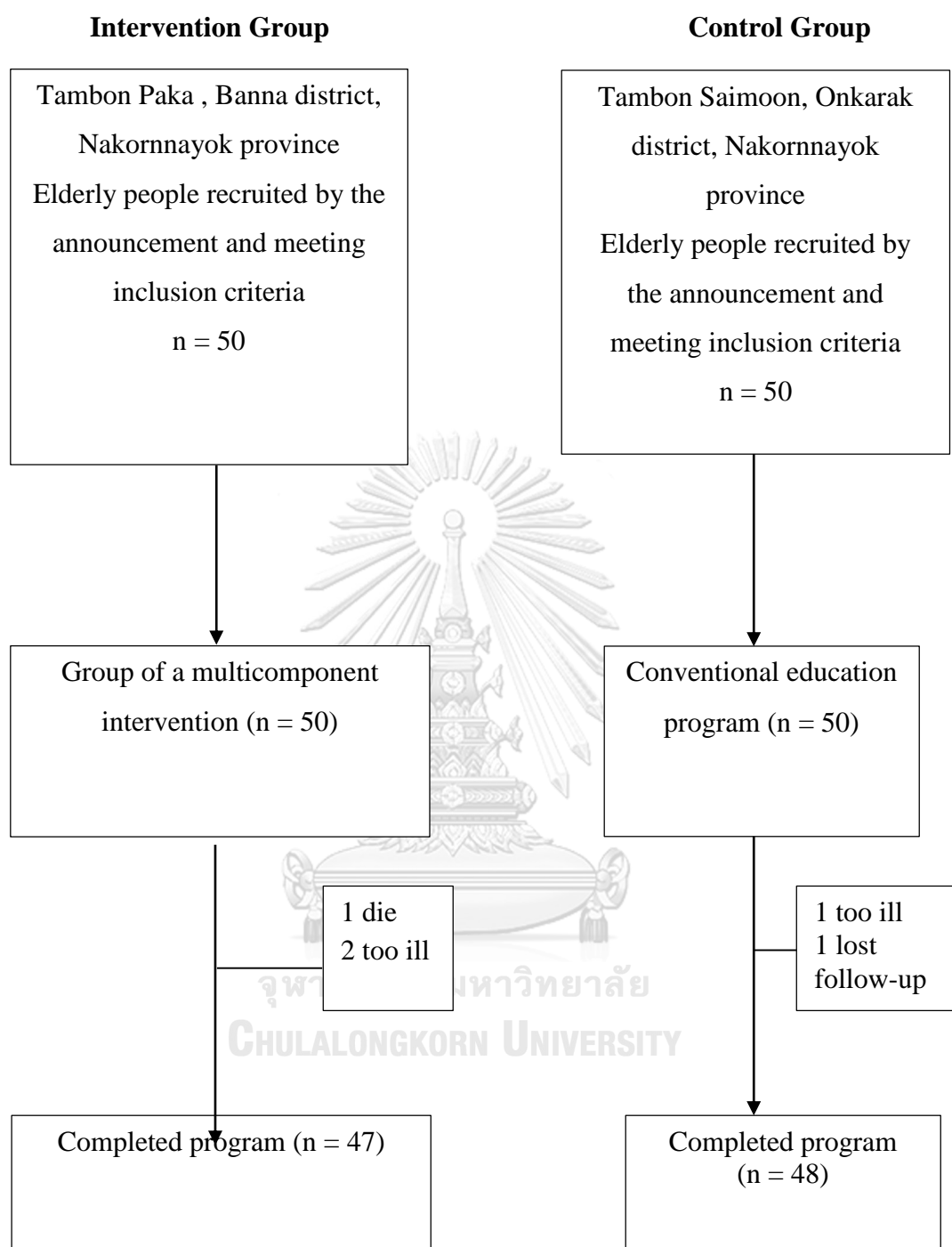
- 1) Baseline characteristics of the participants
- 2) Comparison mean and standard deviation for TUGT, OLST, fear of falling, fall risk perception, and quality of life between the intervention group and control group at base line

3) Comparison TUGT, OLST, fear of falling, fall risk perception, quality of life before and after the program of intervention and control group

4) Comparison mean and standard deviation for TUGT, OLST, fear of falling, falls risk perception, quality of life between the intervention group and control group after the program

5) Comparison history of fall in last 12 months and falling after program between the intervention group and control group





**Figure 4.1** Flow chart of the study participants of a multicomponent Intervention

#### 4.1 Baseline characteristics of the participants

The presentation of general characteristics is divided in two groups, (a) intervention group—elderly people in Tambon Paka, and (b) control group -- elderly people in Tambon Saimoon (Table 4.1). Age, gender, and falls experiences between intervention and control group was no statistically different ( $p$ -value  $> 0.05$ ).

##### (a) Intervention group-the elderly people in Tambon Paka

As shown in the table 4.1, the elderly in this group were female (58%) and ranged in age 60-74 years with a mean age of 68 (SD = 3.92). Most of participants ranged in age 70-74 years (50%,  $n = 25$ ) followed by 65 to 69 years (36%,  $n = 18$ ). In term of falls experience, most of them (56%) had history of falls 1 time in the previous year.

##### (b) Control group-the elderly people in Tambon Saimoon

The elderly in this group ranged in age 60-74 years with a mean age of 68 (SD = 3.77). Most of participants ranged in age 70-74 years (50%,  $n = 25$ ) followed by 65 to 69 years (36%,  $n = 18$ ). Most of them (58%) had history of falls 1 time in last year.

**Table 4.1** Distribution of general characteristics of the intervention and control group

<b>General characteristics</b>	<b>Intervention (n = 50) (%)</b>	<b>Control group (n = 50) (%)</b>	<b>p-Value</b>
Gender			0.258 <sup>(b)</sup>
Male	21(42.0)	21(42.0)	
Female	29(58.0)	29(58.0)	
Age			0.87 <sup>(a)</sup>
60-64 years	7(14.0)	7(14.0)	
65-69 years	18(36.0)	18(36.0)	
70-74 years	25(50.0)	25(50.0)	
Mean (S.D.)	68.36(3.92)	68.48(3.77)	
<b>Falls experience</b>			0.85 <sup>(a)</sup>
1 fall	28(56.0)	29(58.0)	
2 falls and over	22(44.0)	21(42.0)	

Significant at p-value < 0.05, (a) = t-test for continuous data, (b) = Chi square test for nominal data



**Table 4.2 Comparisons of general characteristics between the intervention and control group at baseline**

General characteristics	Intervention (n = 50) (%)	Control group (n = 50) (%)	p-Value
Education level			0.115 <sup>(b)</sup>
Less than secondary	33(66.00)	40(80.00)	
Secondary and over	17(34.00)	10(20.00)	
Health status			0.749 <sup>(b)</sup>
No health problem	45(90.00)	44(88.00)	
Health problem	10(20.00)	6(12.00)	
Occupation			0.251 <sup>(b)</sup>
No and Retirement	8(16.00)	13(26.00)	
Trading and Business	20(40.00)	13(26.00)	
Agriculture and Employee	22(44.00)	24(48.00)	
Significant at p-value < 0.05, (a) = t-test for continuous data, (b) = Chi square test for nominal data			

Regarding the level of education of the intervention group, most of them were less than secondary school level (66.00% of intervention and 80% of control group) and education level between intervention and control group was similar (p-value > 0.05). In term of health status, both intervention and control group were similar. Most of respondent had not health problem (90.00% of intervention and 88% of control group). The characteristics of occupation between both groups were similar (p-value > 0.05). The majority of respondent in both groups were agriculture and employee (44.00% of intervention and 48% of control group).

**Table 4.3 Comparisons of home and environment among study population at baseline**

<b>General characteristics</b>	<b>Intervention group (n = 50) (%)</b>	<b>Control group (n = 50) (%)</b>	<b>p Value</b>
<b>Home and environment</b>			
There is non-slip floor in the toilet/rest room.	30(60.00)	38(76.00)	0.086*
There is not roughly on the floor.	27(54.00)	25(50.00)	0.689*
There are step floors inside home.	18(36.00)	26(52.00)	0.107*
There is enough light inside home.	31(62.00)	23(46.00)	0.108*
There is light reflective of lighting switch in the bedroom.	23(46.00)	25(50.00)	0.689*
There is handrail in the toilet/rest room.	27(54.00)	15(30.00)	0.015*
The toilet/rest room is inside home.	25(50.00)	16(32.00)	0.067*
There is toilet seat.	25(50.00)	21(42.00)	0.422*
There is stoop in your home.	21(42.00)	19(38.00)	0.683*
The lighting switch is not high from ground over 90 centimeters.	21(42.00)	22(44.00)	0.840*
The electric power outlet is high from ground at least 45 centimeters.	31(62.00)	25(50.00)	0.227*
The area around the house is not slippery or without water.	31(62.00)	28(56.00)	0.542*

Significant at p-value < 0.05, \*Chi square test

In part of characteristics of home and environment, homes' participants in control group had non-slip floor in the toilet/rest rooms were 76.0% and intervention group were 60.0%. Both of intervention and control group had not rough floor (54.0% of intervention and 50.0% of control group). The intervention group's homes (36.0%) and control group (52.0%) had step floor inside. 62% of intervention and 46.0% of control group had enough light inside. Moreover, there was light reflective of lighting switch in the bedroom (46.0% of intervention and 50.0% of control group).

Half the intervention group (50.0%) had toilet/rest room inside their homes. 32.0% of control group had toilet/rest room inside their homes as well. The participants in intervention group (50.0%) and 42.0% of control group had toilet seat. However, intervention group's home (54.0%) and 32.0% had handrail in the toilet/rest room.

The lighting switch is not high from ground over 90 centimeters in the intervention group's home (42.0%) and control group's home (44.0%). The electric power outlet is high from ground at least 45 centimeters in the intervention group's home (62.0%) and control group's home (50.0%). There was not slippery around their home (62.0% of intervention group and 56.0% of control group).

**Table 4.4 Comparison of place and cause of previous fall among study population at baseline**

	Intervention group (n = 50) (%)	Control group (n = 50) (%)	p Value
<b>General characteristics</b>			
<b>Place of falling</b>			0.230 <sup>(b)</sup>
• Inside home	21(42.00)	27(54.00)	
• Outside home	29(58.00)	23(46.00)	
<b>Cause of falling</b>			0.072 <sup>(b)</sup>
• <b>Intrinsic factor</b>	28(56.00)	29(58.00)	
Dizzy	7(14.00)	13(26.00)	
Impair balance	21(42.00)	16(32.00)	
• <b>Extrinsic factor</b>	22(44.00)	21(42.00)	
Insufficient light	12(24.00)	9(18.00)	
Unsuitable shoes	4(8.00)	3(6.00)	
Break off	6(12.00)	9(18.00)	

Significant at p-value < 0.05, (b) = Chi square test for nominal data

In term of place of falling between intervention and control group was similar (p-value < 0.05). More than half of participants in the intervention group falls occurred outside their homes (n = 21, 42.00%). However, most of the participants in control group falls occurred inside their home (n = 27, 54.00%). Also, most of the participants from both group (58.0% of control group and 56.0% of intervention group) had fallen from intrinsic factor. Specifically, 42.0 % of intervention and 32% of control group had fallen from impair balance and 14.0 % of intervention and 26% of control group had fallen from dizzy.

Regarding extrinsic factor, the faller from intervention group caused from extrinsic factor (44.0%). Of these, 24.0% reported insufficient light were cause of falling, 12.0% reported break off, and 8.0% used unsuitable shoes. Moreover, insufficient light (18.0%) and break off (18.0%) were caused of falling among the control group as well.



#### **4.2 Comparison mean and standard deviation for TUGT, OLST, fear of falling, fall risk perception, and quality of life between the intervention group and control group at base line**

Table 4.5 describes data at base line survey, among 100 participants (50 in each group). Their average Time Up and Go test (TUGT) were  $16.30 \pm 3.44$  and  $15.22 \pm 2.99$ , and the average One Legged Stance test (OLST) were  $8.60 \pm 4.28$  and  $9.97 \pm 2.89$ . Their average score for fear of falling were  $49.74 \pm 27.79$  and  $48.18 \pm 25.33$ . The average fall risk perception score of both groups were  $7.62 \pm 3.07$  and  $7.98 \pm 3.07$ .

Regarding their quality of life, there are 4 domains. The average of the first domain, Physical health were  $21.98 \pm 2.59$  and  $21.24 \pm 1.84$ , Psychological health were  $19.36 \pm 2.24$  and  $18.36 \pm 2.67$ , Social relationships were  $9.14 \pm 1.87$  and  $9.08 \pm 1.78$ , and Environment domain were  $25.74 \pm 3.32$  and  $24.60 \pm 2.74$ . The averages of total quality of life were  $81.76 \pm 7.84$  and  $79.26 \pm 7.66$ . The average TUGT, OLST, fear of falling score, fall risk perception score, and total quality of life in the intervention and control group were not statistically significantly different.

Table 4.5 Distribution of TUGT, OLST, fear of falling, fall risk perception, and quality of life between the intervention group and control group at base line by Independence t-test

variables	Total	Intervention	Control	Independence t-test	p- value
		(n = 50) (%)	(n = 50) (%)		
	Mean+SD	Mean±SD	Mean±SD		
TUGT	15.76±3.25	16.30±3.44	15.22±2.99	1.672	0.098
OLST	9.29±3.7	8.60±4.28	9.97±2.89	-1.862	0.066
Fear of falling	48.96±26.46	49.74±27.79	48.18±25.33	0.293	0.770
Fall risk perception	7.8±3.06	7.62±3.07	7.98±3.07	-0.587	0.559
Quality of life					
Physical health	21.61±2.27	21.98±2.59	21.24±1.84	1.41	0.103
Psychological health	18.86±2.5	19.36±2.24	18.36±2.67	2.03	0.046
Social relationships	9.11±1.82	9.14±1.87	9.08±1.78	0.16	0.870
Environment	25.17±3.08	25.74±3.32	24.60±2.74	2.18	0.064
Total Quality of life	80.51±7.81	81.76±7.84	79.26±7.66	1.68	0.110

Significant at p-value < 0.05

### **4.3 Compare TUGT, OLST, fear of falling, fall risk perception, quality of life before and after the program of intervention and control group by using Pair t-test**

Comparison of the mean score on TUGT, OLST, fear of falling, fall risk perception, quality of life within each group after the program was assessed by the Pair t-test. The results as shown in table 4.6 as follows:

For the intervention group, the results from the Pair t-test analysis showed that there was a significant different on TUGT score within the intervention group (mean before = 16.13, SD = 3.24; mean after = 10.73, SD = 1.73;  $p < 0.05$ ). There was a significant difference on OLST score within the intervention group (mean before = 8.63, SD = 4.36; mean after = 14.69, SD = 5.23;  $p < 0.05$ ).

The results from the Pair t-test analysis showed that there was a significant different on fear of falling score within the intervention group (mean before = 50.38, SD = 27.83; mean after = 38.47, SD = 18.28).

The results from the Pair t-test analysis showed that there was a significant different on fall risk perception score within the intervention group (mean before = 7.59, SD = 3.15; mean after = 20.95, SD = 1.39;  $p < 0.05$ ).

As shown in table 4.6 , the results from the Pair t-test analysis showed that there was a significant different on total quality of life within the intervention group (mean before = 81.74, SD = 7.61; mean after = 89.72, SD = 5.06;  $p < 0.05$ ).

For each domain of quality of life, there was a significant different on the first domain or physical health within the intervention group (mean before = 22.06 , SD = 2.47, mean after = 23.31, SD = 1.47,  $p < 0.05$ ). The second domain, there was no significant different on the psychological health domain within the intervention



group (mean before = 19.42 , SD = 2.28, mean after = 19.61, SD = 1.64,  $p > 0.05$ ).

The social relationships domain, there was a significant different within the intervention group (mean before = 9.06 , SD = 1.89, mean after = 10.40, SD = 1.20,  $p < 0.05$ ). For the 4<sup>th</sup> domain, there was a significant different on environment within the intervention group (mean before = 25.72 , SD = 3.18, mean after = 28.38, SD = 2.22,  $p < 0.05$ ).

For the control group, the results from the Pair t-test analysis showed that there was not significant different on TUGT score within the control group (mean before = 15.20, SD = 3.05; mean after = 14.86, SD = 2.99;  $p < 0.05$ ). There was a significant difference on OLST score within the control group (Mean before = 10.07, SD = 2.90; Mean after = 12.15, SD = 4.56;  $p < 0.05$ ).

The results from the Pair t-test analysis showed that there was not significant different on fear of falling score within the control group (mean before = 47.85, SD = 24.84; mean after = 47.54, SD = 24.55).

The results from the Pair t-test analysis showed that there was a significant different on fall risk perception score within the control group (mean before = 7.59, SD = 3.15; mean after = 20.95, SD = 1.39;  $p < 0.05$ ).

As shown in table 4.6 , the results from the Pair t-test analysis showed that there was not significant different on total quality of life within the control group (mean before = 79.20, SD = 7.81; mean after = 79.33, SD = 7.97;  $p < 0.05$ ).

For each domain of quality of life, there was not significant different on the first domain or physical health within the control group (mean before = 21.25 , SD = 1.88, mean after = 21.37, SD = 1.86,  $p < 0.05$ ). The psychological health domain was no significant different on within the control group (mean before = 18.31 , SD = 2.69,

mean after = 18.37, SD = 2.57,  $p > 0.05$ ). The 3<sup>rd</sup> domain or social relationships domain , there was a significant different within the control group (mean before = 9.08 , SD = 1.81, mean after = 9.25, SD = 1.61,  $p < 0.05$ ). For the 4<sup>th</sup> domain, there was not significant different on environment within the control group (mean before = 24.66 , SD = 2.75, mean after = 24.45, SD = 3.10,  $p < 0.05$ ).



**Table 4-6 Distribution of TUGT, OLST, Fear of falling, Fall risk perception, Quality of life before and after the program of intervention group by using pair sample t test**

variables	Before the program		After the program		Pair t-test	p-value
	Mean	SD	Mean	SD		
<b>Intervention group</b>						
TUGT	16.13	3.24	10.73	1.73	10.82	0.00
OLST	8.63	4.36	14.69	5.23	-10.45	0.00
Fear of falling	50.38	27.83	38.46	18.28	7.03	0.00
Fall risk perception	7.59	3.15	20.95	1.39	-33.46	0.00
Quality of life	81.74	7.61	89.72	5.06	-11.23	0.00
• Physical health	22.06	2.47	23.31	1.47	-5.06	0.00
• Psychological health	19.42	2.28	19.61	1.64	-1.24	0.22
• Social relationships	9.06	1.89	10.40	1.20	-6.34	0.00
• Environment	25.72	3.18	23.38	2.22	-9.58	0.00
<b>Control group</b>						
TUGT	15.20	3.05	14.86	2.99	1.12	0.26
OLST	10.07	2.90	12.15	4.56	-4.93	0.00
Fear of falling	47.85	24.84	47.54	24.55	1.77	0.83
Fall risk perception	7.91	3.07	9.52	2.92	-3.93	0.00
Quality of life	79.20	7.81	79.33	7.97	-0.62	0.55
• Physical health	21.25	1.88	21.37	1.86	-1.95	0.05
• Psychological health	18.31	2.69	18.37	2.57	-1.00	0.32
• Social relationships	9.08	1.81	9.25	1.61	-2.68	0.10
• Environment	24.66	2.75	24.45	3.10	1.34	0.18

#### **4.4 Comparison mean and standard deviation for TUGT, OLST, fear of falling, falls risk perception, quality of life between the intervention group and control group after the program by Independence t-test**

As shown as table 4.7, according to Independence t-test revealed that time up and go test (TUGT) had significant difference on TUGT after the program ( $p = 0.000$ ). However, mean minutes of TUGT was highly decreased in intervention group and it was lower than control group after the program ( $p < 0.05$ ). In control group, mean minutes of TUGT was slightly after the program.

In part of One legged stance test (OLST): it found that the intervention and control group had significant difference on OLST after the program ( $p = 0.013$ ). However, the intervention group had more mean minutes of OLST than the control group after the program.

Average mean score of fear of falling by using Fall Efficacy Scale showed that the intervention and control group was significant difference on fear of falling score after the program ( $p = 0.044$ ). However, the intervention group had less mean score than the control group after the program ( $p = 0.044$ ).

Fall risk perception: it found that intervention and control group was significant difference on fall risk perception score after the program ( $p = 0.000$ ). However, the intervention group had more mean score than the control group after the program ( $p = 0.00$ ).

##### **Quality of life:**

After the program, the total quality of life (QoL) score was significant difference between the intervention group and control group ( $p = 0.000$ ). In each domain of QoL was presented physical health, psychological health, social relationships, and environment were statistically significant different ( $p < 0.05$ ).

Physical health domain: it found that the intervention and control group was significant difference on physical health domain after the program ( $p=0.000$ ).

Psychological health domain: it found that the intervention and control group had significant difference on psychological health domain after the program ( $p=0.006$ ).

Social relationships domain: it found that the intervention and control group had had significant difference on social relationships domain after the program ( $p = 0.000$ ).

Environment domain: it found that the intervention and control group had significant difference on social relationships domain after the program ( $p = 0.000$ ).



**Table 4-7 Distribution of TUGT, OLST, fear of falling, fall risk perception, quality of life between the intervention group and control group after the program by Independence t-test**

Variables	Intervention	Control	Independence t-test	p-value
	group (n = 47) (%) Mean±SD	group (n = 48) (%) Mean±SD		
TUGT	10.73(1.73)	14.86(2.99)	-8.257	0.000
OLST	14.69(5.23)	12.15(4.56)	2.520	0.013
Fear of falling	38.47(18.28)	47.54(24.55)	-2.046	0.044
Fall risk perception	20.96(1.40)	9.52(2.92)	24.23	0.000
Quality of life (Total)	89.72(5.06)	79.33(7.97)	7.56	0.00
Physical health	23.28(1.47)	21.37(1.86)	5.62	0.000
Psychological health	19.61(1.63)	18.37(2.57)	2.80	0.006
Social relationships	10.40(1.20)	9.25(1.61)	3.93	0.000
Environment	28.38(2.22)	24.45(3.10)	7.06	0.000

#### 4.5 Comparison rate of falls between the intervention and control group after the intervention program.

**Table 4.8 Comparison history of fall in last 12 months and falling after program between the intervention group and control group**

Group	History of fall at Base line		After program	
	Amount of falling	n = 50 (100.0%)	Amount of falling	IG, n = 47 (100.0%) CG, n = 48(100.0%)
Intervention Group (IG)	1 time	28(56.0%)	1 time	3(6.38%)
	2 times and more	22(44.0%)	2 times	-
Control Group (CG)	1 time	29(58.0%)	1 time	10(20.83%)
	2 times And more	21(42.0%)	2 times	2(4.16%)

In part of history of fall in last 12 months at base line, almost of the participants in both groups had fall 1 time (56% of intervention and 58% of control group). After the 6<sup>th</sup> month of the program, the control group data revealed that 25.09% had fallen (20.38% had fallen 1 time and 4.16% had fallen 2 times).

## CHAPTER V

### DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

This chapter consists of the conclusion and summarization the findings, the discussion by clarify the reason with the previous studies, and the recommendations of the research finding and guidance for the further research. This study was a quasi-experimental study aimed to assess the effect of a multicomponent intervention and exercise calendar to prevent falls and improve quality of life among elderly people. The elderly people in Tambon Paka, Banna district, Nakornnayok province received the 6 months' multicomponent intervention and the exercise calendar and the elderly people in Tambon Saimoon, Onkarak district, Nakornnayok province received the conventional education for control group. The total of participants at baseline survey was 100 elderly people (50 persons for each group). After implements of the intervention, three of participants in intervention group (1 die and 2 too ill) and two of participants in control group (1 too ill and 1 lost follow-up) dropped from the study.

A multicomponent intervention program consists of 1) Community based education program to develop risk perception of falls, identify risk home and environment hazard, how to prevent falls, the exercise for improve balance, gait, and muscle strength, 2) Monthly community group meeting for sharing experience related to falls or nearly falls from the elderly, caregivers or their family, and learn together from the group , 3) Individual home based exercise and skill training exercise program for training how to exercise for how to exercise for improve balance, gait, and muscle strength and how to practice at their home and how to use exercise calendar , and 4)



Home visiting for enhancing the elderly and caregiver maintain of their concerning about practice exercise and risk home and environment hazard at their homes.

Outcome assessment was carried at 6 months after implementation of the intervention in this area. The measurement tools used falls risk perception questionnaire, the Falls Efficacy Scale (FES) (61) was measured fear of falling, WHOQOL-BREF questionnaire. Physical testing (gait and balance) was tested by Time up and go Test and One legged stance test.

Statistics analysis used percentage, mean to determine basic characteristics of the study population, independence t-test compare the extraneous variables between the intervention and control group, and Pair t-test for calculate the different between before and after the intervention.

## **5.1 Discussion**

### **5.1.1 Baseline characteristics**

All the responders were aged 60 to 74 years ( $68.36 \pm 3.92$  in the intervention and  $68.48 \pm 3.77$  in the control group). Most of participants in both groups had similar characteristics. The similarity characteristics of the intervention and control group were gender, age, falls experience, education level, occupation, place of falls, and cause of falling.

More than half of the participants in both intervention and control groups were female (58.0% in both groups). The data of Thailand population in 2017 found that Thailand had a population of 3.4 million females compare to only 3.3 million males. Since females have longer life expectancy than males. Male life expectancy at birth is 71.2 years and female life expectancy at birth is 76.1 years (62) according to Population Division of the Department of Economic and Social Affairs of the United Nations

(United Nation, 2013). From one study among the elderly people who underwent a comprehensive multidisciplinary geriatric assessment at Technology Research for Independent Living Clinic, Dublin, Ireland that was found significantly more female fallers compared to male faller (58.4% versus 34.6% respectively,  $p < 0.001$ ) (11). Furthermore, the study by Sophonratanapokin (2012) revealed that female experienced falls more than male.

The history of fall or falls experience, elderly people had fallen 1 time on 12 months before (56.0% of intervention and 58.0% of control group). The elderly who had experience of falling seems to be a sign of weakness, health impairment, and mobility problem. The Systemic Review and Meta-Analysis of Deandrea (2010) reported that the strongest factor associations were found for history of falls (OR 2.8 for all fallers; OR 3.5 for recurrent fallers). Most of respondents finished less than secondary school (66.0% in intervention and 80.0% in control group). This was found similar in the study among the elderly in rural area at Khon Kaen which found that the primary school level was the majority education level among the participants (35).

In this study, a health status refers to any symptoms includes vision problem, hearing problem, and urinary incontinence that related to fall. Most of participants had no health problem (90.0% of intervention and 88.0% of control group).

Occupation among the participants in the intervention group and control group was no significant difference. Forty percent of the participants in the intervention group were trading and business and 26.0% in control group.

Home and environment or extrinsic factors are important in contributing to falls risk. In this study found environmental hazards in the homes of elderly people included slippery floor in the toilet/rest room (40.0% in the intervention, and 24.0% in

control group), step floors (36.0% in the intervention and 52.0% in control group), without handrail in the toilet/rest room (46.0% of intervention and 60.0% of control group), insufficient light inside home (38.0% of intervention and 54.0% of control group), toilet/rest room located outside home (50.0% of intervention and 68.0% of control group), and electric power outlet is high from ground < 45 centimeters (38.0% of intervention and 50.0% of control group). The study of Sophonratanapokin (2012) was conducted among the elderly people in Thailand by The National Statistical Office Thailand in 2007. The data revealed that the factors associated with the chance of falls were hazards in their homes such as a slippery floor in the bathroom or toilet (OR 1.39; 95% CI 1.21-1.59,  $p = 0.000$ ), and bathroom or toilet located outside the homes (OR 1.23; 95% CI 1.21-1.35,  $p = 0.000$ ). Moreover, home hazards were significant predictors of falls.

The places of the previous fall among the elderly people were 58.0% of intervention group and 46.0% of control group outside their home. This was found similar results that 44.5% of falls among the study of Sophonratanapokin (2012) that occurred outside the home. The results falling at baseline revealed that 42.0% of intervention and 32.0% of control group caused from impaired balance among the participants. Moreover, one of most common causes of falls were tripping (34.6%) and slipping (31.6%). Slippery floors contribute to loss of balance in the elderly (45).

### **5.1.2 Comparison TUGT, OLST, fear of falling, fall risk perception, and quality of life between the intervention group and control group at base line.**

The average Time Up and Go test (TUGT) at baseline were  $16.30 \pm 3.44$  and  $15.22 \pm 2.99$  among the intervention and control group respectively. The average One Legged Stance test (OLST) were  $8.60 \pm 4.28$  in the intervention and  $9.97 \pm 2.89$  in control

group. The study of Bongue (2011) found 39.0% of the faller elderly had average seconds TUGT were  $> 10.9$  second, and the average One Legged Stance test (OLST) were less than 12.7 second (36.0%).

Fear of falling, their average score for fear of falling were  $49.74 \pm 27.79$  in the intervention group and  $48.18 \pm 25.33$  in control group. The average fall risk perception score of both groups were  $7.62 \pm 3.07$  and  $7.98 \pm 3.07$ .

In term of quality of life, there are 4 domains of WHOQOL-BREF instrument. The average of the first domain, Physical health among the intervention and control group were  $21.98 \pm 2.59$  and  $21.24 \pm 1.84$  (moderate QoL), Psychological health were  $19.36 \pm 2.24$  and  $18.36 \pm 2.67$  (moderate QoL), Social relationships were  $9.14 \pm 1.87$  and  $9.08 \pm 1.78$  (moderate QoL), and Environment domain were  $25.74 \pm 3.32$  and  $24.60 \pm 2.74$  (moderate QoL). The average of total quality of life were  $81.76 \pm 7.84$  and  $79.26 \pm 7.66$  (moderate QoL).

The average TUGT, OLST, fear of falling score, fall risk perception score, and total quality of life in the intervention and control group were not statistically significantly different.

### **5.1.3 Effect of a multicomponent intervention and exercise calendar on gait and balance performance (by using Time Up and Go Test (TUGT) for gait and One Legged Stance Test (OLST) for balance)**

In term of time up and go test (TUGT) is a simple measure of independence function that involves lower extremity strength, dynamic balance, gait, and agility, was used to measure physical function. There was a significant different on TUGT score within the intervention group (mean before = 16.13, SD = 3.23; mean after = 10.73, SD = 1.73;  $p < 0.05$ ). The significant decrease in time of TUGT seen in the group of

intervention is supported by previous research that reported scores on the TUGT to significantly decrease in time in community dwelling elderly in age 60 and over who live in Bangkok. The participants in the intervention group with home based exercise were significant decrease (better) in time of TUGT. The decrease of TUGT score stated the effectiveness of the combination exercise program (15 minutes  $\times$ 4/week  $\times$  12 weeks) among the elderly in Bangkok can improve TUGT after participated in the exercise program ( $p < 0.05$ ) (48). The research study by Intarakamhang and Chintanaprawasee (2012) examine the effect of Dao Xin Xi exercise (or short Tai Chi) on balance in Thai elderly women. The results shown that the elderly who participate in the 3/week  $\times$  12-weeks exercise improve both static and dynamic balance. In agreement with the study of Prata and Scheicher (2014) revealed that the effects of muscle strength intervention of older with a history of falls improved mobility ( $p = 0.0004$ ). Furthermore, Britten et al. (2017) found the time taken to complete the TUGT decreased significantly from 10.1 s to 7.7 s ( $p < 0.005$ ) after the 8 weeks contemporary dance program. Also, in most analyses, the group of multicomponent program showed greater improvement on all scales from pre to post session, compare with the control group. The study of Khongprasert (2011), she used a series of 36 Thai dance sessions. The participants were divided into Thai dance group (TG) and control group (CG) by voluntary enrollment. The patients with TG attended the Thai dance exercise program 3 times/ week for 12 weeks whereas the CG did not attend the Thai dance exercise program. The results in study 2 (only 20 completed patients, TG=11 and CG=9), There were significant improvements in all parameters of the Thai dance group (on time) after participating in specifically designed Thai dance exercise program and there were also significant differences in UPDRS subscale III, Time Up and Go, Berg Balance Scale,

PDQ8, stride length (Lt.) and gait velocity at 2 months follow-up while step length (Rt.) was decreased significantly from post-test value.

One Legged Stance Test (OLST) is a physical measurement used to assess leg strength and endurance. There was a significant difference on OLST score within the intervention group (Mean before = 8.62, SD = 4.36; Mean after = 14.69, SD = 5.23;  $p < 0.05$ ). Previous research suggested that there was no significant difference before the program ( $p = 0.066$ ). After the program, the intervention group had higher (better) mean score than the control group ( $P < .05$ ) in agreement with Agmon, et al. (2011), an assessment of balance before and after 3 months the Wii Fit Balance Training Intervention among the elderly from the continuing care retirement communities to participate in a program. They found that after the program and expressed experiencing improved balance with daily activities and Balance Scores increased ( $p = .018$ ). As a result, the participants in a study of Poramuthakorn (2010) studied the effectiveness of the program interdisciplinary assessment for older people who have a risk group of further falls. The study compare muscle strength and movement degree of the joints for walking, balance testing found that the intervention group was significantly changed in the way of better and differences with the control group (95% CI,  $p < 0.05$ ). The study of Pankong (2009); she studied the effects of Ram Thai Prayuk on muscular strength, activity daily living and well-being with elderly persons. The program is Ram Thai Prayuk exercise 30 minutes  $\times$  3 times/week in 6 weeks. The results found that the elderly participated in the program reported muscle strength and well-being mean score the experiment were significantly higher than before the experiment ( $p < .01$ ).

#### **5.1.4 Effects of a multicomponent intervention and exercise calendar on fear of falling score (by using The Falls Efficacy Scale (FES)).**

The results shown that there was a significant different on fear of falling score within the intervention group (mean before = 50.38, SD = 27.83; mean after = 38.46, SD = 18.28). Several studies have examined psychosocial issues related to falling to reveal that although not every fall results in serious injury, most falls do have a psychological impact such as fear to falls. Fear of falling is a factor influenced on the balance ability and frequently reported by the elderly. Fear of falling is a weighty psychological concern of the elderly people who have falls experience (11). Fear of falling is regularly operationalized by falls efficacy, i.e., self-perception of one's ability to avoid falling (57) , which is modifiable through intervention (63). In this study, comparison fear of falling score in the elderly people between those participating in the multicomponent intervention and those conventional education found that the participants in the intervention group decreased fear of falling score after the program ( $p = .00$ ). In agreement with the study of Britten Addington and Astil (2017), they revealed that the participants who attended the Contemporary dance program were statistically significant decreases in the fear of falling score ( $p < 0.005$ ). The results of study by Prata and Scheicher (2014) showed improvement in the fear of falling ( $p = 0.002$ ) in the faller group who was submitted to 12 weeks of virtual reality and muscle strength training. The activities training to improve muscle strength in many programs might decrease fear of falling in the elderly with falls history.

#### **5.1.5 Effect of a multicomponent intervention and exercise calendar on fall risk perception**

In term of fall risk perception questionnaires, the fall risk perception at baseline was not found the difference among two groups with statistics significance. The mean score of the fall risk perception among the elderly people in the intervention group was low level (7.59, SD = 3.15). However, in the intervention group, the level was increased from low level to moderate level and the mean score was more than the control group. The study by Blalock (2016) revealed that awareness of falls risk behaviors recommended to reduce falls risk appears necessary for adoption of risk behaviors to reduce perceived risk. The participants in their study were aware of two behaviors recommended to reduce the risk of falling (exercise, use of safe footwear) and had adopted these behaviors perceived their risk of falling as lower than individuals who were aware of the recommended behaviors but had not adopted them. Moreover, awareness of behaviors recommended to reduce fall risk appears necessary for adoption of these behaviors to reduce perceived risk. Fall-prevention campaigns should emphasize behaviors where awareness is low. Chippendale and Boltz (2014) interviewed the elderly age 65 years and older from 3 urban senior centers. Results shown that the built environment contributes to perceived fall risk, personal strategies used to adapt to perceived fall risk-behavioral approaches. Moreover, behavioral strategies are used by seniors to prevent outdoor falls.

#### **5.1.6 Effect of a multicomponent intervention and exercise calendar on the Quality of life (by using WHOQOL-BREF)**

Assessing quality of life (QOL) is an essential fragment in evaluating the effects of treatments and health services on the participants' wellbeing. The average mean score of total quality of life were 81.74 in the intervention group and 79.20 in the control group. There were not statistical different of the quality of life score at



baseline between the intervention and control group. The total quality of life was classified into 3 levels included high QoL (QoL score = > 96), moderate QoL (QoL score = 61-95), and low QoL (QoL score = 26-60). At base line, it found that the majority of participants have had a moderate quality of life.

The Pair t-test was shown that the overall effects of a multicomponent intervention and exercise calendar on the total quality of life and its 4 domains were statistical significant difference between before and after the intervention. Our findings are in line with several other studies. The study in Thailand by Intarakamhang and Chintanaprawasee (2012) was to evaluate the effect of Dao De Xin Xi exercise (or short Tai Chi) on balance and quality of life in Thai elderly people in Bangkok. Results shown that the elderly who participate in the 3/week  $\times$  12-weeks exercise improve static, dynamic balance, and quality of life in each 4 domains, those may results in psychological relaxation. The results from 1,792 participants aged  $\geq$  72 years could be expected, depressive mood and fear of falling were among the variables with the strongest negative association with quality of life. Moreover, even under adjustment for their variables frequent falling retained an independent negative association with quality of life in this analysis(64). Results from systematic reviews (65) in quality of life as an outcome of fall prevention interventions among the aged revealed that six studies showed significant improvements in quality of life. They addressed fall prevention among individuals 60 years or older. Participants in the interventions were community dwellers in seven trials, hospitalized persons in four trials and nursing home residents in one trial. Two of these studies were exercise oriented, one was information oriented and one was Comprehensive Geriatric Assessment (CGA) oriented. The study by Leszczyńska et al. (2016) , they aimed at

assess the predisposition to falling as well as the subjective evaluation of quality of life in the elderly after implementation of the fall prevention program. The results revealed that health improvement exercise program minimizes susceptibility to falls and has a beneficial effect on improvement of quality of life in elderly people. One study examined the long-term relations between falls and health-related quality of life (HRQoL) and life satisfaction (LS) over six years in the general elderly population among 1,321 (aged 60–93 years) in Sweden. Those results revealed that fallers scored significant lower in HRQoL and LS at baseline and after six years, compared to non-fallers, especially in the SF-12 physical component ( $p = <0.001$ ) (Stenhagen, 2014). The previous study revealed that falling elderly presented lower scores of quality of life when compared to the non-falling elderly ( $p=0.0159$ ) The research mentioned that aspects of health related quality of life can be negatively impacted by the fall what make them study and understand the importance of preventing falls (Menezes C ,2016). In conclusion, falls predict a long-term reduction in quality of life particularly physical component in both of the general and faller elderly population. Moreover, activities from the prevention falls program has a beneficial effect on improvement quality of life in elderly.

#### 5.1.7 Falling

In part of history of fall in last 12 months at base line, almost of the participants in both groups had fall 1 time (56% of intervention and 58% of control group). After the 6th month of the program, the control group data revealed that 25.09% had fallen (20.38% had fallen 1 time and 4.16% had fallen 2 times). Recent studies shown the prevention falls program can reduce the fall rate (Gillespie et al., 2009, Sherrington, 2011, (66)

## 5.2 CONCLUSIONS

The main purpose of this study was to evaluate the effectiveness of a multicomponent intervention and exercise calendar to prevent falls and improve quality of life among elderly people by using health education to enhance falls risk perception and reduce falls risk factors, exercise to improve muscle strength and balance, and home visiting to identify hazardous environment. The results of the program show:

1. Gait measure by TUGT of the participants in the intervention group decreased (better) significantly from the baseline to after intervention compare with the control group.
2. Balance (OLST) of the participants in the intervention group increased (better) significantly from the baseline to after intervention in the intervention and control group.
3. The falls risk perception of the participants in the intervention group increased significantly from the baseline to after intervention compare with the control group.
4. The fear of falling of the participants in the intervention group decreased significantly from the baseline to after intervention compare with the control group.
5. The total quality of life score of the participants in the intervention group increased significantly from the baseline to after intervention compare with the control group. All 4 domains of quality of life were moderate level
6. Rate of falls of the participants after 6 months of the program in the intervention group less than the control group.

### 5.3 LIMITATION OF THE STUDY

1. The limitation of self-reported in exercise calendar may be containing errors 1) social desirability bias because the participants know the benefit of exercise and 2) recall bias because most of the elderly people recorded once a week. It might loss of memory.

2. Time limitation, the study duration was 6 months. It was not enough to assess the sustainability of the outcome such as rate of falling.

3. The activities of the program was created by the researcher, this may not fit for all the elderly people.

5. The participants were elderly in rural area that the quality of life generally is not quite low at the baseline. This might affect the results of the study.

6. This research is conducted within the rural area of Thailand, the study cannot generalize the environmental setting in other region of Thailand.

### 5.4 RECOMMENDATIONS

1. Research time devoted to implementation should be extended for longer studies to more than six months. It might better to observe long term effects such as rate of falls, and muscle strength of the elderly.

2. Further research should be done in participatory action research, because its engagement with problem solving in a particular context of the elderly people.

3. Qualitative research should be done to explore the prevention falls behaviors of the elderly without falls history to share their experiences to other elderly.

4. Research should be identified for screening and assessment individual falls risk factors for provide suitable program for prevention falls in the elderly.

5. Research should be undertaken to further explore the implementation of a multicomponent intervention with the other specific contexts, such as communities in urban areas.

6. Research should be undertaken with multidiscipline professor team such as physiotherapist, engineer or architect, social worker, and healthcare provider working to design and implement effective falls prevention program.



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ภาคผนวก

จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

## Appendix A

### Falls Prevention Manual



จุฬาลงกรณ์มหาวิทยาลัย  
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## สาเหตุของการหกล้มในผู้สูงอายุ



### 1. ปัจจัยภายใน

ปัจจัยภายในที่เป็นสาเหตุทำให้เกิดการหกล้มในผู้สูงอายุเกี่ยวข้องกับผู้สูงอายุเอง เกิดจากการเปลี่ยนแปลงด้านต่าง ๆ ของร่างกายตามอายุที่เพิ่มมากขึ้น เช่น เมื่ออายุมากขึ้น ความสามารถในการมองเห็นเปลี่ยนแปลงไป การรับรู้ลดลงส่งผลให้การเคลื่อนไหวช้าลง บางรายมีภาวะกระดูกเปราะและหักง่าย ซึ่งความเสี่ยงหรือการเปลี่ยนแปลงที่เกิดขึ้นจะแตกต่างกันไปในแต่ละคน ขึ้นอยู่กับกรรมพันธุ์ วิธีการดำรงชีวิต อาหารการกิน สภาพเศรษฐกิจและสังคม



### 2. ปัจจัยภายนอก

1. สิ่งแวดล้อมที่ไม่เหมาะสม เช่น บันได ไม่มีราวจับ หรือมีสิ่งของวางตามขั้นบันได



หรือการใช้ส้วมที่ไม่เหมาะสมกับผู้สูงอายุ ได้แก่ ส้วมแบบนั่งยอง ๆ

2. การรับประทานยาพร้อมกันตั้งแต่ 4 ชนิดขึ้นไป ยาอาจทำปฏิกิริยากันและส่งผลต่อผู้สูงอายุ เช่น ทำให้เวียนศีรษะ



### ทำอย่างไร? ไม่ให้ทกล้ม

**ออกกำลังกายเพิ่มความแข็งแรงของกล้ามเนื้อ**

การออกกำลังกายเพื่อเพิ่มความแข็งแรงของกล้ามเนื้อ คือ การออกแรงด้วยท่าทางออกกำลังกาย ทำแบบซ้ำ ๆ หลาย ๆ ครั้ง โดยไม่ต้องใช้อุปกรณ์ใด ๆ ช่วย

คู่มือป้องกันการหกล้มสำหรับผู้สูงอายุ 7

### ประโยชน์ของการออกกำลังกายเพื่อเพิ่มความแข็งแรงของกล้ามเนื้อ

1. ลดทุลง ลดไขมัน จากมวลกล้ามเนื้อที่เพิ่มขึ้นจะเผาผลาญอาหารให้กลายเป็นพลังงาน
2. ป้องกันและรักษากระดูกพรุน กระตุ้นให้ร่างกายเพิ่มมวลกระดูก
3. ป้องกันและรักษาโรคเบาหวาน การออกกำลังกายแบบฝึกกล้ามเนื้อ ป้องกันคนที่อยู่ในภาวะใกล้เป็นเบาหวานไม่ให้เป็นเบาหวานได้ดีกว่าการใช้ยา
4. เมื่อมีกล้ามเนื้อที่แข็งแรง จะส่งเสริมและเพิ่มการทรงตัวที่ดี
5. แก้ไขความอ่อนแอของร่างกายที่เกิดจากการหดตัวของกล้ามเนื้อทำให้สามารถทำงานหนักเดิน ฟ้องเที่ยว หรือกิจกรรมอื่นได้งเหมือนคนอายุน้อย
6. ร่างกายแข็งแรง และใช้ชีวิตได้อย่างมีความสุข
7. ทำให้มีบุคลิกดี สง่า รูปร่างดี กระชับ เคลื่อนไหวได้หนักแน่นและคล่องตัว

#### ฝึกการทรงตัวของร่างกาย

**การออกกำลังกายเป็นประจำอย่างสม่ำเสมอจะทำให้เกิดกล้ามเนื้อที่แข็งแรง เมื่อมีกล้ามเนื้อที่แข็งแรง จะส่งเสริมและเพิ่มการทรงตัวที่ดี จึงเป็นการป้องกันการหกล้มอีกหนึ่งวิธี**

จุฬ  
CHUL

### ทบทวนการใช้ยาโดยแพทย์

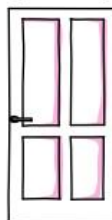


ผู้สูงอายุที่มีโรคประจำตัวหรือใช้ยาเป็นประจำเป็นส่วนหนึ่งของความเสี่ยงในการหล่น โดยเฉพาะอย่างยิ่ง การรับประทานยามากกว่า 4 ชนิดขึ้นไป หรือยาบางชนิดออกฤทธิ์กดการทำงานของระบบประสาท อาจทำให้ผู้สูงอายุมีอาการมึนงง เวียนศีรษะ ทำให้เสี่ยงต่อการหล่น การปรึกษาแพทย์ และ ทบทวนการใช้ยา จะช่วยให้ผู้สูงอายุได้รับคำแนะนำในการรับประทานยาที่เหมาะสม รวมไปถึงการ ทบทวนการใช้ยาที่อาจทำปฏิกิริยาร่วมกันและส่งผลกระทบต่ออาการต่าง ๆ ได้ จึงควรพบแพทย์ ประจำตัวหรือแพทย์ใกล้บ้าน เพื่อทบทวนการใช้ยาที่ไม่จำเป็นที่อาจส่งผลกระทบต่อความเสี่ยงในการหล่น

### สร้างสภาพแวดล้อมที่เหมาะสม



90 ซม.



1. ประตู ควรเปิด-ปิดได้ง่าย มีความกว้าง ไม่น้อยกว่า 90 ซม. หรือห้องแต่ละห้องสามารถ เข้า-ออกได้ง่าย  
ที่มา : บ้านใจดี สสส (2556)

**ปฏิทินการออกกำลังกายและการฝึกออกกำลังกายที่บ้าน**

การออกกำลังกายเป็นประจำอย่างสม่ำเสมอจะช่วยให้ร่างกายแข็งแรง และช่วยเสริมสร้างกล้ามเนื้อ เพื่อช่วยในการทรงตัว และการเดินสำหรับผู้สูงอายุ การออกกำลังกายเพื่อป้องกันการหกล้มในผู้สูงอายุ นั้นมีหลายรูปแบบ ซึ่งผู้สูงอายุสามารถเลือกรูปแบบการออกกำลังกายที่เหมาะสมกับตนเองได้ โดยเริ่มจากท่าออกกำลังกายง่าย ๆ ที่สามารถทำได้ที่บ้าน สถานที่ควรมีที่ติดจับที่มั่นคง แข็งแรง เพื่อความปลอดภัยในการออกกำลังกาย

**ท่าฝึกการออกกำลังกาย**



**1. ทำหันหน้า (บริหารศีรษะ)**

- ยืนตรงมองไปข้างหน้า ค่อย ๆ หันหน้าไปทางขวาให้มากที่สุดเท่าที่จะทำได้
- จากนั้นค่อย ๆ หันหน้าไปทางซ้ายให้สุด
- ทำซ้ำ 10 ครั้ง



**2. ทำบิดตัว (บริหารลำตัว)**

- ยืนตรงมองไปข้างหน้ามือเท้าเอา ค่อย ๆ บิดลำตัวช่วงบนไปด้านขวาให้มากที่สุดเท่าที่จะทำได้โดยไม่บิดสะโพก
- จากนั้นบิดลำตัวช่วงบนไปด้านซ้ายให้มากที่สุดเท่าที่จะทำได้
- ทำซ้ำ 10 ครั้ง

**ท่าฝึกความแข็งแรงของกล้ามเนื้อ (ท่าที่ 3-4)**



**3. ทำกระดูกข้อเท้า (บริหารข้อเท้า)**

- นั่งเก้าอี้ แล้วเริ่มจากขาขวา ยกขาขวาขึ้นจากพื้น ค่อย ๆ กระดกปลายเท้าเข้าหาตัว ทำซ้ำ 10 ครั้ง
- จากนั้นเปลี่ยนเป็นขาซ้าย ยกขาซ้ายขึ้นจากพื้น ค่อย ๆ กระดกปลายเท้าเข้าหาตัว
- ทำซ้ำ 10 ครั้ง



**4. ทำลุกจากเก้าอี้ โดยไม่ใช้มือพยุง**

- นั่งบนเก้าอี้ที่มีพนักพิงแข็งแรงไม่เคลื่อนไหวและไม่ได้ล็อก
- วางเท้าหลังหน้าเก้าอี้ ค่อย ๆ โน้มตัวไปด้านหน้าและใช้ 2 มือช่วยพยุงตัวค่อยขึ้น
- ทำซ้ำ 10-20 ครั้ง

**ท่าฝึกการเดินและการทรงตัว (ท่าที่ 5-7)**



**6. ยืนต่อเท้า โดยใช้ราวจับ**

- ยืนตรงขาขวา ไข่มือจับราวไว้มั่นคง (ข้างไหนก็ได้) เอาเท้าข้างหนึ่งไปวางข้างนั้นเท้าอีกข้างหนึ่งให้เป็นเส้นตรง และค้างท่าไว้ 10 วินาที (นับ 1-10)
- จากนั้นยกส้นเท้าขึ้นเปลี่ยนข้างโดยเอาเท้าที่อยู่ข้างหลังไปวางข้างหน้าให้เป็นเส้นตรง และค้างท่าไว้ 10 วินาที (นับ 1-10)



**6. เดินต่อเท้า โดยใช้ราวจับ**

- ยืนตรง ไข่มือจับราวไว้มั่นคง ค่อย ๆ เริ่มเดินโดยก้าวเท้าให้ปลายเท้าต่อส้นเท้า จนครบ 10 ก้าว
- จากนั้นกลับหลังหัน ไข่มือจับราวโดย ปลายเท้าต่อส้นเท้า เดินไป 10 ก้าว
- ทำซ้ำ 10 ครั้ง



**7. ยืนขาเดียว โดยใช้ราวจับ**










- ยืนหันข้างจับราวไว้มั่นคง ยกขาข้างหนึ่งขึ้น และยืนด้วยขาข้างเดียวนาน 10 วินาที
- จากนั้นเปลี่ยนเท้าอีกข้างหนึ่ง โดยทำ 10 วินาที (นับ 1-10)

**ปฏิทินการออกกำลังกาย**







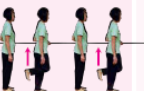

ปฏิทินการออกกำลังกายนี้ใช้เป็นบันทึกการออกกำลังกายของผู้สูงอายุด้วยตนเองที่บ้าน โดยผู้สูงอายุต้องออกกำลังกายวันละ 3 ท่า (ตามคู่มือการออกกำลังกาย และที่ได้รับบริการฝึก) อย่างน้อยสัปดาห์ละ 3 วัน ปฏิทินนี้จะใช้บันทึกหลังจากที่ผู้สูงอายุออกกำลังกายด้วยตนเอง ผู้วิจัยและผู้ช่วยวิจัยจะติดตามการใช้ปฏิทินการออกกำลังกายนี้ในช่วงที่ติดตามเยี่ยมผู้สูงอายุที่บ้านทุกเดือน

## Exercise Calendar

### ปฏิทินออกกำลังกายเดือนที่ 1

สัปดาห์ที่ 1		
วันที่ 1	วันที่ 2	วันที่ 3
		
<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 2 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10-20 ครั้ง
		
<input type="checkbox"/> ท่าที่ 3 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำ 10 ครั้ง
<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า


### ปฏิทินออกกำลังกายเดือนที่ 1

สัปดาห์ที่ 2		
วันที่ 1	วันที่ 2	วันที่ 3
		
<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง
		
<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง
<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า










คู่มือป้องกันการหกล้มสำหรับผู้สูงอายุ 23

24 คู่มือป้องกันการหกล้มสำหรับผู้สูงอายุ

### ปฏิทินออกกำลังกายเดือนที่ 1

สัปดาห์ที่ 3		
วันที่ 1	วันที่ 2	วันที่ 3
		
<input type="checkbox"/> ท่าที่ 1 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 2 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำข้างละ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 3 ทำข้างละ 10 ครั้ง
<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า

### ปฏิทินออกกำลังกายเดือนที่ 1

สัปดาห์ที่ 4		
วันที่ 1	วันที่ 2	วันที่ 3
		
<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำข้างละ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง	<input type="checkbox"/> ท่าที่ 2 ทำ 10 ครั้ง
		
<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง	<input type="checkbox"/> ท่าที่ 1 ทำ 10-20 ครั้ง
<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า	<input type="checkbox"/> ทำครบ 3 ท่า

คู่มือป้องกันการหกล้มสำหรับผู้สูงอายุ 25



## Appendix B

### THE INSTRUMENT EVALUATION

The questionnaire was tested by 30 elderly people with history falls in the past year in January 2015. These volunteer had characteristics similar to the participants in the intervention group. A Cronbach's alpha coefficient regarding participants' fall risk perception indicated an acceptable score, 0.85. The detail in each item was presented in the table below:

#### Falls Risk Perception

No	Item	Internal consistency if Item deleted
1	Getting older increases the risk of fall.	0.838
2	Females have more chance of falling than males.	0.844
3	An elderly person with hypertension has a higher risk of fall than one without it.	0.833
4	An elderly person with forgetting often has more risk of fall.	0.836
5	An elderly person with cerebrovascular disease has more risk of a fall than a person without that disease.	0.844
6	An elderly person being depressed has more risk of a fall than the one who isn't depressed.	0.843
7	An elderly person with calm character, and concentrates, has less risk of fall than an impatient elderly person.	0.843
8	An elderly with an eye disorder has more risk of a fall.	0.839
9	An elderly person who took 4 medications, increases the risk of fall.	0.848
10	An elderly person who takes sleeping pills or an antidepressant regularly has more risk of a fall than a person who does not use those medications.	0.847
11	An elderly person who uses antihypertensive medications, increases the risk of fall.	0.842

12	An elderly person who smokes has the risk of a fall equal to the non-smoker.	0.855
13	An elderly person who drinks increases the risk of fall.	0.847
14	An elderly person who regularly exercises will reduce the risk of fall.	0.843
15	An elderly person who lacks proper nutrients, which can affect muscle strength, increases the risk of fall.	0.849
16	An elderly person who wears loose, baggy clothes, or clothes that are over length, may trip and increase the risk of fall.	0.845
17	The size of ones shoes isn't a cause for the risk of fall.	0.852
18	A house with different floor levels increases the risk of fall.	0.851
19	An adequate lighting can reduce the risk of fall.	0.843
20	The walkway is cluttered may increase the risk of fall.	0.847
21	An elderly person who grabs the railing while going up or down stairs has a lower risk of a fall than the one who doesn't hold on to the railing.	0.843
22	The toilet with a railing will be safer from falls than no railing.	0.843
23	Using an appropriate mobility assistance tool, such as the right size cane, will reduce the risk of fall.	0.838

#### Reliability Statistics

Internal consistency	N of Items
0.850	23

## Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
risk1	60.93	21.513	.601	.838
risk2	61.17	21.592	.417	.844
risk3	61.13	19.844	.648	.833
risk4	61.20	20.097	.585	.836
risk5	61.20	21.545	.422	.844
risk6	61.13	21.223	.437	.843
risk7	60.87	22.257	.493	.843
risk8	60.97	21.551	.544	.839
risk9	60.90	22.714	.285	.848
risk10	60.80	22.993	.425	.847
risk11	61.07	21.582	.455	.842
risk12	61.40	21.766	.250	.855
risk13	60.80	22.993	.425	.847
risk14	60.87	22.326	.469	.843
risk15	60.97	22.240	.284	.849
risk16	60.93	22.202	.399	.845
risk17	61.27	21.720	.282	.852
risk18	61.10	21.748	.293	.851
risk19	60.83	22.420	.536	.843
risk20	60.80	22.993	.425	.847
risk21	60.80	22.579	.668	.843
risk22	60.80	22.579	.668	.843
risk24	60.93	21.168	.563	.838

## APPENDIX C

### QUESTIONNAIRE (ENGLISH)

The questionnaire divides into 6 parts as below:

Part I: General demographic characteristics

Part II: House living place.

Part III: Health status and tobacco and alcohol drinking history.

Part IV: Fall risk perception

Part V: Fear of falling

Part VI: Quality of life

Part I General demographic characteristics

Please mark ✓ in the box only one answer or fill in the blank to answer truthfully.

1. Gender	<input type="checkbox"/> 1.Male <input type="checkbox"/> 2.Female
2. Age	.....years
3. Body weight/Hight	.....Kgs. ....Cms.
4. Education level	<input type="checkbox"/> 1.Never been in school <input type="checkbox"/> 2.Primary school <input type="checkbox"/> 3. Secondary school <input type="checkbox"/> 4. Vocational school <input type="checkbox"/> 4. Bachelor degree or higher
5. Occupational	<input type="checkbox"/> 1.No work <input type="checkbox"/> 2.Retirement <input type="checkbox"/> 3. Commercial <input type="checkbox"/> 4. Agriculture <input type="checkbox"/> 5. Employee <input type="checkbox"/> 6 Other .....
6. Number of son or daughter	.....
7. Who are you live with?	<input type="checkbox"/> 1. Living alone <input type="checkbox"/> 2. Spouse <input type="checkbox"/> 3. Son or daughter <input type="checkbox"/> 4. Other .....
8. Who are take care you regularly?	<input type="checkbox"/> 0. None <input type="checkbox"/> 1. Spouse <input type="checkbox"/> 2. Son or daughter <input type="checkbox"/> 3. Other ...
9. Time of your last falls	<input type="checkbox"/> 1. 05.00-8.00 <input type="checkbox"/> 2. 8.01-12.00 <input type="checkbox"/> 3. 12.01-15.00 <input type="checkbox"/> 4. 15.01-17.00 <input type="checkbox"/> 5. 17.01-19.00 <input type="checkbox"/> 6 19.01-21.00 <input type="checkbox"/> 7. 21.01-23.00 <input type="checkbox"/> 8. 23.01-05.00
10. Place of falling	<input type="checkbox"/> 1. Inside your home please specify..... <input type="checkbox"/> 2 Outside your home please specify.....
11. Cause of falling	<input type="checkbox"/> 1. Dizzy <input type="checkbox"/> 2. Impair balance/slip <input type="checkbox"/> 3. Dim <input type="checkbox"/> 4. Unsuitable shoes <input type="checkbox"/> 5. Break off <input type="checkbox"/> 6. Other please specify

## II: House living place.

Please mark ✓ in the box only one answer or fill **Part** in the blank to answer truthfully.

1	Residence style	<input type="checkbox"/> 1. Terraced house	<input type="checkbox"/> 2. Detached house
		<input type="checkbox"/> 3. Townhome	
2	How many floors in your home?	<input type="checkbox"/> 1. Single floor	<input type="checkbox"/> 2. High single floor
		<input type="checkbox"/> 3. Two floors	
3	Are there any ladder?	<input type="checkbox"/> 1. Yes	<input type="checkbox"/> 2. No
4	(Observe by the interviewer) Is this house durable?	<input type="checkbox"/> 1. Yes	<input type="checkbox"/> 2. No
5	Which floor of your home do you stay?	<input type="checkbox"/> 1. Single floor	<input type="checkbox"/> 2. High single floor
		<input type="checkbox"/> 3. Two floors	
6	There is handrail in the toilet/rest room.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
7	The toilet/rest room is inside home.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
8	There is toilet seat.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
9	There is non-slip floor in the toilet/rest room.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
10	The bedroom's elderly is in the first floor.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
11	There is not roughly on the floor.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
12	There are step floors inside home.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
13	There is enough light inside home.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
15	There is light reflective of lighting switch in the bedroom.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
16	There is stoop in your home.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
17	The lighting switch is not high from ground over 90 centimeters.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
18	The electric power outlet is high from ground at least 45 centimeters.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes
19	The area around the house is not slippery or without water.	<input type="checkbox"/> 0. No	<input type="checkbox"/> 1. Yes

**Part III: Health status and tobacco and alcohol drinking history.**

1	You check-up health annually.	<input type="checkbox"/> 0. Never	<input type="checkbox"/> 1. Yes	
2	Do you have the following health complaints?			
	2.1 Dizziness	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.2 Sleepless	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.3 Fainting	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.4 Recognition Impairment	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.5 Balance Impairment	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.6 Hearing Impairment	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.7 Visual Impairment	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.8 Osteoporosis	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.9 Osteoarthritis	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.10 Parkinson	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.11 Urinary incontinence	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
	2.12 Other disease	<input type="checkbox"/> 0. None	<input type="checkbox"/> 1. Yes, but now it is gone.	<input type="checkbox"/> 2. Still have symptoms
3	<b>Smoking Habit</b> <input type="checkbox"/> 0. Never <input type="checkbox"/> 1. Stop smoking    1.1 Period of smoking history.....year. Stopping period .....year. <input type="checkbox"/> 2. Current smoker    2.1 No. of cigarette...../ day			
4	<b>Drinking Habit</b> <input type="checkbox"/> 0. Never <input type="checkbox"/> 1. Stop drinking    1.1 Period of drinking history.....year. Stopping period .....year. <input type="checkbox"/> 2. Current drinker    2.1 .....glass per day			

**Part IV: Fall risk perception (23 items)**

No	Item	Agree	Not decide	Disagree
1	Getting older increases the risk of fall.			
2	Females have more chance of falling than males.			
3	An elderly person with hypertension has a higher risk of fall than one without it.			
4	An elderly person with forgetting often has more risk of fall.			
5	An elderly person with cerebrovascular disease has more risk of a fall than a person without that disease.			
6	An elderly person being depressed has more risk of a fall than the one who isn't depressed.			
7	An elderly person with calm character, and concentrates, has less risk of fall than an impatient elderly person.			
8	An elderly with an eye disorder has more risk of a fall.			
9	An elderly person who took 4 medications, increases the risk of fall.			
10	An elderly person who takes sleeping pills or an antidepressant regularly has more risk of a fall than a person who does not use those medications.			
11	An elderly person who uses antihypertensive medications, increases the risk of fall.			
12	An elderly person who smokes has the risk of a fall equal to the non-smoker.			
13	An elderly person who drinks increases the risk of fall.			
14	An elderly person who regularly exercises will reduce the risk of fall.			
15	An elderly person who lacks proper nutrients, which can affect muscle strength, increases the risk of fall.			
16	An elderly person who wears loose, baggy clothes, or clothes that are over			

	length, may trip and increase the risk of fall.			
17	The size of ones shoes isn't a cause for the risk of fall.			
18	A house with different floor levels increases the risk of fall.			
19	An adequate lighting can reduce the risk of fall.			
20	The walkway is cluttered may increase the risk of fall.			
21	An elderly person who grabs the railing while going up or down stairs has a lower risk of a fall than the one who doesn't hold on to the railing.			
22	The toilet with a railing will be safer from falls than no railing.			
23	Using an appropriate mobility assistance tool, such as the right size cane, will reduce the risk of fall.			



**Part V: Fear of falling**

On a scale from 1 to 10, with 1 being very confident and 10 being not confident at all, how confident are you that you do the following act

1 = very confident      5 = moderate confident      10 = not confident at all

No.	Activity:	Score
1	Take a bath or shower	
2	Reach into cabinets or closets	
3	Walk around the house	
4	Prepare meals not requiring carrying heavy or hot objects	
5	Get in and out of bed	
6	Answer the door or telephone	
7	Get in and out of a chair	
8	Getting dressed and undressed	
9	Personal grooming (i.e. washing your face)	
10	Getting on and off of the toilet	
	<b>Total Score</b>	

**Part VI: Quality of life**

This assessment asks how you feel about your quality of life, health, or other areas of your life. **Please answer all the questions.** If you are unsure about which response to give to a question, **please choose the one** that appears most appropriate. This can often be your first response.

1	How would you rate your quality of life?	Very poor	Poor	Neither poor nor good	Good	Very good
2	How satisfied are you with your health?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	satisfied	Very satisfied
3	To what extent do you feel that physical pain prevents you from doing what you need to do?	Not at all	A little	A moderate amount	Very much	An extreme amount
4	How much do you need any medical treatment to function in your daily life?	Not at all	A little	A moderate amount	Very much	An extreme amount
5	How much do you enjoy life?	Not at all	A little	A moderate amount	Very much	An extreme amount
6	To what extent do you feel your life to be meaningful?	Not at all	A little	A moderate amount	Very much	An extreme amount

7	How well are you able to concentrate?	Not at all	A little	A moderate amount	Very much	Extremely
8	How safe do you feel in your daily life?	Not at all	A little	A moderate amount	Very much	Extremely
9	How healthy is your physical environment?	Not at all	A little	A moderate amount	Very much	Extremely
10	Do you have enough energy for everyday life?	Not at all	A little	Moderately	Mostly	Completely
11	Are you able to accept your bodily appearance?	Not at all	A little	Moderately	Mostly	Completely
12	Have you enough money to meet your needs?	Not at all	A little	Moderately	Mostly	Completely
13	How available to you is the information that you need in your day-to-day life?	Not at all	A little	Moderately	Mostly	Completely
14	To what extent do you have the opportunity for leisure activities?	Not at all	A little	Moderately	Mostly	Completely
15	How well are you able to get around?	Very poor	Poor	Neither poor nor good	Good	Very good
16	How satisfied are you with your sleep?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
17	How satisfied are you with your ability to perform your daily living activities?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
18	How satisfied are you with your capacity for work?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
19	How satisfied are you with yourself?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
20	How satisfied are you with your personal relationships?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
21	How satisfied are you with your sex life?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
22	How satisfied are you with the support you get from your friends?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied

23	How satisfied are you with the conditions of your living place?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
24	How satisfied are you with your access to health services?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
25	How satisfied are you with your transport?	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
26	How often do you have negative feelings such as blue mood, despair, anxiety, depression?	Never	Seldom	Quite often	Very often	Always



จุฬาลงกรณ์มหาวิทยาลัย  
CHULALONGKORN UNIVERSITY

**APPENDIX D**  
**Questionnaire in Thai**

แบบสอบถาม

ส่วนที่ 1 ข้อมูลส่วนบุคคล โปรดทำเครื่องหมาย  ลงในช่อง  หน้าข้อความ หรือเขียนตอบตามความเป็นจริงเกี่ยวกับตัวท่าน

1. เพศ	<input type="checkbox"/> 1.ชาย เซ็นติเมตร . BMI .....	<input type="checkbox"/> 2.หญิง	3. น้ำหนัก.....กิโลกรัม ส่วนสูง.....
2. อายุ ..... ปี			
3. การศึกษา	<input type="checkbox"/> 1.ไม่ได้รับการศึกษา	<input type="checkbox"/> 2.ประถมศึกษา	<input type="checkbox"/> 3.มัธยมศึกษา <input type="checkbox"/> 4.อนุปริญญา <input type="checkbox"/> 4.ปริญญาตรีและสูงกว่า
4. อาชีพ <input type="checkbox"/> 1.ไม่ได้ประกอบอาชีพ <input type="checkbox"/> 2.ข้าราชการเกษียณ <input type="checkbox"/> 3.ค้าขาย <input type="checkbox"/> 4.เกษตรกร <input type="checkbox"/> 5.รับจ้าง <input type="checkbox"/>	6.ธุรกิจส่วนตัว <input type="checkbox"/> 7.อื่นๆ (ระบุ).....		
5. จำนวนบุตร	บุตร.....คน <input type="checkbox"/> 1. มีชีวิต.....คน <input type="checkbox"/> 2. เสียชีวิต/ สาวสูญ.....คน		
6. ท่านพักอาศัยอยู่ในครัวเรือนเดียวกับ <input type="checkbox"/> 1. อยู่คนเดียว <input type="checkbox"/> 2. อยู่กับผู้อื่น.....คน			
7. ปัจจุบันท่านพักอาศัยอยู่ในครัวเรือนเดียวกับใคร (ตอบได้มากกว่า 1 ข้อ) <input type="checkbox"/> 1.สามี/ภรรยา <input type="checkbox"/> 2.บุตรชาย/บุตรสาว <input type="checkbox"/> 3.บุตรเขย /บุตรสะใภ้ <input type="checkbox"/> 4.หลาน <input type="checkbox"/> 5.ญาติ <input type="checkbox"/> 6.อื่นๆ (ระบุ) .....			
8. บุคคลที่ดูแลท่านเป็นประจำ <input type="checkbox"/> 0. ไม่มี <input type="checkbox"/> 1. สามี/ภรรยา <input type="checkbox"/> 2.บุตรชาย <input type="checkbox"/> 3. บุตรสาว <input type="checkbox"/> 4.บุตรเขย/บุตร สะใภ้ <input type="checkbox"/> 5.หลาน <input type="checkbox"/> 6.ญาติ <input type="checkbox"/> 7.อื่นๆ (ระบุ).....			
9. ครั้งล่าสุดที่ท่านล้มเกิดขึ้นเวลาใด <input type="checkbox"/> 1. 05.00-8.00 น. <input type="checkbox"/> 2. 8.00-15.00 น. <input type="checkbox"/> 3. 15.00-16.00 น. <input type="checkbox"/> 4. 16.00-19.00 น. <input type="checkbox"/> 5. อื่นๆ (ระบุ) .....			
10. บริเวณที่ท่านเคยหกล้ม <input type="checkbox"/> 1. ในบ้าน ระบุ..... <input type="checkbox"/> 2. นอกบ้าน ระบุ.....			
11. สาเหตุที่ทำให้หกล้ม <input type="checkbox"/> 1. เวียนศีรษะ <input type="checkbox"/> 2. ตาพร่า หรือมองเห็นไม่ชัด <input type="checkbox"/> 3. เสียการทรงตัว <input type="checkbox"/> 4. รองเท้าไม่เหมาะสม <input type="checkbox"/> 5. มีขอบหรือขั้น สูงทำให้สะดุด / พื้นต่างระดับ <input type="checkbox"/> 6. พื้นเปียกหรือลื่น <input type="checkbox"/> 7. ถูกชนล้ม <input type="checkbox"/> 8. สะดุดสิ่งของที่พื้น <input type="checkbox"/> 9. ไม่ ทราบสาเหตุ <input type="checkbox"/> 10. สาเหตุอื่นๆ(ระบุ).....			

ส่วนที่ 2 ข้อมูลด้านที่อยู่อาศัยและสิ่งแวดล้อมของผู้สูงอายุ (ร่วมกับการสังเกตโดยผู้สัมภาษณ์)

1. ลักษณะที่พักอาศัย	<input type="checkbox"/> 1. ดึกแถว/ห้องแถว <input type="checkbox"/> 2. บ้านเดี่ยวมีบริเวณ <input type="checkbox"/> 3. ทาวน์เฮาส์
2. จำนวนชั้น	<input type="checkbox"/> 1). ชั้นเดียวติดพื้นดิน <input type="checkbox"/> 2). ชั้นเดียวมีใต้ถุน <input type="checkbox"/> 3). 2 ชั้น
3. บันได <input type="checkbox"/> 0. ไม่มี (ข้ามไปตอบข้อถัดไป) <input type="checkbox"/> 1. มี <input type="checkbox"/> 3..1) มีราวจับหรือที่ยึด <input type="checkbox"/> 3.2) ไม่มีราวจับหรือที่ยึด	
4. ลักษณะบ้านของท่านเป็นอย่างไร	<input type="checkbox"/> 1. แข็งแรง คงทน <input type="checkbox"/> 2. ไม่แข็งแรง ไม่คงทน (บันทึกลักษณะบ้านโดย ผู้สัมภาษณ์). .....
5. ท่านพักอาศัยอยู่ชั้นใดของบ้าน	<input type="checkbox"/> 1) ชั้น 1 ไม่ยกสูง <input type="checkbox"/> 2) ชั้น 1 ยกสูง <input type="checkbox"/> 3) ชั้น 2 <input type="checkbox"/> 4) ชั้น 3 หรือมากกว่า
6. ห้องน้ำ/ห้องส้วมมีราวให้ยึดเกาะ	<input type="checkbox"/> 0. ไม่ใช่ <input type="checkbox"/> 1. ใช่
7. ห้องน้ำ/ห้องส้วมอยู่ภายในบ้าน	<input type="checkbox"/> 0. ไม่ใช่ <input type="checkbox"/> 1. ใช่
8. ส้วมเป็นแบบนั่งหย่อยเท้า	<input type="checkbox"/> 0. ไม่ใช่ <input type="checkbox"/> 1. ใช่
9. พื้นห้องน้ำเป็นพื้นกระเบื้องหยาบ หรือมีแผ่นรองกันลื่น	<input type="checkbox"/> 0. ไม่ใช่ <input type="checkbox"/> 1. ใช่
10. ห้องนอนของผู้สูงอายุอยู่ชั้นล่าง/บ้านชั้นเดียวมีห้องสำหรับผู้สูงอายุ	<input type="checkbox"/> 0. ไม่ใช่ <input type="checkbox"/> 1. ใช่

11. ไม่มีของวางเกะกะบริเวณพื้น	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
12. ไม่มีพื้นต่างระดับในบ้าน หรือถ้ามี มีแถบสีแบ่งขอบเขตให้ชัดเจน	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
13. ไฟส่องสว่างมีเพียงพอ	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
14. ทางเดินภายในบ้านสามารถเดินได้อย่างสะดวก	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
15. สวิตช์ไฟในห้องนอนเป็นแบบสะท้อนแสง	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
16. ไม่มีธรณีประตู	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
17. สวิตช์ไฟอยู่สูงจากพื้นไม่เกิน 90 เซนติเมตร	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
18. ปลั๊กไฟอยู่สูงจากพื้นอย่างน้อย 45 เซนติเมตร	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
19. พื้นที่บริเวณรอบบ้านไม่ลื่นหรือไม่มีน้ำขัง	<input type="checkbox"/> 0. ไม่ใช่ ใช่	<input type="checkbox"/> 1.
<b>ส่วนที่ 3 ด้านสุขภาพ</b>		
1. ท่านเคยตรวจสุขภาพประจำปี	<input type="checkbox"/> 0. ไม่เคยเลย <input type="checkbox"/> 2) 2 ปีที่แล้ว	<input type="checkbox"/> 1. เคย (ระบุ) <input type="checkbox"/> 1) 1 ปีที่แล้ว <input type="checkbox"/> 3) 3ปีหรือมากกว่า 3ปีที่แล้ว
2. ประวัติสุขภาพ/อาการเจ็บป่วย		
2.1) เวียนศีรษะ	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.2) นอนไม่หลับ	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.3) เป็นลมบ่อย	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.4) หลง ๆ ลืม ๆ หรือความจำเสื่อม	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.5) การทรงตัวไม่ดี	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.6) โรคหูตึง	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.7) โรคเกี่ยวกับตา (ต้อกระจก/ต้อหิน/ต้อเนื้อ)	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.8) โรคกระดูกพรุน	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.9) โรคปวดข้อ (ข้อเสื่อม)	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.10) การเคลื่อนไหวผิดปกติ (โรคพาร์กินสัน)	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.11) กลั้นปัสสาวะไม่อยู่	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
2.12) โรคอื่นๆ ระบุ .....	<input type="checkbox"/> 0. ไม่เคยเป็นเลย <input type="checkbox"/> 2. เป็นอยู่ปัจจุบัน	<input type="checkbox"/> 1. เคยเป็น แต่ปัจจุบันหายแล้ว
3. ท่านสูบบุหรี่ หรือไม่	<input type="checkbox"/> 0. ไม่สูบบุหรี่เลย <input type="checkbox"/> 1.เคยสูบแต่ปัจจุบันเลิกแล้ว เลิกมา .....ปี <input type="checkbox"/> 2.ปัจจุบันสูบ (กรณีที่สูบบุหรี่มาตอบคำถามดังต่อไปนี้)	

2.1 ความถี่ในการสูบ .....ครั้ง /วัน		2.2 จำนวนบุหรี่ที่สูบ.....มวน/วัน	
4. ท่านดื่มสุราหรือไม่ (รวมหมายถึง เหล้า เบียร์ ไวน์ สาโท อุ เหล้าพื้นบ้านอื่นๆ ฯลฯ )			
<input type="checkbox"/> 0. ไม่เคยดื่มเลย	<input type="checkbox"/> 1. เคยดื่มแต่เลิกแล้ว เลิกมา .....	ปี	
<input type="checkbox"/> 2. ปัจจุบันดื่ม	2.1 ความถี่ในการดื่ม .....	ครั้งต่อสัปดาห์	2.2 ปริมาณที่ดื่มต่อวัน.....

**ส่วนที่ 4 การรับรู้ความเสี่ยงต่อการหกล้ม** คำชี้แจง ข้อคำถามนี้ ให้ผู้สัมภาษณ์ถามถึงการรับรู้ความเสี่ยงต่อการหกล้มของผู้สูงอายุ

โดยใส่เครื่องหมาย (✓) ลงในช่องที่ตรงกับความคิดเห็นของผู้สูงอายุที่มีต่อปัจจัยเสี่ยงต่างๆ

ข้อ	คำถาม	มากที่สุด	ปานกลาง	ไม่เห็นด้วย
1	ท่านคิดว่าอายุที่เพิ่มมากขึ้นทำให้เสี่ยงต่อการหกล้มมากขึ้น			
2	ผู้ท่านคิดว่าสูงอายุเพศหญิงมีโอกาสหกล้มมากกว่าเพศชาย			
3	ท่านทราบว่าสูงอายุที่มีโรคความดันโลหิตสูงมีโอกาสเสี่ยงต่อการหกล้มมากกว่าผู้ที่ไม่มีความดันโลหิตสูง			
4	ท่านสังเกตเห็นว่าผู้สูงอายุหลังล้มง่ายมีเสี่ยงต่อการหกล้มมากขึ้น			
5	ท่านคิดว่าผู้สูงอายุที่มีโรคหลอดเลือดสมองมีโอกาสเสี่ยงต่อการหกล้มมากกว่าผู้ที่ไม่มีความดันโลหิตสูง			
6	ท่านคิดว่าผู้สูงอายุที่มีภาวะซึมเศร้ามีความเสี่ยงต่อการหกล้มกว่าผู้ที่ไม่มีความซึมเศร้า			
7	ท่านคิดว่าผู้สูงอายุที่มีบุคลิกใจเย็น มีสมาธิ เสี่ยงต่อการหกล้มน้อยกว่าผู้สูงอายุที่ใจร้อน			
8	ท่านคิดว่าผู้สูงอายุที่มีความคิดปวกดด้านสายตามีโอกาสเสี่ยงการหกล้มมากขึ้น			
9	ท่านทราบว่าผู้สูงอายุที่รับประทานยาต้านตั้งแต่ 4 ชนิด ทำให้เพิ่มความเสี่ยงต่อการหกล้ม			
10	ท่านทราบว่าผู้สูงอายุที่ใช้ยาคลายเครียดหรือยานอนหลับเป็นประจำมีโอกาสเสี่ยงต่อการหกล้มมากกว่าผู้ที่ไม่ใช้ดังกล่าว			
11	ท่านคิดว่าผู้สูงอายุที่ใช้ยาคุมขาลความดันโลหิตทำให้เพิ่มความเสี่ยงต่อการหกล้ม			
12	ท่านคิดว่าผู้สูงอายุที่สูบบุหรี่มีความเสี่ยงต่อการหกล้มเท่ากับผู้ที่ไม่สูบบุหรี่			
13	ท่านคิดว่าผู้สูงอายุที่ดื่มสุราทำให้เพิ่มความเสี่ยงต่อการหกล้ม			
14	ท่านทราบว่าผู้สูงอายุที่ออกกำลังกายอย่างสม่ำเสมอจะช่วยลดความเสี่ยงต่อการหกล้มได้			
15	ท่านทราบว่าผู้สูงอายุที่มีภาวะขาดสารอาหาร ส่งผลต่อความแข็งแรงของกล้ามเนื้อ ทำให้เพิ่มความเสี่ยงในการหกล้ม			
16	ท่านคิดว่าผู้สูงอายุที่สวมเสื้อผ้าที่มีหลวม ขนาดใหญ่ หรือยาวเกินไป อาจทำให้เกิดการสะดุด เกี่ยวจึงเพิ่มความเสี่ยงต่อการหกล้มได้			
17	ท่านคิดว่าขนาดของรองเท้าที่สวมไม่ทำให้เสี่ยงต่อการหกล้ม			
18	ท่านคิดว่าบ้านที่มีพื้นต่างระดับ ทำให้ผู้สูงอายุเสี่ยงต่อการหกล้มมากขึ้น			
19	ท่านคิดว่าแสงสว่างที่เพียงพอสามารถลดความเสี่ยงต่อการหกล้มได้			
20	ท่านทราบว่าการวางสิ่งของขวางทางเดิน อาจทำให้เสี่ยงต่อการหกล้มมากขึ้น			
21	ท่านคิดว่าผู้สูงอายุที่จับราวบันไดขณะขึ้น-ลง จะเสี่ยงต่อการหกล้มน้อยกว่าผู้ที่ไม่จับราวบันได			
22	ท่านคิดว่าผู้สูงอายุใช้ห้องน้ำที่มีราวจับ จะปลอดภัยจากการหกล้มมากกว่าห้องน้ำที่ไม่มีราวจับ			
23	ท่านคิดว่าการใช้อุปกรณ์ที่ช่วยในการเคลื่อนไหวที่เหมาะสม เช่น ไม้เท้าที่มีขนาดเหมาะสม จะลดความเสี่ยงต่อการหกล้ม			

**ส่วนที่ 5 แบบสอบถามความกลัวการหกล้ม**

คำชี้แจง ข้อคำถามนี้ ให้ผู้สัมภาษณ์ถามถึงความกลัวต่อการหกล้มของผู้สูงอายุ

ในแต่ละข้อจะมีคะแนนจาก 0 – 10

1 หมายถึง ไม่กลัว(มีความมั่นใจเต็มที่) 5 หมายถึง มีความมั่นใจปานกลาง

10 หมายถึง กลัวมากที่สุด(ไม่มีความมั่นใจ)

ความมั่นใจ หมายถึง คุณสามารถทำกิจกรรมแต่ละอย่างต่อไปนี้ได้โดยมั่นใจว่าไม่มีการล้ม, ไม่มีความมั่นใจ, มีความมั่นใจปานกลาง หรือมีความมั่นใจเต็มที่

	ไม่กลัว (มั่นใจเต็มที่) 1 คะแนน	มีความมั่นใจปานกลาง 5 คะแนน	กลัวมากที่สุด (ไม่มีความมั่นใจ) 10 คะแนน
1. สวมใส่-ถอดเสื้อผ้า			
2. เตรียมอาหารหนึ่งมื้อง่ายๆ			
3. อาบน้ำ			
4. นั่ง/ลุกขึ้น จากเก้าอี้			
5. ลงนอน/ลุกขึ้นจากเตียง			
6. เดินไปเปิดประตูหรือรับ โทรศัพท์			
7. เดินภายในบ้าน			
8. เอื้อมหยิบของในตู้คิดค้น/ ชั้นวางของ			
9. ทำงานบ้านเบาๆ (เช่น ถาด บ้าน, บัดฝุ่น)			
10. เดินไปซื้อของเล็กน้อย (เช่น ไปร้านขายของชำ)			

### ส่วนที่ 6 แบบสอบถามคุณภาพชีวิต

คำชี้แจง ข้อคำถามนี้ ให้ผู้สัมภาษณ์ถามถึงความรู้สึกเกี่ยวกับชีวิตความเป็นอยู่ สุขภาพและเรื่องต่างๆ ในชีวิตของผู้ถูกสัมภาษณ์ ในช่วง 2 สัปดาห์ที่ผ่านมาว่าเป็นอย่างไร โดยให้ทำเครื่องหมาย ○ ล้อมรอบในช่องคำตอบที่ได้สัมภาษณ์ในแต่ละข้อ

ข้อ	คำถาม					
1	ท่านคิดว่าท่านมีจิตวิญญาณเป็นอยู่ อยู่ในระดับใด	แย่มาก (1)	แย่ (2)	กลางๆ (3)	ดี (4)	ดีมาก (5)
2	ท่านพอใจกับสุขภาพของท่านเพียงใด	ไม่พอใจ มาก (1)	ไม่พอใจ (2)	กลางๆ (3)	พอใจ (4)	พอใจมาก (5)
3	ท่านรู้สึกว่าคุณภาพร่างกายของท่านเป็นอุปสรรค/ ปัญหา ที่ทำให้ท่านไม่สามารถทำในสิ่งที่อยากทำ เพียงใด	ไม่เลย (5)	เล็กน้อย(4)	ปานกลาง (3)	มาก(2)	มากที่สุด (1)
4	ในชีวิตประจำวันท่านมีความจำเป็นต้องพึ่งหรือการ รักษาทางการแพทย์เพียงใด	ไม่เลย(5)	เล็กน้อย(4)	ปานกลาง (3)	มาก(2)	มากที่สุด (1)
5	ท่านรู้สึกเพียงพอในชีวิตที่ีอยู่นูขณะนี่มากเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
6	ท่านรู้สึกในชีวิตท่านมีความหมายสักแค่ไหน	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
7	ท่านมีสมาธิในการทำสิ่งต่างๆดีเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
8	ในชีวิตประจำวันท่านรู้สึกปลอดภัยในชีวิตและ ทรัพย์สินเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
9	สภาพแวดล้อมรอบๆ ตัวท่านมีผลคือสุขภาพของ ท่านเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
10	ท่านมีกำลัง/เร็วแรงพอที่จะดำเนินชีวิตประจำวัน เพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
11	ท่านยอมรับสุขภาพร่างกายของตนเองเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
12	ท่านมีเงินพอใช้จ่ายตามที่ท่านต้องการเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
13	ท่านได้รับรู้เรื่องราวข่าวสารที่จำเป็นในแต่ละวัน มากน้อยเพียงใด	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
14	ท่านมีเวลาที่จะได้พักผ่อนอย่างสบายๆ สักแค่ไหน	ไม่เลย(1)	เล็กน้อย(2)	ปานกลาง (3)	มาก(4)	มากที่สุด (5)
15	ท่านสามารถจะไปไหนมาไหนได้ดีเพียงใด	แย่มาก(1)	แย่(2)	กลางๆ(3)	ดี(4)	ดีมาก(5)
16	ท่านพอใจกับการนอนหลับของท่านเพียงใด (หลับ ดีและเต็มอิ่ม)	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)



17	ท่านพอใจกับความสามารถทำกิจกรรมประจำวันของท่านเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
18	ท่านพอใจกับความสามารถในการทำงานของท่านเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
19	ท่านรู้สึกภาคภูมิใจในตนเองเพียงใด	ไม่เลย(1)	น้อย(2)	กลางๆ(3)	มาก(4)	มากที่สุด (5)
20	ท่านพอใจในความสามารถในการสร้างสัมพันธ์ภาพ/ความเป็นเพื่อนกับคนอื่นเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
21	ท่านพอใจกับความสุขทางเพศ/ชีวิตคู่ของท่านเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
22	ท่านพอใจที่ได้รับการช่วยเหลือสักเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
23	ท่านพอใจกับสภาพที่อยู่อาศัยของท่านเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
24	ท่านพอใจกับการช่วยเหลือที่ได้รับจากโรงพยาบาล/โรงพยาบาลส่งเสริมสุขภาพตำบลเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
25	ท่านรู้สึกพอใจในการคมนาคม/เดินทางของท่านเพียงใด	ไม่พอใจมาก (1)	ไม่พอใจ(2)	กลางๆ(3)	พอใจ(4)	พอใจมาก (5)
26	ท่านมีความรู้สึกที่ไม่ดี เช่น รู้สึกหุนหัน วิตกกังวล ซึมเศร้า บ่อยแค่ไหน	ไม่เลย (5)	นานครั้ง(4)	ปานกลาง(3)	บ่อยๆ (2)	เสมอ (1)

ขอบคุณในความร่วมมือนะ



จุฬาลงกรณ์มหาวิทยาลัย  
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### Field of interest

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2. Health promotion
3. Community Health