ASSESSING THE RELATIONSHIP BETWEEN KNOWLEDGE AND PRACTICES ON FALL PREVENTION WITH THE OCCURRENCE OF FALLS AMONG ELDERLY RESIDENTS IN NURSING HOMES JINZHOU, CHINA

LI MUZHENG

UNIVERSITI SAINS MALAYSIA

2025

ASSESSING THE RELATIONSHIP BETWEEN KNOWLEDGE AND PRACTICES ON FALL PREVENTION WITH THE OCCURRENCE OF FALLS AMONG ELDERLY RESIDENTS IN NURSING HOMES JINZHOU, CHINA

by

LI MUZHENG

Thesis submitted in fulfilment of the requirements
for the degree of
Master of Science

September 2025

ACKNOWLEDGEMENT

This thesis marks the conclusion of a meaningful academic journey, and I am deeply grateful to all who have contributed to its completion.

First and foremost, I would like to express my heartfelt gratitude to my supervisor, Dr. Eva Nabiha Zamri. It was truly a privilege to study under her guidance at USM. Her patient mentorship, constructive feedback, and tireless dedication have been instrumental in shaping this work. The countless discussions and her meticulous revisions not only improved the quality of this thesis but also taught me invaluable lessons about perseverance, academic rigor, and the qualities of a true researcher.

I am also indebted to my field supervisor, Professor Kun Liu, for his valuable advice during the data collection phase and for his constant encouragement throughout the analysis. My sincere appreciation also goes to my co-supervisors**,** Dr. Noorsuzana binti Mohd Shariff and Dr. Nurdiana binti Zainol Abidin**,** whose thoughtful insights, care, and support greatly enriched this study.

This research would not have been possible without the generous cooperation of the Jinzhou Civil Affairs Bureau and the elderly care institutions in the three districts of Jinzhou. I am grateful to the nursing home staff, the elderly participants who kindly shared their time, and my team of students whose dedication during data collection was invaluable. Their contributions provided the foundation for this research.

Finally, I wish to extend my deepest thanks to my family for their unwavering support. My beloved parents and sister have been my greatest source of strength, offering boundless love, encouragement, and sacrifices. Their constant support gave me courage and determination to pursue my studies abroad and complete this work.

TABLE OF CONTENTS

LIST OF TABLES

Page

LIST OF FIGURES

Page

LIST OF SYMBOLS

&	And
%	Percent
=	Equal to
≥	More than and equal to
≤	Less than and equal to
>	More than
<	Less than

LIST OF ABBREVIATIONS

KOFP	Knowledge on Fall Prevention
POFP	Practice on Fall Prevention
LOE	Level of Education
HOS	History of Stroke
COPD	Chronic Obstructive Pulmonary Disease
PVD	Peripheral Vascular Disease
TUGT	Time Up and Go Test
HBM	Health Belief Model
KAP	Knowledge-Attitude-Practice
GDS-15	Geriatric Depression Scale -15
WHO	World Health Organization
IPS	Institut Pengajian Siswazah (Institute of Postgraduate Studies)
USM	Universiti Sains Malaysia
AMDI	Advanced Medical and Dental Institute
ADL	Activities of Daily Life
QOL	Quality of Life
MCAR	Missing Completely at Random

LIST OF APPENDICES

MENILAI HUBUNGAN ANTARA PENGETAHUAN DAN AMALAN PENCEGAHAN JATUH DENGAN KEJADIAN JATUH DALAM KALANGAN PENDUDUK WARGA EMAS DI RUMAH PENJAJAAN JINZHOU, CHINA

ABSTRAK

Jatuh dalam kalangan warga emas adalah isu kesihatan awam yang utama disebabkan oleh akibat kesihatan yang serius. Walau bagaimanapun, konteks khusus rumah jagaan di China masih kurang mendapat perhatian kajian. Kajian ini bertujuan untuk menangani jurang tersebut dengan menentukan hubungan antara pengetahuan dan amalan pencegahan jatuh (*KOFP & POFP*) dengan kejadian jatuh dalam kalangan warga emas di rumah jagaan di China. **Kaedah:** Kajian keratan lintang telah dijalankan di rumah jagaan di Jinzhou, Wilayah Liaoning, China. Saiz sampel akhir sebanyak 341 peserta telah ditentukan menggunakan perisian OpenEpi (versi 3.01). Kaedah pensampelan rawak kluster pelbagai peringkat telah digunakan untuk merekrut peserta. Data telah dikumpulkan menggunakan soal selidik berstruktur dan penilaian mobiliti fizikal menggunakan Ujian *Timed Up and Go* (TUGT), yang dikendalikan oleh penyelidik terlatih. Ujian regresi logistik digunakan untuk menentukan faktor-faktor yang berkaitan dengan kejadian jatuh. **Hasil:** Kadar kejadian jatuh adalah 27.9%. Skor *KOFP* yang lebih tinggi menunjukkan hubungan yang signifikan dengan kejadian jatuh (Nisbah Kemungkinan Diselaraskan [*AOR*]= 1.16, 95% CI: 1.06–1.27), manakala hubungan antara *POFP* dan kejadian jatuh tidak signifikan (*AOR*=1.03, 95% CI: 0.99-1.08). Penemuan lain yang signifikan termasuk jantina, iaitu wanita lebih cenderung mengalami jatuh berbanding lelaki (*AOR* = 1.76, 95% CI: 1.03–2.99). Warga emas yang mempunyai sejarah strok (*HOS*) adalah lebih

tiga kali kemungkinan berisiko jatuh (AOR = 3.12, 95% CI: 1.64–5.93). Pencapaian pendidikan, khususnya sekolah menengah rendah/tinggi (AOR = 0.55, 95% CI: 0.31–0.974) dan pendidikan kolej (AOR = 0.40, 95% CI: 0.17–0.98), menunjukkan hubungan songsang dengan kejadian jatuh. Selain itu, gangguan mobiliti (AOR = 2.07, 95% CI: 1.21–3.55) didapati mempunyai hubungan signifikan dengan kejadian jatuh. **Kesimpulan:** Kejadian jatuh adalah lazim dalam kalangan warga emas di rumah jagaan di China, dengan beberapa faktor penyumbang yang dikenal pasti dalam kajian ini. Faktor-faktor seperti jantina, pencapaian pendidikan, sejarah strok (*HOS*), mobiliti, dan tahap *KOFP* menyumbang terhadap kejadian jatuh. Bagi mencegah kejadian jatuh dalam kalangan warga emas dengan lebih berkesan, ia adalah penting untuk mempertimbangkan pelbagai faktor secara kolektif dan bukan hanya menumpukan kepada satu faktor. Oleh itu, intervensi pencegahan jatuh yang sesuai boleh direka bentuk dan dilaksanakan berdasarkan penemuan kajian ini. **Kata Kunci:** Warga Emas, Jatuh, Rumah Jagaan, Pengetahuan, Amalan, Pencegahan Jatuh.

ASSESSING THE RELATIONSHIP BETWEEN KNOWLEDGE AND PRACTICES ON FALL PREVENTION WITH THE OCCURRENCE OF FALLS AMONG ELDERLY RESIDENTS IN NURSING HOMES JINZHOU, CHINA

ABSTRACT

Falls among older adults are a major public health concern due to their severe health consequences. Nevertheless, the specific context of nursing homes in China has received limited research attention. This study addresses gaps by determining the relationships between knowledge and practice on falls prevention(KOFP&POFP) and occurrence of falls among elderly residents in Chinese nursing homes. **Methods:** A cross-sectional survey was conducted in nursing homes in Jinzhou, Liaoning Province, China. A final sample size of 341 participants was calculated using OpenEpi software (version 3.01). A multistage cluster random sampling method was employed to recruit participants. Data were collected using a structured questionnaire and physical mobility assessment, using the Timed Up and Go Test (TUGT) conducted by trained researchers. Logistic regression test was employed to determine the factors associated on falls. **Results:**The fall occurrence rate was 27.9%. A higher KOFP score was significantly associated with fall occurrence (Adjusted Odds Ratio [AOR]= 1.16, 95% CI: 1.06-1.27), while the association between POFP and falls was not significant(AOR=1.03, 95% CI: 0.99-1.08). Other significant findings included gender, which women were more likely to experience falls than men (AOR = 1.76, 95% CI: 1.03–2.99). The elderly with a history of stroke(HOS) were over three times odds more likely to fall(AOR = 3.12, 95% CI: 1.64–5.93). Educational attainment, specifically junior/senior high school (AOR = 0.55, 95% CI: 0.31–0.97) and college

education (AOR = 0.40, 95% CI: 0.17–0.98), were inversely associated with fall occurrence.Additionally, impaired mobility (AOR = 2.07, 95% CI: 1.21–3.55) were significantly associated with fall. **Conclusion:** Falls are common among elderly residents in Chinese nursing homes. Factors such as gender, educational attainment, HOS, mobility, and level of KOFP were contributed to the occurrence of falls . In order to effectively prevent falls in the elderly, it is essential to consider multiple factors collectively, rather than focusing on a single factor. Thus, appropriate fall prevention intervention can be designed and implemented based on the findings of this study.
Keywords: Elderly, Fall, Nursing home, Knowledge, Practice, Falls prevention.

CHAPTER 1

INTRODUCTION

1.1 Introduction

A fall is defined as an unanticipated occurrence in which an individual loses their equilibrium and falls to the ground due to a displacement of the center of gravity away from the support surface (Ungar et al., 2013). Falls are a serious public health problem and are one of the biggest reasons for hospitalization, morbidity and mortality among elderly people (Gomes et al., 2013). Statistics from the World Health Organization (WHO) suggest that each year an estimated 684,000 individuals die from falls globally, of which over 80% are in low- and middle-income countries(WHO, 2021).

Elderly individuals experience a significantly higher occurrence of falls compared to other age groups. Studies show that while the prevalence of falls among middle-aged adults (46-65 years) is relatively low, reporting 21%, this rate increases dramatically among those aged 65 and older, with approximately 30% to 40% experiencing at least one fall annually. In contrast, younger adults (20-45 years) have a prevalence of less than 20%(Talbot et al., 2005). The heightened risk causes of falls among the elderly are multifactorial(Ambrose et al., 2013). Intrinsic factors include lower limb muscle weakness, poor balance, functional and cognitive impairments, visual disturbances, dizziness, chronic conditions, use of assistive devices, and depression symptoms (Damián et al., 2013; Gill et al., 2005; Gomes et al., 2013). Extrinsic factors, such as environmental hazards (e.g., insufficient lighting, loose rugs, and a lack of bathroom safety equipment), contribute to the elevated risk of falls. Additionally, the use of multiple medications (polypharmacy) further increases vulnerability (Ambrose et al., 2013).

A review of the literature reveals that between 30% and 40% of community-dwelling older adults aged 65 years and above fall each year(Rubenstein et al., 2004). This prevalence is even higher for nursing home residents, with studies reporting rates ranging from 38% to 49%. For example, a study in Australia reported a fall prevalence of approximately 41.8% among nursing home residents, while data from European countries showed similar rates, with some as high as 50% (Hartholt et al., 2011; RAO, 2005; Shao et al., 2023). These findings highlight the elevated risk of falls in institutionalized settings compared to community environments, emphasizing the importance of targeted fall prevention strategies in nursing homes.

Adults over 60 years of age experience the highest number of fatal falls. Each year, there are 37.3 million falls severe enough to require medical attention (WHO, 2021). It is estimated that falls contribute to 40% of hospitalizations due to trauma, resulting in a range of significant injuries including fractures, contusions, lacerations, and in severe cases, intracranial bleeding (Partridge et al., 2018; Xi et al., 2022). Furthermore, 12% of fall cases result in long-term nursing care needs (Stevens et al., 2006; WHO, 2008). These injuries have a significant impact on both physical and mental health, affecting self-care abilities and quality of life (QOL). They can cause a fear of falling again and a loss of independence.

Falls not only result in physical injuries but also have profound psychological and social consequences. Although certain risk factors, such as aging and gender are beyond control, a significant number of falls can be prevented through targeted interventions. Understanding the risk factors that lead to falls, as well as implementing effective fall prevention strategies, is crucial in mitigating the frequency of these incidents. This study aims to investigate the distribution of falls among elderly residents in nursing homes and assess how the knowledge and practice on falls prevention

(KOFP&POFP) of the elderly in nursing homes influence the occurrence of falls. By identifying key factors, researchers can provide valuable insights that guide the development of effective fall prevention interventions to enhance the QOL for elderly residents.

1.2 Problem Statement and Study Rationale

With increasing age, the risk of falls rises significantly, with rates potentially increasing by up to 60% (Ye et al., 2021). This issue is particularly pressing for older adults in nursing homes, who are even more susceptible to falls due to chronic illnesses and limited mobility. Additionally, research conducted in long-term care facilities reported an average fall rate of 1.7 falls per person-year, a figure notably higher than the 0.65 falls per person-year observed in older adults living in the community (Becker & Rapp, 2010). In China, the rapidly aging population has led to a significant increase in demand for quality services, including nursing homes. Many elderly residents lack adequate social support, making them heavily reliant on nursing homes for comprehensive care (Li et al., 2022). Studies indicate that the prevalence of falls in Chinese nursing homes ranges between 24% and 39%, with contributing factors including age, gender, visual impairment, chronic illnesses, polypharmacy, walking aid use, and insufficient environmental modifications (Huang et al., 2023). Such conditions not only heighten the risk of falls but also underscore the urgency of implementing effective fall prevention strategies in these settings.

Falls among the elderly significantly impact their physical health, independence, and overall QOL. Among the multiple risk domains, mobility and health-related factors are particularly critical yet often under-discussed in institutional settings. Elderly in nursing homes frequently present with reduced mobility due to conditions such as

sarcopenia, arthritis, or post-stroke impairments, which significantly compromise their balance and increase fall susceptibility (Najafi et al., 2018). Additionally, health-related factors, including chronic diseases such as hypertension and diabetes, polypharmacy, and cognitive impairment, are highly prevalent in this population. However, poor health status resulting from these conditions can directly impair physical function and further contribute to the risk of falls in this population (Dhalwani et al., 2017; Duan et al., 2022). For caregivers and families, the incidents of falls often result in increased emotional, physical, and financial burdens. In nursing homes, frequent falls not only lead to higher healthcare costs and resource constraints but also pose legal and reputational risks (Schoberer et al., 2022). Given these profound consequences, understanding and mitigating fall risks is critical to ensuring the safety and well-being of elderly residents and the sustainability of long-term care facilities.

Numerous studies have examined the contributing factors of falls among the elderly, broadly categorizing these risk factors into socio-demographic, health-related, and mobility-related dimensions. For example, Papadopoulos et al. (2020) investigated the influence of socio-demographic and health factors in community-dwelling older adults, study of Litwin (2017) investigated the relationship between mobility and other confounders, and Tang's study (2023) assessed fall prevention of knowledge, attitude, and practices (KAP) among older adults in community settings. While these studies provide valuable insights, they largely focus on elderly populations living in the community, with limited exploration of nursing home residents. Moreover, the interplay between fall prevention knowledge, practices, and actual fall occurrences remains insufficiently studied, especially in institutional settings like nursing homes.

Given the combined impact of rapid population aging and existing healthcare system limitations, understanding the factors influencing falls in nursing homes is both

critical and urgent. Although there has been increasing emphasis on fall prevention education globally, its applicability and effectiveness in Chinese nursing homes remain underexplored. Therefore, understanding how KOFP&POFP correlate with fall occurrences in these settings is essential for developing effective prevention strategies.

To address this gap, this study investigates the relationship between KOFP, POFP and fall occurrences among elderly residents in Chinese nursing homes. By synthesizing socio-demographic, health-related, and mobility factors, this research aims to provide comprehensive insights that inform targeted fall prevention strategies, enhance caregiver training, and promote a safer living environment for elderly residents. Ultimately, the findings of this study will contribute to reducing fall-related injuries and improving the overall QOL for this vulnerable population.

1.3 Research Questions

1. What is the distribution of falls among elderly residents in Jinzhou City?
2. What is the relationship between KOFP & POFP and the occurrence of falls among elderly residents in Jinzhou City?
3. What are the final factors associated with the occurrence of falls among elderly residents in Jinzhou City?

1.4 Research Objectives

1.4.1 General Objective

To assess the distribution and factors associated with the occurrence of falls and the relationship with KOFP & POFP among elderly residents in nursing homes, Jinzhou City.

1.4.2 Specific Objectives

1. To determine the distribution of falls among elderly residents in nursing homes in Jinzhou City.
2. To identify the relationship between KOFP & POFP and the occurrence of falls among elderly residents in nursing homes in Jinzhou City.
3. To determine the relationship between risk factors and the occurrence of falls among elderly residents in nursing homes in Jinzhou City.

1.5 Research Hypothesis

1.5.1 Objective 2: Relationship between KOFP&POFP and the occurrence of falls

Null Hypothesis (Ho):

There is no significant relationship between KOFP &POFP (the scores) and the occurrence of falls among elderly residents in nursing homes in Jinzhou City.

Alternate Hypothesis (H1):

There is a significant relationship between KOFP &POFP(the scores) and the occurrence of falls among elderly residents in nursing homes in Jinzhou City.

1.5.2 Objective 3: Relationship between risk factors and the occurrence of falls

Null Hypothesis (Ho):

There is no significant relationship between the risk factors and the occurrence of falls among elderly residents in nursing homes in Jinzhou City.

Alternate Hypothesis (H1):

There is a significant relationship between risk factors and the occurrence of among elderly residents in nursing homes in Jinzhou City.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Research and theoretical literature regarding falls among the elderly and their related risk factors were reviewed to achieve the objective of this study. The review begins with an overview of falls among the elderly, particularly those living in nursing homes. It also covers the risk factors for falls and knowledge and practices related to fall prevention among the elderly. Next, the review focuses on the literature related to risk factors for falls in nursing homes. The relationships between falls and KOFP, POFP and various risk factors of falls will be discussed at the end of this study.

2.2 Occurrence of Falls among the Elderly

Falls are a significant global public health concern, particularly among the elderly population. The World Health Organization (WHO) reports that each year, an estimated 684,000 individuals die due to falls, with the majority (over 80%) occurring in low- and middle-income countries(Katiri et al., 2024). Falls are a leading cause of injury-related mortality and morbidity in older adults. Globally, about 30% to 50% of people aged 65 and older experience at least one fall annually (Quijoux et al., 2021). The risk of falls increases with age, and is particularly high among nursing home residents, with some studies reporting prevalence rates of up to 60% (Hartholt et al., 2011).

In China, which has the largest elderly population in the world, the number of people aged 60 and above exceeded 300 million by the end of 2024, accounting for 22.0% of the total population(National Bureau of Statistics of China, 2025). This demographic shift indicates that China has entered a moderately aging society. Regional disparities

in aging trends are also evident, with Liaoning Province exhibiting the most significant pattern, where 25.72% of residents are elderly, well above the national average. Within Liaoning Province, Jinzhou City stands out, with 28.59% of its population 60 and above of age(National Bureau of Statistics, 2021). The concentrated demographic aging in regions like Jinzhou city poses significant public health challenges, particularly in the high occurrence of falls among elderly residents of nursing homes. Studies have shown that the incidence of falls among elderly residents in Chinese nursing homes is 32% (95% CI: 24%–39%), based on a meta-analysis of 3,503 participants from 11 provinces, cities, and autonomous regions(Huang et al., 2023). However, evidence on fall occurrence and related factors in some regions, such as Jinzhou City, is limited, particularly regarding the relationships between fall prevention knowledge, practices and occurrence of fall events among institutionalized elderly populations.

2.3 Risk Factors for Falls among Elderly

Falls have been a persistent and consequential issue among the elderly residing in nursing homes, as they are often associated with grave physical harm and a detrimental influence on the general health and welfare of the residents(Baixinho et al., 2022). According to statistics, the elderly living in long-term care institutions fall more frequently than those living in the community, because the elderly living in long-term care institutions are relatively older and generally in worse physical condition than the elderly living in the community(Schoene et al., 2014). Figure 2.1 summarizes five domains of fall risk: individual, clinical, functional, medication-related, and environmental. It also indicates the some of the variables analyzed in this study.

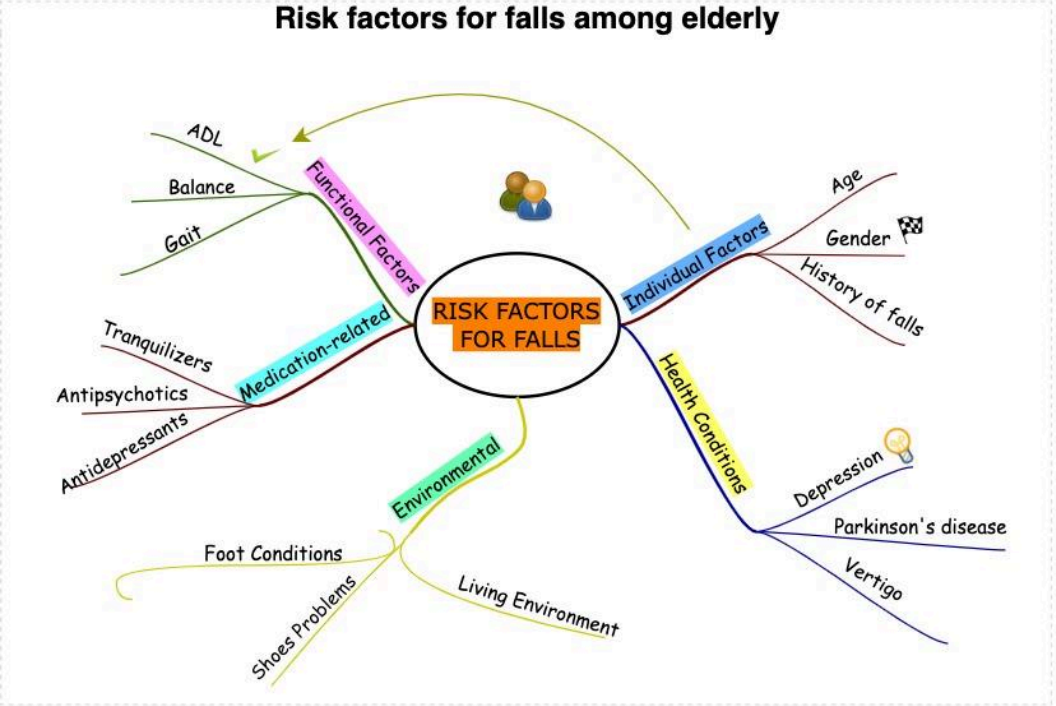

Figure 2.1 Risk Factors for Falls among Elderly

2.3.1 Socio-demographic Factors

Age is a well-established risk factor for falls, particularly among the elderly residing in nursing homes. As people age, natural physiological changes such as reduced muscle strength, slower reaction times, and decreased balance capabilities contribute to a heightened fall risk (Giovannini et al., 2022). Additionally, older adults are more likely to experience chronic conditions that further compromise mobility and stability (Li et al., 2013). Studies have shown that the risk of falls increases significantly with age, particularly for individuals over the age of 80, who are more prone to experiencing recurrent falls (Vaishya & Vaish, 2020).

Gender also plays a significant role in fall risk. Research suggests that women are generally at a higher risk of falls compared to men, primarily due to factors such as higher rates of osteoporosis, lower muscle mass, and hormonal changes following menopause (Zhao et al., 2020). However, falls among men are often associated with

more severe injuries, including a higher incidence of hip fractures (Peng et al., 2023). These differences highlight the need for gender-specific strategies in fall prevention programs.

Educational attainment is another socio-demographic factor influencing fall risk. Older adults with higher educational levels may have better access to health information and resources, enabling them to adopt healthier lifestyles and actively participate in fall prevention programs (Mcmahon et al., 2011). Conversely, those with lower education levels may lack awareness of preventive measures, which could contribute to a higher risk of falls. Studies have indicated that education influences an individual's ability to make informed decisions about health and rehabilitation services, ultimately impacting their fall risk (Nishinakagawa et al., 2023).

Marital status and occupational history are two socio-demographic factors that have been demonstrated to have a significant impact on the risk of falls among the elderly (Wah et al., 2024; Wu & Ouyang, 2017). Married individuals may benefit from greater social and emotional support, which can contribute to better health monitoring and physical activities, potentially reducing fall risk, whereas widowed, separated, or divorced individuals often lack the support systems that encourage healthy eating and physical activity, thus increasing their risk (Kim et al., 2020). Evidence from a study of 100 long-term care elderly residents showed that married participants had significantly better physical functioning and lower fall risk compared to their unmarried counterparts(Çakar et al., 2011). Those who previously engaged in physically demanding jobs may experience musculoskeletal wear and tear, chronic pain, or joint degeneration (Abdalla et al., 2017). Older adults with an occupational history involving frequent twisting or bending, prolonged standing, or extended periods of sitting are

more likely to develop low back pain, which can increase their fall risk (Wong et al., 2022).

2.3.2 Health-related Factors

A systematic review of risk factors for falls in older people in nursing homes and hospitals documented 18 associated risk factors affecting falls in older people in nursing homes, including age, sex, history of falls, walking aids, visual impairment, disability, cognitive impairment, wandering, depression, stroke, incontinence, Parkinson's disease, dizziness, number of medications, sedatives, antipsychotics, antidepressants and diuretics. Of these risk factors, a history of falls is considered an indicator of an underlying problem, whereas impaired balance is the true causal factor(Montero-Odasso et al., 2022). The history of falls and use of walking aids can help identify those at high risk for falls (Deandrea et al., 2013). Evidence from China reinforces the multifactorial nature of fall risk. A study in a long-term care facility in Xiamen, China, concluded that factors affecting falls are Activities of Daily Life (ADL), medical condition, cognitive status, living environment, foot and footwear, and loss of sensation (Zhang et al., 2019).

These findings emphasize that the multifactorial nature of fall risk, which encompasses intrinsic health-related factors such as chronic illnesses, mental health conditions, and medication influences.

Medical conditions have been identified to be associated with the higher prevalence of falling, including Parkinson’s disease, cognitive impairments, diabetes, stroke, chronic obstructive pulmonary disease, depression, and chronic kidney disease. However, evidence shows that older adults with multimorbidity have a higher frequency of falls compared to those with fewer or no chronic conditions (Immonen et al., 2020).

Psychological factors also contribute to fall risks. In a Malaysian study(Hui Kioh & Rashid, 2018), the presence of depression and respiratory disease is strongly associated with the incidence of falls among elderly people living in nursing homes. Older adults with depression and a history of falls are at higher risk of falls. For those elderly who have experienced falls, they will have a strong sense of fear of falling and will reduce their activities of daily living because of this fear, which will indirectly lead to lower limb muscle weakness and decreased balance, thus increasing the risk of falls (Sharifi et al., 2015).

The influence of drug factors is also a significant determinant of falls among elderly individuals in nursing home settings. Empirical investigations reveal that drug utilization constitutes a contributing factor in roughly seventy-five percent of falls, with psychotropic drugs representing over eighty percent of all pharmaceutical agents (Oya et al., 2022). By addressing these health-related factors through comprehensive assessment and tailored interventions, it is possible to reduce fall risk in nursing home residents and improve their overall QOL.

2.3.3 Mobility Factor

Studies have shown that a history of falls, gait and balance issues, level of consciousness, and walking ability are significant factors predicting fall risk, with a history of falls widely considered the strongest predictor (James et al., 2014). On top of that, it was also mentioned that focusing on strengthening strength, increasing flexibility, and improving balance can reduce the risk of falls. Emphasis on targeted interventions focusing on the four key variables: history of falls, gait and balance, level of consciousness, and ambulation/elimination should be emphasized to decrease the actual falls risk (Rubenstein & Josephson, 2006).

2.3.4 Balance among Elderly

Balance involves the complex integration and coordination of multiple body systems, including the vestibular, vision, hearing, motor, and higher premotor systems(Horak, 1997). A Canadian study of Long-Term Care Homes identified individual physical ability as the largest independent group of factors leading to falls. Residents with any fracture or dramatic behavior change, mobility will be at increased risk for falls (Kuhnow et al., 2022). The impact of balance disorders is particularly significant in older adults. About one-third to one-half of people aged 65 and older report problems with balance and mobility. It can lead to gait instability, which in turn can lead to repeated falls and impact on social functioning. One of the key concerns is the increased risk of falls, which can also result in a significant level of morbidity, such as trauma, the need for immobilization, and a fear of further falls (Bloem et al., 2001; Visser et al., 2008).

Assessing balance in the elderly is therefore crucial to clinical diagnosis and to reducing falls in the elderly (Mancini & Horak, 2010). The Timed Up and Go Test (TUGT) will be used in this study to assess balance and mobility among elderly residents. The TUGT is a widely used, rapid, and effective tool that measures the time it takes for an individual to rise from a chair, walk three meters, turn around, walk back, and sit down. It provides valuable insights into an individual's dynamic equilibrium, gait stability, and risk of falls, making it particularly suitable for assessing mobility in older people in nursing homes (Borowicz et al., 2016). However, the TUGT has some limitations. It primarily focuses on physical performance and may overlook cognitive factors, such as attention and decision-making, which also contribute to fall risk. Additionally, the test's outcomes can be influenced by variations in physical strength or mobility impairments, which may limit its accuracy for individuals with severe physical

disabilities (Herman et al., 2010). To address this, future assessments could incorporate complementary tools that account for both physical and cognitive aspects of balance.

2.4 KOFP and POFP

Education is crucial to raising awareness, and the first step in providing individualized and appropriate education should be to assess the knowledge gaps of older people. The initial phase in guiding fall prevention protocols among nursing home older adults is anticipated to be the evaluation of their comprehension of fall prevention. This assessment is crucial in the development of fall prevention strategies in the future (Ott, 2018).

Kamei et al. (2015) reported that the preventive behavior of the older learners was effectively influenced by the experiential learning in a simulated household environment and practical sessions focused on identifying fall hazards. Similarly, two other studies revealed that 50% of participants made positive lifestyle changes after receiving fall prevention education (Clemson et al., 2004; Haines et al., 2011). Kempton et al. (2000) found that educational interventions led to a reduction in self-reported falls and hospitalizations, which can be attributed to increased knowledge about fall risks, the importance of physical activity, safe footwear, balance enhancement, and managing medication-induced risks (Dickinson et al., 2011). Moreover, health education interventions led by primary health care (PHC) professionals have been recognized as crucial in reducing fall incidence among elderly people. Effective health promotion initiatives enable older individuals to take control of their practices, thereby reducing fall risks (Dos Santos et al., 2020; Gardner et al., 2002; Johansson et al., 2018). In a study involving elderly women, Nogueira et al. (2022) demonstrated a positive

correlation between KOFP and POFP, highlighting that practical applications of this knowledge serve as an effective means of reducing falls among older adults.

Overall, falls are a major health concern among the elderly, particularly those residing in nursing homes. Given the heightened vulnerability of this population, further research is essential to explore the levels of KOFP&POFP among elderly residents in institutional settings. Such studies can contribute to a deeper understanding of effective fall prevention strategies and inform targeted interventions in nursing homes.

Table 2.1 Collection of Risk Factors for Falls in the Elderly in Nursing Homes

No.	Factors for falls	Descriptions
1	Age	Muscle strength and balance decline with age, increasing vulnerability to falls(Maio Nascimento et al., 2022).
2	Mobility factor	Mobility impairments, such as difficulties with ambulation or deviations in gait mechanics, increase the risk of falls. These impairments can disrupt balance control, leading to a higher likelihood of falls, particularly during transitions such as standing or turning(Maio Nascimento et al., 2022).
3	Health-related factors	Chronic ailments, namely arthritis, Parkinson's disease, stroke, and sensory impairments (such as visual or auditory deficiency), possess the capability to impede mobility and heighten the susceptibility of falling(S. Tang et al., 2022).
4	Medications	The use of certain medications, such as sedatives, tranquilizers, antipsychotics, and some types of blood pressure medications, may cause dizziness, drowsiness, or changes in blood pressure, all of which can contribute to falls.
5	History of falls	Those who have previously experienced falls are more likely to fall again in the future. As it may be indicative of underlying concerns or compromised equilibrium.
6	Psychological factors	Depression and anxiety have the potential to impact an individual's mobility, thereby increasing falls.
7	KOFP&POFP	There exists a positive correlation between the knowledge(KOFP) and practice(POFP)of fall prevention, with the practice serving as an effective measure for reducing the incidence of falls among old adults.

2.5 Theoretical Appraoches in this Study

The main theoretical approaches considered in this study are the Health Belief Model (HBM) and the Knowledge-Attitude-Practice (KAP) Model. The theoretical foundation of this study is based on two complementary models: the Health Belief Model (HBM) and the Knowledge-Attitude-Practice (KAP) Model. Together, these

models provide a comprehensive framework for understanding the factors that influence fall prevention behaviors among elderly residents in nursing homes.

2.5.1 Health Belief Model (HBM)

The Health Belief Model provides a useful framework for understanding the factors that motivate individuals to engage in health-promoting behaviors (Anuar et al., 2020; Champion et al., n.d.). In this study, this model aligns with the study objective of evaluating how elderly residents perceive risks and benefits of fall prevention and how these perceptions influence their preventive behaviors. Specifically, the constructs of HBM- including perceived susceptibility and severity, perceived benefits and barriers, cues to action, and self-efficacy- provide a theoretical lens to understand how knowledge and practices on fall prevention may relate to the actual occurrence of falls. The relevance of the HBM in this research is as follows:

1. **Perceived Susceptibility and Severity:** By examining how elderly residents perceive their own risk of falling and the potential consequences of falls, the HBM provides insight into whether these perceptions motivate preventive behaviors. If elderly residents recognize that they are at a high risk of falls and understand the serious impact a fall can have on their health, they may be more likely to engage in fall prevention practices.

2. **Perceived Benefits and Barriers:** The HBM framework helps assess how elderly residents weigh the benefits of fall prevention behaviors (e.g., using assistive devices, engaging in physical activity) against any barriers they may face (e.g., lack of knowledge, physical limitations). Understanding this balance is essential for designing effective interventions that promote fall prevention behaviors among elderly residents.

3. **Cues to Action:** Cues to action may include health education by staff or witnessing fall incidents among peers that prompt individuals to take preventive practices.

4. **Self-efficacy:** The model also emphasizes the importance of self-efficacy, or confidence in one's ability to perform a behavior. In the context of our study, this involves assessing whether elderly residents feel capable of implementing preventive measures, such as using mobility aids or participating in strength and balance exercises.

Applying the HBM offers a useful framework for analyzing the factors that influence fall prevention behaviors in elderly residents. It posits that increased awareness of risk factors and the benefits of preventive actions may positively influence fall prevention practices. By assessing KOFP and POFP, this study draws on key elements of the HBM, as these behaviors are often shaped by underlying health beliefs. This approach offers indirect insight into how belief-related constructs may influence preventive actions in institutional settings.

2.5.2 Knowledge-Attitude-Practice (KAP) Model

In this study, the Knowledge-Attitude-Practice (KAP) model is applied as a framework to understand the relationship between knowledge and preventive behaviors among elderly residents in nursing homes (Wang et al., 2020; Wong, 2020). Although the traditional KAP model describes a sequential process in which knowledge influences attitudes, and attitudes, in turn, influence practices, this study focuses specifically on the relationship between knowledge and practice. The relevance of the KAP model in this research lies in the following aspects:

1. **Theoretical Framework**: The KAP model provides a theoretical basis for analyzing how knowledge about fall risks and prevention strategies may lead to the adoption of preventive behaviors among elderly residents. By focusing on knowledge and practice, this study aims to understand how an increased awareness of fall prevention can translate into safer behaviors.

2. **Guiding Intervention Design**: By exploring the direct link between knowledge and behavior, the KAP model helps inform the design of effective interventions. Enhancing knowledge of fall prevention strategies among elderly residents could directly encourage them to adopt preventive behaviors, thus reducing the incidence of falls.

3. **Analytical Foundation**: The KAP model supports the study's objective to analyze how knowledge about fall prevention influences actual behaviors, addressing a significant research gap related to fall prevention among elderly residents in Chinese nursing homes.

Overall, the KAP model serves as a useful framework in this study, helping to explore the impact of knowledge on behavior in the context of fall prevention among the elderly.

2.5.3 Integration of Models

The HBM and KAP models complement each other in this study. While the HBM focuses on perceptions, motivation, and confidence in performing preventive behaviors, the KAP model emphasizes the transition from knowledge to action. Together, these models provide a comprehensive framework for analyzing both the cognitive and behavioral aspects of fall prevention. This dual approach ensures a

thorough understanding of the factors influencing fall prevention behaviors among elderly residents in nursing homes.

2.6 Consequences of Fall

Falls among the elderly often result in physical injuries ranging from minor to severe. The most frequent outcomes include pain, bruising, lacerations, and fractures, particularly in the upper extremities and hips. In more severe cases, falls can lead to intracranial bleeding, which can have life-threatening consequences(Scott et al., 2011; Soriano et al., 2007). Moreover, falls often result in reduced mobility and limitations in daily activities, leading to disabilities. This, in turn, may require extended bed rest, rehabilitation, and long-term nursing care, thereby significantly increasing the burden on both families and healthcare systems.

These physical consequences are accompanied by psychological impacts, including the fear of falling again, which further limits independence and social participation among the elderly(Woolcott et al., n.d.). Research highlights the critical importance of reducing fall incidence due to the severe health outcomes it may cause (Lee & Yu, 2020). This not only helps in maintaining the physical well-being of older adults but also reduces the broader societal burden of caregiving and healthcare costs associated with fall-related injuries.

It has been observed that individuals who have previously experienced a fall are at a heightened risk of subsequent falls. Statistics indicate that 40% of individuals who have fallen once are more likely to experience another fall (De Roza et al., 2022). In recent years, there has been a consistent increase in falls among elderly individuals residing in nursing homes. Data suggest that the likelihood of falls in nursing homes is three times higher than among community-dwelling elderly individuals, making nursing

home residents particularly vulnerable to these incidents(Hui Kioh & Rashid, 2018; Quijoux et al., 2021). Furthermore, about 12% of these individuals experience repeated falls, often requiring extended care within the nursing home setting.

Given the serious consequences and high recurrence rates of falls in nursing homes, it is crucial to thoroughly understand the occurrence and risk factors involved. By identifying these influential elements, effective fall prevention and intervention strategies can be implemented to reduce the frequency of falls and improve overall outcomes for elderly residents in these settings.

Falls are one of the main causes of injuries, physical incapacity, and even death , which may lead to serious health problems among the elderly (Siracuse et al., 2012). The following are some potential consequences of falls:

2.6.1 Physical Injuries

Falls have the potential to cause a variety of physical injuries, such as fractures (such as broken bones), sprains, strains, bruises, and lacerations. The severity of these injuries may range from minor to life-threatening, necessitating medical intervention, rehabilitation, or surgical procedures(Gelbard et al., 2014; Rich et al., 2007; Sotoudeh et al., 2018).

2.6.2 Loss of Mobility and Independence

Injuries resulting from falls may result in a decrease in mobility, thereby impeding an individual's ability to independently perform their daily activities and tasks. Consequently, the use of assistive devices such as canes or wheelchairs may become necessary, and assistance may be required for daily activities such as bathing, dressing, or cooking(Galetti Prata et al., 2012; Pitchai et al., 2019).

2.6.3 Fear of Falling

Experiencing a fall can lead to a fear of falling again. This sense of unease may incapacitate individuals and prompt them to curtail their undertakings and social engagements, ultimately resulting in a reduction in physical well-being, isolation, and an overall deterioration in the standard of living. This fear can be debilitating and cause individuals to limit their activities and social interactions, leading to decreased physical fitness, isolation, and a decline in overall QOL (Chang et al., 2010; Iglesias et al., 2009).

2.6.4 Psychological Impact

Falls can elicit a range of psychological repercussions, such as heightened anxiety, depression, and a reduced sense of self-assurance. This may lead individuals to experience a diminished sense of security and increased susceptibility, particularly if the fall resulted in a grave injury or necessitated hospitalization(Clemson & Swann, 2008).

2.6.5 Increased Healthcare Utilization

Frequently, falls give rise to escalated healthcare utilization, encompassing emergency department consultations, hospital admittances, and post-treatment appointments with medical experts. Such occurrences may give way to augmented healthcare expenses and probable interferences in conventional daily activities and routines(Siracuse et al., 2012).

2.6.6 Long-term Complications

In certain instances, falls may result in enduring complications. A case in point is when a fall-related fracture leads to chronic pain, limited mobility, or the necessity of continued medical attention. Moreover, falls can pose a particularly grave threat to

elderly individuals and may exacerbate other health problems or a decline in functionality(Letícia Tavares Alves et al., 2017).

2.6.7 Financial Burden

The repercussions of falls and their aftermath can lead to noteworthy monetary implications for individuals and their respective families. The outlays for medical expenses, rehabilitation costs, and the requirement of assistive appliances or modifications to the home can be financially taxing. Furthermore, falls may result in diminished productivity or the necessity for caregiving assistance, which can impact income and fiscal steadfastness(Carpenter et al., 2019; Peng et al., 2019; Vu et al., 2023).

2.7 Conceptual Framework

The conceptual framework depicted in Figure 2.1 illustrates the factors associated with falls among elderly residents in nursing homes. The framework identifies four main categories of factors that contribute to fall risks:

Socio-demographic Factors: Variables like age, gender, marital status, and level of education play a role in determining the likelihood of falls. Older age, certain gender patterns, and lower educational attainment may increase fall risk.

Mobility Factor: The ability to move independently or with assistance directly impacts the likelihood of falls. Mobility limitations make elderly individuals more prone to accidents.

KOFP&POFP: The understanding of fall risks and the adoption of preventative practices by both staff and residents are essential. Greater awareness and preventive actions can reduce the incidence of falls.

Health-related Factors: The presence of chronic diseases, the intake of medications, and symptoms of depression are significant contributors to fall risk. These factors can affect physical and mental stability, further increasing fall susceptibility.

These factors combined interact to influence the occurrence of falls among elderly residents in nursing homes, highlighting the complexity of the issue and the need for multi-dimensional fall prevention strategies.

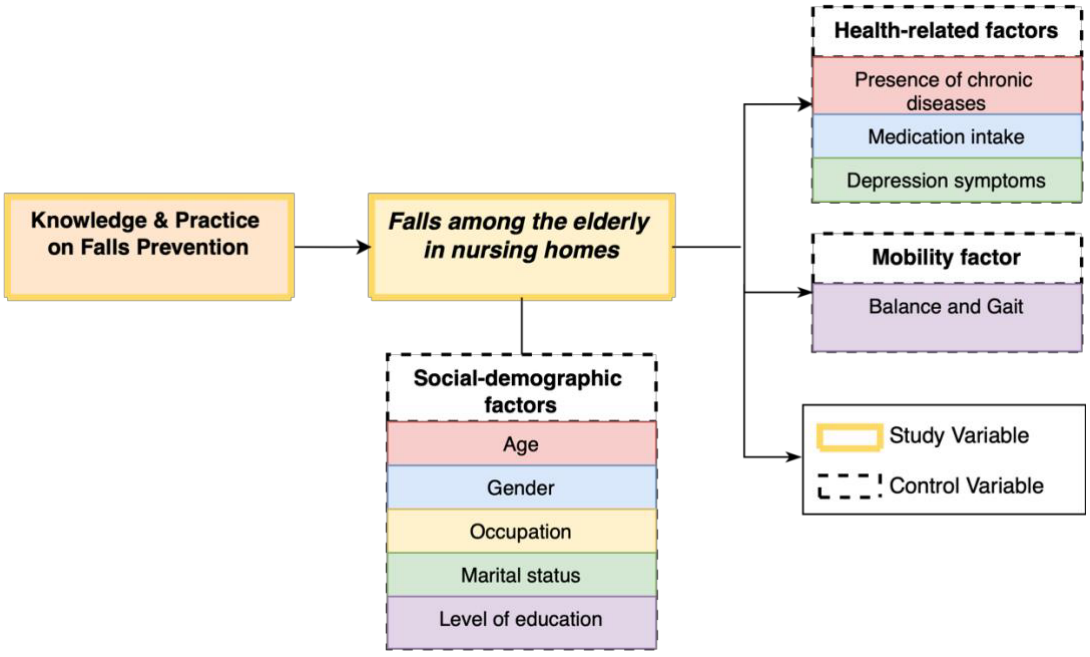

Figure 2.2 Conceptual Framework