

RESIDENTIAL INTERIOR ENVIRONMENTS
OF RETIRED GOVERNMENT EMPLOYEES IN THAILAND

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(ABSTRACT)

The purpose of this study was to explain the safety and usability problems in the residential interior environment of Thai older adults. A sample of 163 retired government employees who live in Bangkok, Thailand were asked to complete a self-administered questionnaire which included questions about housing characteristics, interior environment features, personal information, health condition, and activity level. The mean age of the older adults was 68.1 and ranged from 60 to 93 years. The data were analyzed using frequencies, percentages, and means as descriptive statistics and one-way analyses of variance.

The findings revealed that most of the Thai older adults had lived in their own two story detached houses more than ten years and with their family members. The majority of the respondents had vision problems, but almost all could easily perform activities of daily living by themselves and half of them could easily perform instrumental activities of daily living by themselves. Problematic interior environmental features in each area of the home were identified and prioritized. When respondents were divided by age group, significant differences appeared in the degree of difficulty with two safety and usability features in the home. Divided by daily activity levels, respondents revealed significant differences in the degree of difficulty associated with eight safety and usability features. When the homes were broken down to five categories: entrance and stairs, bedroom, bathroom, kitchen, and other interior features of the house, it was these other interior features that seemed to have the most problems in safety and usability. The kitchen had the most problems in safety and usability when compared to other rooms. Based on these findings, design recommendations for Thai housing were developed.

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TABLE OF CONTENTS

Abstract.....	ii
Acknowledgments.....	iii
Table of Contents.....	iv
List of Table.....	vii
List of Figure.....	viii
Chapter	
I. Introduction.....	1
Statement of the Problem.....	4
Purpose of the Study.....	4
Objectives.....	5
Research Questions.....	5
Significance of the Study.....	5
Delimitations.....	5
Limitations.....	5
II. Review of Literature.....	7
Physical Changes in the Normal Aging Process.....	7
Activities of Daily Living.....	10
Thai Housing.....	12
Residential Interior Environment for the Older Adult.....	14
Theoretical Framework.....	24
III Methodology.....	27
Sample.....	27
Instrument.....	27
Procedure.....	28
Variables.....	29
Hypotheses.....	29

Data Analysis.....	30
IV Findings.....	31
Description of Sample.....	31
Housing Situations.....	31
Health Conditions.....	36
Activity Levels.....	38
Interior Environment Features.....	40
Home Modifications.....	48
Intended Home Modifications.....	55
General Comments and Suggestions.....	56
Statistical Analyses and Discussions.....	57
V Summary, Conclusions, Design Recommendations, Implications, and Recommendations for Further Research.....	66
Summary.....	66
Conclusions.....	69
Design Recommendations.....	70
Implications.....	74
Recommendations for Further Research.....	75
References.....	77
Appendixes	
A. Background on Thailand.....	82
B. Original Survey Instrument: English Version.....	84
C. Original Survey Instrument: Thai Version.....	89
D. Revised Survey Instrument: English Version.....	94
E. Revised Survey Instrument: Thai Version.....	103
F. Letter of Introduction: English Version.....	114
G. Letter of Introduction: Thai Version.....	116

H. Follow-up Postcard: English Version.....	118
I. Follow-up Postcard: Thai Version.....	120
J. Open Ended Responses to Other Difficulties.....	122
K. Open Ended Responses to Other Modifications.....	128
L. Open Ended Responses to Intended Modifications.....	133
M. General Comments and Suggestions.....	139
Vita.....	145

LIST OF TABLES

1. Gender and Age of the Respondents.....	32
2. Housing Characteristics of the Respondents.....	33
3. Height and Weight of the Respondents.....	36
4. Health Conditions of the Respondents.....	37
5. Respondents' Abilities to Perform Activities of Daily Living.....	39
6. Mean Scores of Degree of Difficulty among Features in the Home.....	42
7. Home modifications.....	49
8. One-Way Analyses of Variance: Age Groups.....	58
9. One-Way Analyses of Variance: Activity of Daily Living Levels.....	61
10. One-Way Analyses of Variance: Instrumental Activity of Daily Living Levels.....	64
11. One-Way Analyses of Variance: Home Areas.....	65

LIST OF FIGURES

1. Exterior Environment of a Thai Single Family Detached House.....	15
2. Porch.....	15
3. Living Room.....	16
4. Living Room.....	16
5. Stairs.....	17
6. Bedroom.....	17
7. Buddha Room.....	18
8. Bathroom.....	19
9. Dining Room.....	20
10. Kitchen.....	20
11. Shophouses.....	21
12. Townhouses.....	21
13. Behavioral and Affective Outcome of Person-Environment Transactions.....	25
14. Safety and Usability Problem: Kitchen.....	43
15. Safety and Usability Problem: Furniture Arrangement.....	44
16. Safety and Usability Problem: Furniture.....	45
17. Safety and Usability Problem: Cabinet.....	46
18. Safety and Usability Problem: Stairs.....	47
19. Example of Home Modification: Bathroom.....	50
20. Example of Home Modification: Stairs.....	51
21. Example of Home Modification: Kitchen.....	52
22. Example of Home Modification: Door.....	53
23. Example of Home Modification: Furniture.....	54

CHAPTER I

Introduction

The increase in the aging population is a universal trend in most countries in the world including Thailand. This trend is one of the key demographic phenomena that Thailand faces over the next few decades. Between now and 2015, the proportion of older adults in Thailand will nearly double (Institute for Population and Social Research, 1996). Presently, medical advances and public health improvements help older people stay healthier, have fewer disabilities, and live longer than their predecessors. However, the decline of physical and intellectual competencies by the normal aging process is still most often unavoidable. A supportive interior environment can enhance the quality of life of the older adult and help compensate for physical losses in later years (Lawton, 1980). An appropriate fit between the functional capacity of an older person and his or her surroundings should be considered. Therefore, it is important to study the relationships between characteristics of Thai older adults and features in their residential interior environments.

The population of Thailand is approximately 59,709,000, with an annual growth rate of approximately 1.2 %. Thailand's population is one of the most homogeneous in South-east Asia. All but five percent of the population are Thai-speaking Buddhists (Institute for Population and Social Research, 1996). Thailand has already experienced enormous changes in the demographic factors that will influence its society for many years to come. For example, the age distribution of the population is being transformed from a bottom-heavy one, dominated by children and young adults, to a mature distribution with greater representation from those who are middle-aged and elderly. As Thailand's population ages quite rapidly over the next few decades, an entirely different household profile will emerge: household heads will, on average, be older. More members of these households will be elderly parents, and fewer will be young children (Campbell, Mason, & Pernia, 1993).

By 2015, the number of people in Thailand who are 60 or older will double, from four million in 1990 to around 8.4 million (Institute for Population and Social

Research, 1996). Between 1990 and 2025, the amount of aging population is projected to increase by 337 %. The percentage of the older population in Thailand will grow from 8.6 % in the year 2000 to 16.8 % in the year 2025. These demographic factors will certainly affect the type and quality of housing that will be demanded in the next 30 years (Poapongsakorn, 1988).

In Thai society, the older adults have been well respected as the head of the family. A report on the elderly in Thailand (Siripanich, Piyasilpa, Supanvanich, Tirapat, Laksanavichan, Pothipuk, & Tomana, 1982) indicates that 98.56 % of the elders in Bangkok were thought to be well respected. For males and females, being respected was comparatively similar. Thai older adults usually play an important role in the enculturation process of the younger generation. One of the prime responsibilities placed on children is taking care of their parents in their old age, a prominent feature of the Thai concept of family. There is no feeling of being inconvenienced by this duty of caring for aged parents; on the contrary, their acquired wisdom gives them an honored place in the household (Office of the Prime Minister, Royal Thai Government, 1991). The expectation that children, as economically active adults, will provide comfort and support to their parents, particularly when parents are too old to work or care for themselves, is shared by all segments of Thai society. In Thailand, this support takes both economic and social forms and is viewed as repayment to parents for having borne, cared for, and raised the child. It is a tradition deeply rooted in the secular and religious culture and firmly linked to the broad normative structure. Moreover, helping support parents and providing them comfort is also viewed as a way a person can accumulate religious merit (Knodel, Chamrathirong, & Debavalya, 1987).

In Thailand, from a family-oriented Asian viewpoint, institutionalization is usually solely for the destitute. Only 0.1 % of the older Thai population lives in public and private institutions (Mahidol University, 1995). Placing an older person in a nursing home is frowned upon as showing a lack of compassion. Even where nuclear families have evolved, parents would typically stay with one of their children (Komin, 1995). Chayowan (1985) states that the linkages between the elderly and their families can be seen in the extent to which support is provided by children. From

Chayowan's study, 97 % said they had received care or support from at least one child. This finding documents the fact that most older persons have children who assist in their care. Only 6.4 % of the elderly are single or have no living children. Most of the elderly in Thailand live either in their own homes or those of their children.

From a study of household crowding in Bangkok (Edwards, Fuller, Vorakitphokatorn, & Sermsri, 1994), it is reported that extended families of various types are common in Bangkok, comprising 28 % of the total households. Fully 25 % of the sample households were three-generation families. Ten percent of the households consisted of not just one but two or three married couples and their offspring. Very few Bangkokians live alone, extended families are fairly common, and the average household size is more than five persons. However, the majority of these household (72 %) were comprised of nuclear families.

As Thailand has become more industrialized, the structure of the family has begun to change. The extended family has begun to disintegrate leading to situations where older people have no one to look after them (Komin, 1995). Thai older adults in rural areas are often living by themselves because their sons and daughters have to move out to work in other cities. For people in urban areas, family life styles have begun to follow western patterns. Newly married couples are likely to leave their parents' household to set up their own family. As a result, the traditional extended family structure, where grandparents are surrounded by their children, in-laws and grandchildren, is being replaced by smaller family units (Komin, 1995). Extended families are becoming dysfunctional and chances for the aged being left alone are higher (Pongsapich, 1992).

The results of a survey on epidemiology of the elderly in Thailand (Siripanich, et.al, 1982) revealed that Thai elders between 60-69 years old constituted 55 % of the total elderly population. In Bangkok, 36.68 % of the elders were male, while 63.32 % were female; 46.4 % of the elders lived with their spouses and 47.10 % were widow or widowers. Around 74 % of the male elders and 64 % of the female elders were healthy. Good health conditions were found to be declining relative to increasing age. Figures for Bangkok indicated that 76.53 % of male elderly and 71.54 % of female elderly had contributed to their communities by volunteering. The degree of

contribution was found to be declining with increasing age. Men were found to have made more contributions than women. In Thailand, employees of government, state enterprises, and large-scale private firms are entitled to receive welfare services of one kind or another, but those who are self-employed or work for small firms generally are not (Chen & Jones, 1989). Results from a study conducted by the Kasikornthai research center (1997) revealed that 92.6 % of the sample of older adults had a special savings account while 7.4 % of them have no savings. According to Siripanich et al.'s (1982) research, male elders were found to be more independent than female elders in all age groups. On the whole the state of self-independence of the elders in Bangkok was slightly lower than that in the provincial areas (35% and 40%).

In the traditional Thai lifestyle, the elderly were to depend upon their children. However, in a dynamic change of life patterns in Thai society, the elderly today are thought to possess higher capability in managing their own lives than previous generations. The home environment is an important factor in the independent living of elderly residents. The Thai government policy on aging (Mahidol University, 1995) indicated the need for research-based information on aging in many areas; therefore, studies concerning residential interior environments for older adults should be conducted in Thailand.

Statement of Problem

Most older adults in Thailand age in place, and after retirement they spend more time in the home than ever before; therefore, residential interior environments play a significant role in supporting senior life. There are limited reports on aging in Thailand; moreover, information concerning residential interior environments for Thai older adults has not been documented. For this reason, it is important to identify the interior environment features in the home that create safety and usability problems for older adults in Thailand. Also, it is necessary to examine Thai older adults' characteristics that affect the use of residential interior spaces.

Purpose of the Study

The purpose of this study was to explain the safety and usability problems in the residential interior environment of Thai older adults.

Objectives of the Study

There were four objectives to this study:

1. To describe the demographics, housing characteristics, and health conditions of Thai older adults.
2. To describe the interior environmental features in the home that create safety and usability problems for older adults in Thailand.
3. To investigate the relationship of age and the activity level of Thai older adults with interior environment features.
4. To make recommendations for safety and usability in the Thai older adult interior home environment.

Research Question

1. Do relationships exist between age and activity level of Thai older adults and their residential interior environment?
2. What area of the home has the most safety and usability problem?

Significance of the Study

The findings of this study describe the demographic, housing characteristic, and health conditions of Thai older adults. This study provides implications for designing residential interior environments that meet Thai older adults' needs. The results of this study may be used by interior designers, architects, housing professionals, policymakers, educators, and researchers to develop Thai residential environments that are suitable for older adults.

Delimitations

The research location was limited to only Bangkok's Metropolitan Areas, Thailand. Also, the sample was limited to retired government employees who live in residences. The sample did not include older adults who live in institutions.

Limitations

This study was an exploratory study. The sample was not random so it may not be representative of a larger population. The research location was limited to only Bangkok's Metropolitan Areas, Thailand, and may not apply to other small cities, small towns or rural areas in Thailand. The sample was retired government officials who have middle incomes and receive stable pensions from the government. Thus,

the conclusion may be difficult to generalize to either older adults in other occupational groups or older adults who have different kinds and different levels of incomes. Since Thai people retire early at age 60, the result may not generally be compared with other countries whose people retire later than 60 years old.

CHAPTER II

Literature Review

The review of literature for this study explored related research on residential interior environments of Thai older adults. This chapter begins with physical changes in the normal aging process and activities of daily living. Then, the characteristics of the older adult and the housing in Thailand will be discussed. Later, the residential interior environment for the older adult will be explained. The final section of this chapter will focus on the competence and environmental press model of Lawton and Nahemow (1973). This model forms the theoretical framework for this thesis.

Physical Changes in the Normal Aging Process

Sensory abilities often diminish with age. After a certain age, multiple sensory disabilities are the rule rather than the exception and they may occur either gradually or abruptly. The normal aging process decreases an individual's physical and intellectual competencies. Diminished muscle strength, energy, and reflex time, as well as age-related sensory losses, require increased attention to the environment as a means of establishing positive well-being for the elderly (Winchip, 1990). If the environment can be adapted to compensate for sensory losses, the individual's feeling of well-being can be maintained (Malkin, 1992). Winchip (1990) stated that in order to design a safe and secure physical environment for elderly people it is necessary to understand the normal aging process.

Age-related changes deal primarily with sensory decline, a change of the body's center of gravity, loss of manual dexterity, and lack of mobility due to a variety of causes including arthritis, congestive heart failure, poor circulation, osteoporosis, and muscle weakness (Malkin, 1992). Older adults are often unable to detect as much sensory information from their environments as younger people. In general, aging decreases the ability of the body to function properly and efficiently, making it more difficult for the body to maintain stable chemical and physical states (Goodman & Smith, 1992). A basic understanding of the normal aging process is required in order to design a safe and secure physical environment. The biological factors of aging should impact design considerations.

Sight. Changes in vision are the most common sensory impairment. The lens of the eye thickens and becomes opaque. Far-sightedness is a common, age-related, progressive dysfunction (Goodman & Smith, 1992). Cataracts are common and cause fragmentation or blurring of the image. Eventually, recognizing objects or people becomes impossible; the effect is similar to smearing petroleum jelly on the lenses of eyeglasses. Fortunately, cataract surgery with the implantation of an artificial lens is a viable option for many individuals (Malkin, 1992).

As age increases, the line of vision is lowered. The visual field narrows. Depth perception and peripheral vision are moderately impaired. As peripheral vision is diminished, it makes it more difficult to take in as much without turning the head from side-to-side. In designing for the elderly, the functional significance of restricted upgaze is important to understand. The normal limit of upgaze in young adults is 45 degrees. By age 80, it is reduced to 16 degrees. When limited upgaze is combined with restricted neck extension, seeing fire exit signs, room numbers, and other information mounted too high becomes difficult (Malkin, 1992).

The yellowing of the lens affects elderly perception of the colors in the blue-violet range. Violets, blues, and greens fade out of the color spectrum first, although the ability to see red, orange, and yellow is not affected very much. This effect can be experienced by wearing a pair of eyeglasses with yellow lenses. When colors are closely related in hue or value (such as blue and green), an elderly person may not be able to distinguish them (Malkin, 1992).

Starting approximately at the age of 40, vision is gradually impaired. The pupil of the eye decreases in size, creating a need for more light. As people age, they need more light in order to see at the same level they did when they were younger. A 70- or 80-year old individual requires three times as much light to see with the same clarity as someone 20 years old (Malkin, 1992). The elderly person's eyes cannot adjust as rapidly to changes in illumination levels. The eyes need more time to adapt when moving from a space with a higher intensity of lighting to one that is darker. Once the transition has been made, the elderly person is able to see less than a younger person in the darkened room.

While a higher degree of illumination is required, glare becomes a more acute problem (Null, 1988). Glare is one of the biggest problems associated with the aging eye. As the lens becomes more dense, light is scattered, producing sensations of uncomfortable brightness that interfere with vision (Malkin, 1992). Light fixtures with clear glass bulbs (visible filaments) deteriorate the retina of the older person. Most older adults experience other types of vision disorders caused by decreased perception of light and color, and the recovery from glare takes longer (Goodman & Smith, 1992).

Hearing. Significant hearing loss is widespread in older adults. Fewer than 12 percent of those over 65 years of age have normal hearing, and between 30 to 50 percent have a hearing loss that significantly interferes with communication and relationship with others (Kalymun, 1989). High-frequency pitches are the first to become less audible or distinguishable. The ability to understand normal conversation may diminish, especially when combined with background noise. Most elderly people lose their ability to perceive the depth, quality, and subtleties of sound. They may find it difficult or impossible to differentiate background noises from the voice of someone who is talking to them (Goodman & Smith, 1992). In a dining room, the presence of music can make speech hard to understand. Similarly, loud mechanical sounds, noisy air conditioning and appliances make understanding speech difficult.

Touch. Aging brings a reduced sensitivity to both hot and cold. Reaction time is also slower. Because reaction time is slower, water-heating systems need to be calibrated to prevent scalding. Heating, ventilation, and air conditioning systems in buildings designed for older adults must also be more sensitive (Goodman & Smith, 1992). In addition, the skin becomes thinner during aging, making it more susceptible to cutting or tearing.

Body structure and composition. There is a loss of height during aging and a corresponding muscle deterioration that reduces the average size of an older person compared to a younger one. Height loss may be due to compression and hardening of spinal disks and loss of back muscle strength. The inability to reach such items as

switches or shelves may be partly the result of a lack of dexterity in joints and nervous control of body movement (Valins,1988).

Strength and dexterity. Older people tend to lose strength and dexterity that comes with arthritis (Goodman & Smith, 1992). This affliction can cause stiffness which affects a person's ability to grip objects. Muscle strength and muscle endurance tend to decrease in the sixties or seventies (Baucom, 1996). Decline of muscular strength results in overall strength and reduces flexibility. Decrease in flexibility of joints occurs as cartilage becomes more brittle.

Equilibrium, balance and mobility. The gradual reduction in nervous tissue with age may affect balance and the coordination of fine movements. This condition means that the body's center of gravity is pitched forward, making walking clumsy and apelike. Also, seniors lack stability when walking. From Overstall's research (1980), sway normally increases after the sixth decade of life to a level of instability that may place a person at risk of a fall. Females have shown significantly more sway than males. Motor skill capacity directly affects options in getting around and in performing simple task of daily living (Goodman & Smith, 1992). As we age, general motor skills decrease: tasks that were once simple become problematic.

Activities of Daily Living

Activities of daily living are the activities usually performed in the course of a normal day in a person's life, such as eating, toileting, dressing, washing, or brushing the teeth. Two categories of activities are important to a person's independent functioning in daily life: activities of daily living (ADLs) and instrumental activities of daily living (IADLs). ADL functions are essential for an individual's direct self-care and IADL functions are more concerned with self-reliant functioning in a given environment. ADLs, include bathing, dressing, toileting, feeding, transferring from a bed or chair, and walking; IADLs include using the telephone, shopping for personal items, transportation, managing money, doing light housework, and preparing meals (Golant, 1992).

It is widely recognized that routine activities are difficult for many older people, and problems with these activities reduce functional independence (Czaja, Weber, & Nair, 1993). A person's ability to function is an important basis for measuring the

capacity for independent living. ADLs and IADLs are two categories of activities which older people with health problems have difficulty performing (Golant, 1992). The individual is judged on whether he or she can perform these tasks by himself or herself, even with some difficulty, or whether he or she needs assistance. When people have difficulty performing these routine activities, their functional independence is greatly reduced (Baucom, 1996). As the number of either ADLs or IADLs increases, a person is considered more dependent. Dependencies in IADLs are considered less serious than dependencies in ADLs (Golant, 1992). These functional difficulties not only threaten older people's ability to live autonomously and increase their reliance on others, but they also increase their risk of having various housing problems. That is, they will be more vulnerable to accidents within the home and will have greater difficulty using or accessing their dwellings (Golant, 1992).

ADLs used for geriatric assessment range from basic activities which are necessary for self-care to more complicated activities which are necessary for living independently in the community. Findings from the National Health Interview Survey (National Center for Health Statistics, 1987) indicate that tasks that are most problematic for American older adults are walking, bathing, transferring, preparing meals, shopping, and doing heavy housework. However, many ADLs are performed in different ways in Asian countries, which may lead to differences in the meaning of ADL scores in different countries (Jitapunkul, Kanolratnakul, & Ebrahim, 1994). For instance, Thai people eat using a spoon and a fork. Some Thai older people take a bath by using a bowl to scoop and pour water over the body and some of them take a shower, but they never take a bath. Some of them are still familiar with using a squat toilet.

An important aspect of health status, particularly as it relates to need for assistance from others, is the ability to move about. One survey (Chen & Jones, 1989) showed only about 1% of the Thai elderly people cannot get around the house at all (that is, they are bedridden). From the data, 58.7 % of the elderly people are still able to get around the house without help, while 38.3 % had difficulty getting around the house. Around 1.9 % of the elderly people can get around the house only with help (Chen & Jones, 1989). There is often a steady decline in mobility with age.

Different physical and mental changes associated with aging affect older people's ability to carry out the activities of daily living in their own homes. Technical aids and industrial and environmental design can be useful in assisting with these activities. Carefully conceived product and environmental design can reduce the accident rate and insure independence (American Society on Aging, 1987). Interventions which aid older people in the performance of home tasks would greatly improve their quality of life and also reduce the burden of care associated with this population (Czaja et al., 1993). However, to develop design strategies, detailed data on the specific types of difficulties Thai older people encounter when performing home activities is needed.

Thai Housing

During the reign of King Rama V (1868-1910), when international trade was flourishing, western civilization spread into Thailand. A lot of overseas architects and construction workers came to design and work on buildings in Bangkok. After that time the architecture in Thailand was evidently influenced by the western style (Tiptus & Bongsadadt, 1982). The style of houses of the well-to-do was apparently westernized in the exterior design and space planning. The period that followed, the National Administrative Reformation, brought another change as Thai architects educated from overseas returned to design houses influenced by the so-called Western Modern Architecture (Tiptus & Bongsadadt, 1992). The beginning of the 1960s National Economic and Social Plan witnessed the nation's industrial development and technological progress. Housing in this period varied according to the owner's economic status. Moreover, the increase in population and urban land prices resulted in transformation of the typical house from the single-unit housing into the grouping of multi-unit housing, such as suburban housing villages, the government's welfare housing projects, townhouses, apartments and condominium.

Thai people, especially older adults, are unaccustomed to high-rise living (apartment building or condominium) and do not particularly like it. Bangkok people prefer to own land. They would rather spend their money to buy a townhouse than a high-rise apartment condominium because it is a better investment. They build housing vertically only when the land is expensive (Fairclough, 1995). A typical single-

family detached house for middle-income people in Thailand is a two-story house (see Figure 1 to Figure 10). A living room, dining room, kitchen, bathroom, terraces on the front and back of the house, and a garage are located on the first floor. Also, there is a housekeeper's bedroom, and a bathroom in the back of the house. Most of the detached houses have three bedrooms, one or two bathrooms, a Buddha room, and a balcony on the second floor. A Buddha room is the room where statues of the Lord Buddha are kept in the house. The statues are placed on a small set of tables decorated with one or two vase of flowers, two candle holders, and a bowl of joss sticks. Members of the house pray in this room. Most of the houses are built on 400 square meters (4,306 square feet) of land. These houses usually are set amidst large lots so as to ensure privacy. The yards are planted, and well-tended lawns, flowers, and shrub are enclosed within walled compounds (Thomas, 1991).

A shophouse is a typical dwelling for the middle income people who own small businesses or retail shops (see Figure 11). The floor plan of a shophouse is in the shape of rectangle. They occur in terraces of 8 to 20 units. The average unit size is four metres (13 feet) frontage by 12 metres (40 feet) in depth. Construction is normally multistorey, two to four stories being the usual. The ground floor is used for commercial purposes and the upper floors are residential, often occupied by a single family. Shophouses are usually found bordering main and secondary roads (Center for Housing and Human Settlements Studies, 1984).

Most Thai dwellings use wood parquet floor or ceramic tile floor. Thai older people are accustomed to wood flooring since wood is a main material in a traditional Thai house. Thai houses in Bangkok do not have heating systems or chimneys. In some houses, individual air conditioners were installed in some specific rooms such as bedrooms or living rooms. The majority of Thai dwellings are cooled with separate cooling units in each room. Thai houses have a lot of windows due to the hot weather. Screens are attached to the windows so that mosquitoes will not get into the house. Dishwashers, garbage disposals, shower sprays at sinks, and smoke detectors are rarely found in Thai kitchens. Thai people prefer gas stoves rather than electrical stoves because gas is cheaper than electrical power. Figure 1 to Figure 10 show examples of exterior and interior environments of single-family detached Thai

houses including living rooms, bedrooms, Buddha rooms, bathrooms, dining room, and kitchens.

Thai elderly people prefer to live in their familiar dwellings and stay on their lands and their familiar communities. Findings from a study at the Kasikornthai research center (1997) showed that most of the sample of older adults (86.3%) lived in their own dwellings. Only 5.6 % of the older adults lived in their sons or daughters' dwellings (ratio between son: daughter = 40:60). When older people become frail, the home environment needs to be more supportive to compensate for their limitations or disabilities (Pynoos, 1992). Home modifications can make dwellings of older people safer, healthier, and more secure, comfortable, and usable (Golant, 1992).

Residential Interior Environment for the Older Adult

Most housing in which older persons live was designed and planned for younger, healthier people and does not facilitate independence among the elderly (Lawton, 1980). The increase in the amount of time spent in the dwelling and the decrease of physical capabilities affect the ability of older adults to function effectively in homes. The residential environment should be planned to incorporate features which encourage independent living. Enhancement of the physical environment is imperative to improve the quality of life for afflicted older people (Winchip, 1990).

Planning an effective supportive environment requires consideration of several architectural elements and living areas (Winchip, 1990). Safety and usability must be considered in planning an effective support environment. All floors should minimize environmental hazards such as slippery surfaces, changes of levels, and broken tiles. Flooring should be composed of nonslip surfaces, and should be level, with no protruding seams, cracks, or joints. Area rugs should be eliminated to prevent accidents caused by slipping. Windows should be easy to operate. The sill should be 30-36 inches from the floor so the window can be pushed or pulled open and closed with one hand, wrist, or forearm while seated or standing. Lightweight draperies attached with rings that slide along a rod, or roll-up window shades with long cords, are an appropriate selection for older adults. Wall plugs and telephone plugs should be at 18 inches off the floor, thereby limiting the need to bend over to reach the outlets (Valins, 1988).



Figure 1. Exterior Environment of the Thai single family detached house



Figure 2. Porch



Figure 3. Living Room



Figure 4. Living Room



Figure 5. Stairs



Figure 6. Bedroom



Figure 7. Buddha Room



Figure 8. Bathroom



Figure 9. Dining Room



Figure 10. Kitchen



Figure 11. Shophouses



Figure 12. Townhouses

The inability to hear high-frequency sounds is a common problem for older adults; therefore, for an item that chimes (doorbell, alarm), the lower the pitch of the chimes, the better. Acoustic treatments should block out background noise from outside and inside of the houses. Draperies are effective in controlling high-frequency ranges (Malkin, 1992). Because the elderly have difficulty with extremes in light intensity and are sensitive to glare, lighting in senior housing should be of medium brightness, except in task-specific areas. Illumination level should be increased wherever detailed visual tasks such as reading, are to be performed. In the interior environment, glare is pervasive. It may be either direct or reflective. Sunlight is an example of direct glare. Bare windows should have a covering that diffuses the incoming light to avoid contrasts and glare problems. Reflective glare can be seen on tabletops, hard-surface flooring, semi-gloss painted walls, or a myriad of other sources (Malkin, 1992). Using nonreflective surfaces and materials to minimize indirect glare caused by highly polished floors and specular walls, furnishings, or other objects is important. Glare can be reduced by using shielded light fixtures, draperies or other window treatment, and roof overhangs. Indirect lighting is a good solution for glare. All fluorescent and incandescent lights should be indirect (Goodman & Smith, 1992). Indirect lighting should be used whenever possible to minimize the perception of the flickering of fluorescent lamps and because a high level of illumination can be achieved without creating glare (Malkin, 1992). Direct glare should be eliminated by using luminaries with proper baffles and by avoiding harsh down- or side-light (Winchip, 1990). Lighting systems must be easy to operate. Wall switches should be conveniently located in areas where they will be commonly expected. Light switches should be located at 38 inches above the floor at a height easily reachable (Valins, 1988).

Furniture should be firm and sturdily constructed since seniors often use furniture for support. In general, the top surface of a seating piece should be 18 inches above floor level, provide good lower back support, firm padding, and have arms that extend to the front of the seat for aid in standing up. A normal level seat with good arm supports allows the seated seniors to use their arms to push themselves into the upright position (Winchip, 1990).

Doorways, steps, and stairs should be brightly lit. The entry door should be 36 inches wide, which gives a clear opening of 34 inches. All doors in the interior living space should provide a clear space of 32 inches. Lever handles are recommended on all doors since they are the most easily operated by all groups (Raschko, 1991). Stairs should have uniform dimensions. Light switches should be provided at both the top and the bottom of stairs. Handrails should be provided on both sides of the stair and protrude from 6 to 12 inches beyond the last step (Regnier & Pynoos, 1987).

The height and firmness of the bed are the most common problems in the bedroom. Mattress recommendations range from medium to firm. The underspringing should be firm and not allow sagging. Bed heights for the elderly should be the same as their sitting height, about 16 or 17 inches. A clear space should be a minimum of 36 inches at the foot of the bed and the far side of the bed to facilitate circulation, cleaning, bed changing, and bed making (Raschko, 1991). The bedroom for the older adult should be located near the bathroom. The distance from the bedroom to the bathroom should be 20 feet or less. Sound and noise in general should not be obtrusive to the sleeper.

The bathroom has been cited as the room with the most problems (Regnier & Pynoss, 1987). Support elements, such as handrails, a shower seat, and grab bars, are necessary in a bathroom for the elderly. Grab bars on the tub or shower walls and the edge of the tub offer stability and help prevent falls (Hynes-Grace, 1992). The bathroom walls should be reinforced so that grab bars can be installed and support 250 lbs. Blocked brass bars, wood bars, or nylon towel bars are warmer and are much more homelike than stainless steel grab bars (Goodman & Smith, 1992). Rails should be round or oval and measure between 1/2 and 2 inches in diameter. A shower seat (with holes in it so water can drain) can provide additional security for a senior (Winchip, 1990). Rubber flooring in the bathroom is less slippery than tile flooring when wet. Lever door handles and faucet handles require less-than-normal effort and can be easily manipulated by a senior (Valins, 1988). Water heater temperature settings should be lowered. Doors must have a clear opening of at least 32 inches and floor space must contain a clearance of at least 60 x 60 inches for wheelchair turning.

Research related to Thai older people and home accidents (Mahidol University, 1995) showed that home accidents happened in the kitchen more than any other place in the dwelling. Therefore, it is important to incorporate safe and usable design concepts into the kitchen plans. L- or U- shaped kitchens are often recommended because they provide ample floor space (DeMerchant & Beamish, 1995). The stove controls should be at the front of the stove so the person does not have to reach across a hot burner (Hynes-Grace, 1992). Overhead cabinets should be mounted lower where they are easier to reach. Counters are designed in a variety of heights to allow people to stand or sit while cooking (Valins, 1988). Using sharp color contrast in flooring, work surfaces, cupboards, and utility switches in the kitchen can help the low-vision elderly. The color of dishes should contrast strongly with place mat and tablecloth colors. Products for older adults include appliances with large-type instructions printed on oversized knobs (Null, 1988).

According to the study of the lifestyles of Thai older adults who are healthy and have long lives (Siripanich, Tawichachard, T., Pokakul, Tawichachard, N., Lerkngam, & Tomana, 1988), living in well maintained residential environments and sleeping in bedrooms that have good conditions affect good health status and longer lives of older adults. The design of interior environment can play an active role in supporting human lives. By modifying environmental features to fit the older adult's capacities, the older adult's level of functioning may improve (Falletti, 1984). Older adults would benefit from home modifications geared to their specific needs in their existing environment.

Theoretical Framework

The competence and environmental press model of Lawton and Nahemow (1973) and the environmental docility hypothesis of Lawton (1980) provided a suitable theoretical base for understanding the roles that residential interior environments play in older adults lives. The concept of environmental press (Lawton & Nahemow, 1973) deals with individual competencies and the demand character of the physical environment; the higher the level of competence, the greater the level of press tolerated without experiencing stress and discomfort. This model consists of two variables (see Figure 1): (1) the person's competence and ability to use the physical

space and (2) the demands the space places on the individual. These variables were placed on the X and Y axes of a graph to represent a continuum. This model establishes points of balance between the two, called the adaptation level.

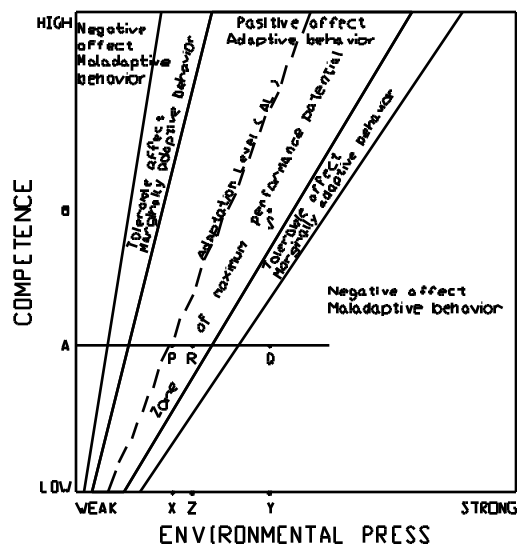


Figure 13. Diagrammatic representation of the behavioral and affective outcome of person-environment transactions.

Source: Ecology and the aging process by M. P. Lawton and L. Nahemow. In C. Eisdorfer and M. P. Lawton (Eds.), The psychology of adult development and aging, p. 661.

Competence is a measure of an individual's biological health, sensation-perception, motor skills, cognitive skills, and ego strength. These characteristics of competence can be measured by specific behavior such as failure to hear conversation. Environmental press consists of challenges or demands that activate behavior. Environments can be classified on the basis of the varying demands that they place on the individual. Environmental press can be a combination of three types: physical, interpersonal, or social. Physical demands include such things as having to walk three flights of stairs to one's apartment (Cavanaugh, 1997).

The goal of using this model is to determine whether individuals are properly matched with their housing situation. If people “fit” their environment, then individual satisfaction and ability to use space increases. Likewise, if a “fit” does not occur, then problems of frustration or boredom arise (Blank, 1988). The environmental docility hypothesis, developed by Lawton (1980), states that the less competent the individual, the greater the impact of environmental factors on that individual. The impact of the environment is great on people who are vulnerable such as the frail older adults. Lawton (1980) also suggested that special attention to the physical environments can maintain and increase functional capacity, self-respect, and dignity of older adults.

The person-environmental fit in residential settings for the elderly is critically important in order to enhance well-being (Lawton,1980; Malkin, 1992). The normal aging process decreases an individual’s physical competencies therefore the aged will be sensitive to the effects of the physical environment. A person with declining health may be unable to do all of the things that he or she once was able to do. He or she may stop doing household tasks and become dependent on other people. The environment can be designed and adapted to compensate for sensory and mobility losses and help the person to stay independent.

CHAPTER III

Methodology

The purpose of this study was to explain the safety and usability problems in the residential interior environment of Thai older adults. This chapter describes the methodology of this study including sample selection, instrument, procedure, variables, hypothesis, and data analysis.

Sample

Because Thai people retire at the age of 60, the sample was selected from male and female retired government officials 60 years of age and older who live in the Bangkok Metropolitan Areas of Thailand. Since this study was an exploratory study, a convenience population was used. Mailing lists that the researcher obtained from government officials were used. The lists consisted of 264 retired government employees of the Ministry of Finance, the Ministry of Public Health, and the Civil Service Commission.

Instrument

The instrument consisted of a questionnaire that was administered by a mailed survey. The instrument was printed in booklet format as recommended by Dillman (1978). The questionnaire consists of five sections: (1) housing characteristics, (2) interior environment features, (3) personal information, (4) health condition, and (5) activities (see Appendix D and Appendix E).

The first section contains partially close-ended questions about housing characteristics of the older adults such as length of residence, home ownership, and household composition. The second section has a Likert-type scale and open-ended questions about the interior environment features in the home that typically create safety and usability problems for older adults. Also, there are partially closed-ended questions about home improvements and open-ended questions about intended home modifications. The questions in this section are divided to five areas: entrance and stair, bedroom, bathroom, kitchen, and other interior features. In the third and fourth section, there are personal information questions that include gender, age, height, weight, and health conditions. The last section is a Likert-type scale asking

about respondents' ability to perform basic activities of daily living (ADL) and instrumental activities of daily living (IADL). The final page has one open-ended question which requests respondents' additional comments about improving safety in their homes. A thank you note for their participation is included on the final page.

An original survey instrument in English (see Appendix A) was first pretested with four graduate students in the Department of Housing, Interior Design and Resource Management at Virginia Tech. Then, the questionnaire was translated into Thai for fit with Thai older adults. An original survey instrument in Thai (see Appendix B) was pilot tested with Thai older adults to avoid confusion and to improve questions. A pretest convenience sample consisted of 20 Thai older people living in Maungthong housing estate community in the northern suburban area of Bangkok. The instrument was sent by assistants to this group of older adults in April, 1997.

The pretest resulted in rewording of several questions for clarity, removal of confusing items, and addition of new questions. As a result of the pilot study, questions regarding the problem of interior environment features were reworded to the level of difficulty with interior environment features. Also, these questions were changed from partially close-ended questions to a five-point Likert scale. Many items in this section were eliminated. For example, slippery bathtub and difficulty getting in or out of the tub were eliminated because Thai older adults do not use bath tubs although they have bath tubs in their bathrooms. The questions about home modification in each area were added in the questionnaire because many Thai older adults in this group have already improved interior environment features in their houses to suit their needs. In the last section of the questionnaire, the item about "getting around your house" was eliminated because the older adults felt confused between getting around your house and walking. The older adults commented that the letters in the questionnaire are too small. Therefore, the revised survey instrument was enlarged to be easily read.

Procedure

Using the mailed-questionnaire technique described by Dillman (1978) as a guide, the self-administered questionnaire was developed to collect the data from the sample group (see Appendix D and Appendix E). A letter of introduction (see

Appendix F and Appendix G), a prepaid return envelope, and the instrument were mailed to retired government employees on June 10, 1997. A follow-up postcard (see Appendix H & Appendix I) was mailed to all non-respondents two weeks later.

Variables

This study had two independent variables and one dependent variable. The variables are identified in the following list.

Independent variables

1. Age
2. Activity levels: (a) basic activities of daily living (taking a shower, dressing, using a toilet, transferring from a bed, transferring from a chair, transferring from a sofa, walking, and climbing stairs) and (b) instrumental activities of daily living (using a telephone, preparing meals, housekeeping, and doing laundry).

Dependent variable

1. Degree of difficulty with the safety and usability of interior environment features in the home. These variables are divided to 5 areas:
 - a) Entrance and stair
 - b) Bedroom
 - c) Bathroom
 - d) Kitchen
 - e) Other interior features.

Hypothesis

1. There would be a difference in degree of difficulty with safety and usability features in: (a) entrance and stairs, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features among age groups.

2. There would be a difference in degree of difficulty with safety and usability features in: (a) entrance and stairs, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features among activity levels.

3. There would be a difference in the area of the home that is perceived to have the most problems.

Data Analysis

Data collected from the questionnaire were analyzed using descriptive statistics. Frequency distributions, means, and percentages were used to describe the demographics, housing characteristics, activity levels, health conditions of Thai older adults, and interior environment features in the home that create safety and usability problems for the older adults. One-way analyses of variance (ANOVA) were used to identify the overall relationships between age and activity level with the degree of difficulty with the safety and usability of interior environment features in the home. Tables were prepared to report the results.

CHAPTER IV

Findings

The purpose of this research was to explain the safety and usability problems in the residential interior environment of Thai older adults. This chapter presents the results of the study. The results include two sections on demographic results and hypotheses testing results. Descriptive statistics were used to describe the demographics, housing characteristics, health conditions, activity levels of Thai older adults and interior environment features in the home that create safety and usability problems for the older adults. Three hypotheses were tested to investigate the relationship of age and activity level of Thai older adults with interior environment features.

Description of Sample

Of the 264 mailed questionnaires, 181 were filled out and returned. Resulting in a 68.6% return rate. Of the 181 returned questionnaires, 18 were incompletely filled out; so that only 163 questionnaires were used in data analysis.

Of the 163 respondents, 52.1% (85) of them were male and 47.9% (78) of them were female. Their mean age was 68.1 years and ranged from 60 to 93 years. Slightly more than one-third were 60 - 64 years of age (36.2%) while 27.0% were 65 - 69 years, 19.6 % were 70 - 74 years, and 17.2 % were 75 years of age or older (see Table 1).

Respondent Housing Situation

The majority of respondents (91.9%) resided in single-family detached houses and 4.9% of the respondents resided in townhouses (see Table 2). A few respondents resided in shophouses (1.3%), condominiums (1.3%), and duplex housing (0.6%). Almost all dwellings (99.4%) were owned. Most respondents (85.7%) lived in their own dwellings rather than living in the dwellings of their children (8.1%) or their relatives (5.6%). Average length of residency was 22.1 years and most (81.4%) of the older adults had stayed in their current dwelling more than 10 years.

Of the 159 respondents, only 7.6% indicated that they lived in one-story dwellings while the majority (87.4%) lived in two-story dwellings. Also, only 24.8% of

them indicated that their bedrooms were located on the first floor of the house while 76.4% had their bedrooms on the second floor of the house. Almost half (46.6%) of respondents occupied three-bedroom dwellings and 39% of respondents had three bathrooms in their dwellings.

Almost all respondents had family members living with them. Only 1.8% of the respondents lived alone. The majority of the respondents lived with their children (70.8%) or their spouses (66.5%). Nearly half (47.2%) of the respondents received help in doing activities of daily living from their spouses, while 39.9% received help from their children and 31.9% received help from helpers or housekeepers.

Table 1
Gender and Age of the Respondents

Age Group	Male		Female		Total	
	N	%	N	%	N	%
60 - 64 year old	27	16.6	32	19.6	59	36.2
65 - 69 year old	23	14.1	21	12.9	44	27.0
70 - 74 year old	20	12.2	12	7.4	32	19.6
75 year old and over	15	9.2	13	8.0	28	17.2
Total	85	52.1	78	47.9	163	100

Table 2
Housing Characteristics of the Respondents

Description	N	%
<u>Housing type</u>		
Single detached house	148	91.9
Townhouse	8	4.9
Shophouse	2	1.3
Condominium	2	1.3
Duplex housing	1	0.6
Total	161	100.0
<u>Homeownership</u>		
Owned or owned by spouse	138	85.7
Owned by child	13	8.1
Owned by relative	9	5.6
Rent	1	0.6
Total	161	100.0
<u>Duration of residence</u>		
1-9 years	28	18.6
10-19 years	36	23.8
20-29 years	43	28.5
30-39 years	29	19.2
40-64 years	15	9.9
Total	151	100

(table continues)

Table 2 (continued)

Description	N	%
<u>Number of stories in the house</u>		
1 story	12	7.6
1.5 stories	1	0.6
2 stories	139	87.4
3 stories	4	2.5
4 stories	3	1.9
Total	159	100
<u>Number of bedroom in the house</u>		
1 bedroom	3	1.8
2 bedrooms	17	10.5
3 bedrooms	75	46.6
4 bedrooms	36	22.4
5 bedrooms	22	13.7
6 bedrooms	8	5.0
Total	161	100.0
<u>Number of bathrooms in the house</u>		
1 bathroom	17	10.6
2 bathrooms	41	25.5
3 bathrooms	63	39.1
4 bathrooms	28	17.4
5 bathrooms	10	6.2
6 bathrooms	1	0.6
7 bathrooms	1	0.6
Total	161	100.0

(table continues)

Table 2 (continued)

Description	N	%
<u>Location of the bedroom</u>		
On the first floor	40	24.8
On the second floor	123	76.4
On the third floor	1	0.6
<u>Living Arrangement</u>		
Lived with child	114	70.8
Lived with spouse	107	66.5
Lived with grandchild	62	38.5
Lived with helper or housekeeper	59	36.7
Lived with in-law	34	21.1
Lived with sibling	19	11.8
Lived with relative	13	8.1
Lived with only spouse	11	6.7
Lived with other person	5	3.1
Lived alone	3	1.8
<u>Caregiver</u>		
Spouse	77	47.2
Child	65	39.9
Helper or housekeeper	52	31.9
Grandchild	27	16.6
In-law	17	10.4
Sibling	10	6.1
Relative	8	4.9
Other person	8	4.9
No caregiver	22	13.5

Respondent Health Conditions

Table 3 shows that the average height of the male respondents was 5' 5" while the female respondents had an average height at 5' 0". The average weights were 143 pounds for males and 123 pounds for female Thai older adults. In a question about health condition (see Table 4), 4.5% of the respondents reported that they had no health problems. Four-fifth (80.4%) of the respondents had vision problems. Around one-third (31.3%) had back pain and 28.8% had difficulty bending and kneeling. Some of the respondents had other health problems such as insomnia (20.3%), sensitivity to touch (19.6%), difficulty hearing (17.2%), dizziness (13.5%), and mobility problems (11.7%). A small number of the respondents needed assistance to move around their dwellings while the majority (92.8%) of them needed no assistance.

Table 3

Height and Weight of the Respondents

Description	MEAN	RANGE
<u>Height</u>		
Male	166CM 5'5"	145 - 180CM 4'9" - 5'11"
Female	154CM 5'0"	143 - 176CM 4'8" - 5'9"
<u>Weight</u>		
Male	65kg 143	40 -92kg 88 - 203
Female	56kg 123	35 - 85kg 77 - 187
<u>Weight problem compared from ratio of weight and height</u>		
Overweight	22	13.5

Note. cm = centimeters; kg = kilograms

Table 4

Health Conditions of the Respondents

Health Problem	N	%
Vision (wearing glasses, cataract, glare, etc.)	131	80.4
Back pain	51	31.3
Difficulty bending, kneeling, etc.	47	28.8
Insomnia	33	20.3
Sensitive to touch	32	19.6
Hearing (hard of hearing, using hearing aids, etc.)	28	17.2
Balance (dizziness, etc.)	22	13.5
Mobility or reliance on walking aids	19	11.7
Dexterity (arthritis, difficulty in grasping, etc.)	12	7.4
Limitations of stamina	11	6.8
<u>Other health problems from an open-ended question</u>		
High blood pressure	12	7.4
High cholesterol	12	7.4
Knee pain	10	6.1
Heart disease	9	5.5
Allergy	7	4.3
Diabetes	5	3.0
Osteoporosis	4	2.5
Arthritis	4	2.5
Overweight	4	2.5
Constipation	3	1.8
Arm pain	3	1.8
Numbness (arm, hand, leg)	3	1.8
Low blood pressure	2	1.2
Hemorrhoids	2	1.2
Forgetfulness	2	1.2

(table continued)

Table 4 (continued)

Description	n	%
<u>Type of assistance</u>		
No assistance	149	92.6
Cane	11	6.8
Another person	5	3.1
Walker	4	2.5
Wheelchair	2	1.2

Activity Levels

Respondents were asked to rate their capabilities to do each of the basic activities of daily living (ADL) and the instrumental activities of daily living (IADL). ADLs included taking a shower, dressing, using a toilet, transferring from a bed, transferring from a chair, transferring from a sofa, walking, and climbing stairs. IADLs consisted of using the telephone, preparing meals, housekeeping, and doing laundry. Activity levels were divided into four levels: never do this activity, can do this activity only with help, can do this activity by myself but it is not easy, and can easily do this activity by myself. Table 5 shows respondents' activity levels. The results indicated that most respondents could easily do ADL tasks by themselves. There was a small percentage experiencing difficulty with ADLs. The least difficult task was transferring from a dining chair (1.2%). Of the ADL tasks, more respondents experienced difficulty climbing stairs than any of the other ADLs (7.4%). These results may relate to health condition results in which 28.8 % of the respondents had difficulty bending and kneeling and 6% of the respondents had knee pain. Of the IADL tasks, the least difficult was using the telephone (2.5%). Around half of the participants could easily perform the following IADL tasks by themselves: preparing meals (64.4%), housekeeping (49.7%), and doing laundry (44.1%). The rest of the participants never do these tasks by themselves or experienced difficulties with these tasks. More participants experienced difficulty with housekeeping than with doing laundry and preparing meals. The results indicated that most of the older adults did not live alone and they had caregivers to help them accomplish tasks in their dwellings (86.5%).

Table 5

Respondents' Abilities Performing Activities of Daily Living

Activity of Daily Living	Never do	With help	Not easy	Easily
<u>Basic Activity of Daily Living</u>				
Taking a shower (n)	-	2	4	156
%	-	1.2%	2.5%	96.3%
Dressing (n)	-	1	5	157
%	-	0.6%	3.1%	96.3%
Using the toilet (n)	-	1	4	158
%	-	0.6%	0.5%	96.9%
Feeding yourself (n)	-	-	4	159
%	-	-	2.4%	97.6%
Transferring from a bed (n)	-	-	4	159
%	-	-	2.4%	97.6%
Transferring from a dining chair	-	-	2	161
%	-	-	1.2%	98.8%
Transferring from a sofa (n)	-	1	3	159
%	-	0.6%	1.8%	97.6%
Walking (n)	-	-	5	158
%	-	-	3.1%	96.9%
Climbing stairs (n)	2	4	8	148
%	1.2%	2.5%	4.9%	91.4%
<u>Instrumental Activity of Daily Living</u>				
Using the telephone (n)	-	-	4	158
%	-	-	2.5%	97.5%
Preparing meals (n)	47	3	7	103
%	29.4%	1.8%	4.4%	64.4%
Housekeeping (n)	60	13	8	80
%	37.3%	8.1%	4.9%	49.7%
Laundry (n)	76	10	4	71
%	47.2%	6.2%	2.5%	44.1%

Note. - indicates no respondents in this category.

Interior Environment Features that Create Safety and Usability Problems

The Likert-type scale questions were used in the section of interior environment features. The respondents were asked to rate their difficulty level with each interior environmental feature. On the scale, a value of “one” indicated the greatest level of difficulty, while “five” indicated no difficulty. The mean scores for safety and usability problems of the respondents are shown in Table 6. The results indicated that the respondents had less difficulty with the following interior environmental features than with others: (a) entrance and stairs, not enough lighting (mean = 4.65); (b) bedroom, too hard or too soft mattress (mean = 4.54); (c) bathroom, difficulty getting on or off the toilet (mean = 4.59); (d) kitchen, not enough lighting (mean = 4.59); and (e) other interior features, light switches difficult to find (mean = 4.47).

Most respondents reported they had a little difficulty with interior environmental features. Even though mean scores of these features were slightly high; few interior environmental features were found to create problems for the older adults. The results indicated that the respondents had more difficulty with the following interior environmental features than with others:

Entrance and stairs

steep stairs (mean = 4.39), (a standard riser height in Building Codes is no more than 20 centimeters or 8 inches);

Bedroom

too much noise from outside affecting sleep patterns (mean = 3.96);

Bathroom

slippery bathroom floor (mean = 4.22);

Kitchen

no seating area for food preparation in the kitchen (mean = 3.59); and

Other interior features

presence of insects or rodents (mean = 3.08).

The five most difficulties the older adults had with interior environmental features were: presence of insects or rodents (mean = 3.08), no seating area for food

preparation in the kitchen (mean = 3.59), not enough space on counter or table in the kitchen (mean = 3.8), too much noise affecting sleep patterns (mean = 3.96), and furniture arrangements that restrict movement (mean = 3.96).

Other difficulties. Open-ended questions were asked to determine other difficulties that the respondents found in each area of their home (see Appendix J).

The worst difficulties in each area were:

Entrance and stairs

1. steep stairs (6 responses),
2. floors on porches are slippery when raining (3 responses);

Bedroom

1. not enough space to move around because the bedrooms were too small and having much furniture (15 responses). According to traditional belief, Thai people always put the headboard of the bed on the east or north; therefore, furniture arrangement might obstruct circulation space;
2. hot, stuffy, bad ventilation, or not enough windows (8 responses);
3. too much noise and dust from streets, express ways, or a factory nearby (7 responses);

Bathroom

1. slippery floor (8 responses);
2. there is no shower curtain or shower door so that the other area is wet (5 responses);

Kitchen

1. the kitchen is too small (11 responses);
2. not enough space on counter or table (5 responses);
3. stuffy, bad ventilation, have much smoke when cooking (4 responses); and

Other interior features

1. presence of ants, cockroaches, mosquitoes, termites, rodents, lizards (13 responses)

Table 6
Mean Scores of Degree of Difficulty Compared Among Features in the Home

Interior environmental feature	N	Mean	StDev	F	P
<u>Entrance and stair</u>					
1. Steep stairs or high thresholds at entrance	124	4.58	.74		
2. Not enough lighting at the entrance	158	4.65	.61		
3. Door handles or door locks difficult to use	158	4.61	.71		
4. Door need a great force to open	104	4.57	.86		
5. Steep stairs	120	4.39	.97		
6. No railings or handrail on both sides of stairs	132	4.54	.85		
7. Not enough lighting on the stairs	152	4.62	.73		
8. No light switches at both the top and bottom of the stair	121	4.61	.91		
				1.33	.234
<u>Bedroom</u>					
1. Not enough space to move around	157	4.40	1.09		
2. Not enough space to make the bed	152	4.31	1.10		
3. No telephone near your bed	108	4.30	1.21		
4. No lamp near your bed	117	4.50	.98		
5. Too hard or too soft mattress	153	4.54	.88		
6. Too much noise affecting sleep patterns	129	3.96	1.30		
				4.87	* .000
<u>Bathroom</u>					
1. Not enough space to move around	148	4.33	1.05		
2. Slippery floor	144	4.22	1.13		
3. Not enough lighting	162	4.58	.84		
4. Difficulty operating faucets	157	4.55	.83		
5. Difficulty getting on or off the toilet	158	4.59	.85		
6. No seat in shower	87	4.34	1.09		
				3.89	* .002
<u>Kitchen</u>					
1. Not enough space to move around	154	4.18	1.14		
2. Slippery floor	137	4.33	.98		
3. Not enough lighting	158	4.59	.80		
4. Cabinet handles or faucet difficult to grasp	155	4.43	.94		
5. Shelves and storage units out of reach	143	4.08	1.14		
6. Not enough space on counter or table	136	3.89	1.26		
7. No seating area for food preparation	127	3.59	1.47		
				12.73	* .000
<u>Other interior features</u>					
1. Furniture arrangements that restrict movement	136	3.96	1.33		
2. Throw rugs that cause tripping	121	4.19	1.14		
3. Glare from windows or bare light bulb	117	4.39	.98		
4. Not enough natural light	126	4.38	.98		
5. Light switches difficult to find	132	4.47	.87		
6. Windows that are difficult to open or lock	155	4.19	1.07		
7. Counters or furniture with sharp edges	119	4.01	1.18		
8. Presence of insects or rodents	137	3.08	1.35		
				20.91	* .000

Note Difficulty degree: 1 = great difficulty, 5 = no difficulty

* $p < .05$ = significant difference.

Along with the results from the survey questionnaire, a researcher visited nine volunteer respondents in their homes and took photos of features that the respondents reported as difficulties. The following figures show interior environmental features that created safety and usability problems for the respondents (see Figure 14 to Figure 18).



Figure 14. Not enough space on counters in the kitchen



Figure 15. Furniture arrangements that restrict movements



Figure 16. Furniture with sharp edges and level changes



Figure 17. Cabinets out of reach and a small step used for reaching.



Figure 18. Steep stairs without railings

Home Modifications

Some respondents did not perceive difficulty with interior features in their homes since they had already made improvements to fit their needs. To determine what modifications the respondents had done in their homes for improving safety and usability, partial closed-ended questions were asked in five areas of the home. The results are shown in Table 7. Almost half of the respondents (49.6%) changed a mattress and 47.8% of them removed furniture that restricted their movements. More than one fourth of the respondents did the following modifications in their homes: installed blinds or curtains at windows (43.5%), increased volume of door bells or telephone ringers (38%), changed bathroom floor tiles to non-slip tiles (34.3%), placed a telephone near a sleeping area (26.3%), and installed more light fixtures in the kitchen (26.3%). From the open-ended questions, the respondents reported other modifications in their homes (see Appendix K). The most predominant modifications respondents did in their homes were:

1. replaced toilets from an eastern style to a western style (8 responses);
2. placed rubber mats on bathroom floor, a bathtub, or under a rug to prevent slipping (7 responses);
3. installed an air-conditioner or an electric fan to cool the bedroom (6 responses);
4. Relocated a bed and a closet for correct orientation and increasing more room space in the bedroom (6 responses);
5. Rebuilt stairs (5 responses); and
6. Installed a hood, an exhaust fan, or built a chimney in the kitchen (5 responses).

Along with the results from the survey questionnaire, photos of some modifications in the respondents' homes are illustrated in Figure 17 to Figure 21

Table 7

Home Modifications

Modification	N	%
<u>Entrance and stair</u>		
Changed door handles or door locks	46	28.2
Installed more light fixtures	41	25.1
Installed handrails	14	8.5
<u>Bedroom</u>		
Changed the mattress	81	49.6
Placed a telephone near the sleeping area	43	26.3
Installed more light fixtures	41	25.1
<u>Bathroom</u>		
Changed bathroom floor tiles	56	34.3
Added a shower seat	29	17.7
Installed grab bars	26	15.9
<u>Kitchen</u>		
Installed more light fixtures	43	26.3
Increased amount of table or counter space	38	23.3
Added a seating area	31	19.1
<u>Other interior features</u>		
Removed furniture that restricts movement	78	47.8
Installed blind or curtain at windows	71	43.5
Increased door bell sound or telephone bell sound	62	38.0

Note. n = 163 respondents



Figure 19. Replaced a toilet from an Eastern style to a Western style, added a shower seat, a shower door, a water container, and changed floor tiles in the bathroom



Figure 20. Built new stairs and stair landings



Figure 21. Installed a hood and an exhaust fan in the kitchen



Figure 22. Installed a grab handle and an insect screen door.



Figure 23. Put soft covers on sharp edges of furniture to prevent bumping and installed curtains to prevent glare

Intended Home Modifications

In this section of the questionnaire, the respondents were asked what kind of modification they wanted to do in the future (see Appendix L). The most predominant intended modifications in each area were:

Entrance and stairs

1. change the door for easy closing and opening (3 responses);
2. rebuild the stairs (3 responses);

Bedroom

1. install an air conditioner (12 responses);
2. build a walk-in closet (8 responses);
3. improve air ventilation in the bedroom (6 responses);
4. increase more space in the bedroom (6 responses);

Bathroom

1. install grab bars in the bathroom(12 responses);
2. improve air ventilation in the bathroom (9 responses);
3. increase bathroom space (6 responses);
4. add a shower seat (5 responses);
5. build a shower room or have a door at a shower area (5 responses);

Kitchen

1. increase kitchen space (10 responses);
2. install more cabinets in the kitchen (7 responses);
3. install a hood in the kitchen (5 responses);
4. add a seating area in the kitchen (5 responses);
5. increase more counter or table spaces (5 responses);

Other interior features

1. increase space in the house or build more room (4 responses); and
2. plant more trees, shrubs, and gardens to prevent the house from dust and noise (4 responses).

General Comments and Suggestions about Safety and Usability Problems

The last question in the questionnaire asked the respondents to give their comments and suggestions about safety and usability problems in their home. A complete detailed list of comments is given in Appendix M. The majority of suggestions fell in the category of practices and behaviors of the older adults. The suggestions about behaviors were:

1. the older adults should stay on the first floor of the houses or stay in one-story houses (30 responses);
2. be careful of falls (11 responses); and
3. be careful while walking (10 responses).

From the findings about basic activities of daily living (ADL), more respondents experienced difficulty climbing stairs than any of the other ADLs so that the practices and behaviors of the older adults were adapted to prevent difficulty climbing stairs by staying on the first floor of the houses. The respondents also gave comments and suggestions in many areas and aspects including entrances, stairs, bedrooms, bathrooms, kitchens, materials, furniture, lighting, electricity, security, emergency, surroundings, and services. The bathroom got more comments than other areas of the home. The most predominant suggestions about interior features, in order of the number of responses, were:

1. the house should have enough lighting and natural light and should install light bulbs that save energy (20 responses);
2. should not place furniture that restricts movement and should have enough space to move around (19 responses);
3. put non-slippery floor tiles on the bathroom floor (15 responses);
4. the house should have only one floor level or fewer floor levels (13 responses);
5. install grab bars in the bathroom (11 responses); and
6. the house should be airy and have good air ventilation (10 responses).

Statistical Analysis and Discussion

One-way analyses of variance (ANOVA) were performed to compare the mean responses of degree of difficulty for each respondent group. A significance level of $p < 0.05$ were used. When significance was found using the one-way ANOVA, Tukey's procedures were used to determine significance differences between the groups.

Hypothesis one. There is a difference in degree of difficulty among age groups with safety and usability features in: (a) entrance and stair, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features. The respondents were divided to four age groups: 60-64 years old, 65-69 years old, 70-74 years old , and 75 years old and over. One-way ANOVA were used to compare mean scores of four age groups (see Table 8). Significant differences among age groups were found in the following two items:

1. too hard or too soft mattress ($p = .035$), and
2. throw rugs that cause tripping ($p = .021$).

There was no significant difference in other features. There was no difference in degrees of difficulty with safety and usability features in the entrance and stair, the bathroom, and the kitchen among age groups. When performing Tukey's pairwise comparisons, in the first item (too hard or too soft mattress), there was a significant difference between the 60-64 year old group and the 75 year old and over group, but there were no difference between the other groups. This finding supported the results in the descriptive section. The result in health conditions section shows that 31.3% of the respondents had back pain. In home modifications section, 49.6% of the respondents changed the mattress. Base on the findings, the 75 year old and over group had more difficulty with the softness of the mattress than the 60-64 year old group. In the second item (throw rugs that cause tripping), there was a significant difference between the 60-64 year old group and the 65-69 year old group while there was no difference between the other groups. The 60-64 year old group had less difficulty with throw rugs that cause tripping than the 65-69 year old group. As age increases, general motor skills decrease. Most Thai dwellings use hard surface flooring such as parquet floor or ceramic tile floor. The combination of lack of stability when walking and placing throw rugs on hard surface flooring could cause difficulty for seniors.

Table 8
One-Way ANOVA of Mean Scores of Degree of Difficulty Compared Among Four Age Groups

Interior environmental feature	N	Mean of age group				F	P
		1	2	3	4		
Entrance and stair							
1. Steep stairs or high thresholds at entrance	124	4.5	4.5	4.7	4.5	.39	.758
2. Not enough lighting at the entrance	158	4.6	4.6	4.6	4.6	.05	.986
3. Door handles or door locks difficult to use	159	4.6	4.5	4.6	4.5	.13	.942
4. Door need a great force to open	142	4.7	4.4	4.7	4.4	1.36	.258
5. Steep stairs	120	4.4	4.5	4.2	4.1	.74	.530
6. No railings or handrail on both sides of stairs	132	4.5	4.6	4.5	4.4	.24	.866
7. Not enough lighting on the stairs	152	4.6	4.5	4.6	4.7	.68	.563
8. No light switches at both the top and bottom of the stair	121	4.7	4.6	4.4	4.6	.61	.608
Bedroom							
1. Not enough space to move around	157	4.4	4.2	4.7	4.0	2.24	.086
2. Not enough space to make the bed	153	4.3	4.1	4.6	4.1	1.69	.171
3. No telephone near your bed	108	4.3	4.3	4.3	4.0	.32	.810
4. No lamp near your bed	118	4.4	4.4	4.6	4.4	.24	.866
5. Too hard or too soft mattress	153	4.6	4.5	4.6	4.1	2.94	.035
6. Too much noise affecting sleep patterns	129	3.8	4.1	4.0	3.8	.44	.724
Bathroom							
1. Not enough space to move around	148	4.3	4.2	4.6	4.1	1.41	.242
2. Slippery floor	143	4.1	4.2	4.3	4.2	.11	.955
3. Not enough lighting	159	4.5	4.5	4.7	4.6	.60	.613
4. Difficulty operating faucets	157	4.5	4.5	4.6	4.5	.28	.838
5. Difficulty getting on or off the toilet	158	4.5	4.5	4.7	4.7	.55	.647
6. No seat in shower	87	4.2	4.2	4.6	4.4	.64	.593
Kitchen							
1. Not enough space to move around	152	4.0	4.1	4.3	4.4	1.13	.339
2. Slippery floor	137	4.4	4.0	4.5	4.1	2.48	.064
3. Not enough lighting	156	4.6	4.3	4.7	4.7	1.78	.153
4. Cabinet handles or faucet difficult to grasp	155	4.4	4.1	4.6	4.5	1.51	.215
5. Shelves and storage units out of reach	143	4.2	3.7	4.1	4.0	1.70	.170
6. Not enough space on counter or table	136	3.9	3.6	4.2	3.8	1.46	.228
7. No seating area for food preparation	126	3.6	3.4	3.7	3.4	.37	.775
Other interior features							
1. Furniture arrangements that restrict movement	136	4.0	3.9	4.1	3.7	.46	.710
2. Throw rugs that cause tripping	121	4.4	3.7	4.3	3.8	3.37	.021
3. Glare from windows or bare light bulb	117	4.4	4.3	4.5	4.0	.96	.412
4. Not enough natural light	126	4.3	4.3	4.4	4.3	.09	.965
5. Light switches difficult to find	132	4.5	4.4	4.5	4.3	.52	.667
6. Windows that are difficult to open or lock	155	4.2	4.0	4.3	4.0	.60	.617
7. Counters or furniture with sharp edges	119	4.2	3.9	3.8	3.8	.72	.540
8. Presence of insects or rodents	136	3.2	3.1	3.1	2.5	1.08	.358

Note Difficulty degree: 1 = Great difficulty, 5 = No difficulty; age groups: group1 = 60 - 64 years old, group2 = 65 - 69 years old, group3 = 70 - 74 years old, group4 = 75 years old and over.

p < .05 = significant difference

Hypothesis two. There is a difference in degrees of difficulty with safety and usability features in: (a) entrance and stair, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features among respondents' activity levels.

Activities in this study consist of nine basic activities of daily living (ADL) and four instrumental activities of daily living (IADL). First, the respondents were divided into two groups: (1) less active group, and (2) more active group by their basic activity of daily living levels. The respondents who needed help or could not easily perform any basic activities of daily living were included in the less active group (group 1) while the respondents who could easily perform nine basic activities of daily living by themselves were included in the more active group (group 2). One-way analyses of variance were used to compare mean scores of degree of problems with usability and safety between the less active group and the more active group of basic activities of daily living (see Table 9). Tukey's procedure was tested after a significant difference was found. No difference was found in the bedroom and the bathroom. The findings show that there was no difference in degrees of difficulty with safety and usability features in the bedroom and the bathroom among respondents' basic activity of daily living levels. Significant differences were found in the entrance and stairs, kitchen, and other interior features. There were significant differences between ADL level of the less active group and ADL level of the more active group in seven features. The findings indicated that the older adults who could not perform ADL well had more difficulty with the following features than the older adults who could easily perform ADLs.

1. Windows are difficult to open or lock ($p = .002$).
2. Throw rugs that cause tripping ($p = .007$).
3. Counters or furniture with sharp edges ($p = .032$).
4. No seating area for food preparation ($p = .042$).
5. Steep stairs ($p = .044$). (A standard riser height in Building Codes is no more than 20 centimeters or 8 inches).
6. Furniture arrangements that restrict movement ($p = .046$).
7. Presence of insects or rodents ($p = .048$).

The Thai house usually has a lot of windows. Most windows were attached by insect screens and iron screens so that insect screens and iron screens could obstruct when the older adults want to open or lock windows. A sliding window might be a more appropriate type of the window in the dwelling of the older adults. Throw rugs were found to cause difficulty for the less active group in. When a throw rug is placed on hard flooring surface, it can easily cause tripping for the older adult who has mobility or balance problems. Therefore, throw rugs should be removed. Counters or furniture with sharp edges cause difficulty for the older adults who could not perform ADLs well. Since the traditional style of Thai furniture has many sharp edges and is made of wood without upholstery, it can become a problem for the older adults. The item “no seating area for food preparation” was the item with most problem in the kitchen. Thai foods require a slightly long time for preparation. The older adults who had difficulty walking or had a lack of stamina might have problems with diminished muscle strength, energy, stamina, and reflex time. The older adult should add a seating area in the kitchen while preparing meals. Steep stairs were the problem for the older adults who could not easily walk and climb stairs. Some older adults reported problems with kneeling, balance, and mobility which would make stair climbing difficult. In addition, the bedrooms of most older adults were located on the second floor of the houses. This problem can be solved by moving the bedroom to downstairs or rebuilding stairs. The findings indicated that some older adults had too much furniture in their homes. Respondents also reported furniture arrangements that restrict movement was one of the top five problems in their homes. The older adults who could not easily walk or who used a walking aid might find furniture obstructing them when walking. Furniture should be removed out of walkways. Because Thailand is situated in a humid tropical zone, the presence of mosquitoes, ants, and termites in the house is a major problem. This was the most reported problem in the house. Mosquito bites may be a danger for older adults’ sensitive skin, so mosquito screens should be installed in every room in the house. Insect elimination should be done regularly and frequently. In summary, the older adults who need help or can not easily perform basic activities of daily living should not have the features mentioned above in their dwellings.

Table 9
One-Way ANOVA of Mean Scores of Degree of Difficulty Compared Between Two
Groups of ADL Levels

Interior environmental feature	Group 1		Group 2		P
	N	Mean	N	Mean	
<u>Entrance and stair</u>					
1. Steep stairs or high thresholds at entrance	112	4.5	12	4.5	.570
2. Not enough lighting at the entrance	143	4.6	13	4.4	.243
3. Door handles or door locks difficult to use	144	4.6	13	4.4	.397
4. Door need a great force to open	128	4.6	12	4.3	.273
5. Steep stairs	109	4.4	10	3.8	* .044
6. No railings or handrail on both sides of stairs	120	4.5	11	4.2	.262
7. Not enough lighting on the stairs	138	4.6	13	4.5	.644
8. No light switches at both the top and bottom of the stair	108	4.6	12	4.5	.895
<u>Bedroom</u>					
1. Not enough space to move around	142	4.4	13	4.1	.388
2. Not enough space to make the bed	138	4.3	13	3.9	.190
3. No telephone near your bed	95	4.3	12	4.1	.691
4. No lamp near your bed	104	4.5	12	4.4	.712
5. Too hard or too soft mattress	137	4.5	14	4.3	.382
6. Too much noise affecting sleep patterns	118	3.9	10	4.0	.953
<u>Bathroom</u>					
1. Not enough space to move around	134	4.3	12	4.0	.232
2. Slippery floor	128	4.2	13	4.0	.603
3. Not enough lighting	144	4.6	13	4.5	.788
4. Difficulty operating faucets	142	4.5	13	4.3	.256
5. Difficulty getting on or off the toilet	144	4.6	12	4.5	.644
6. No seat in shower	77	4.3	10	4.1	.457
<u>Kitchen</u>					
1. Not enough space to move around	141	4.2	11	3.9	.411
2. Slippery floor	126	4.3	10	3.9	.134
3. Not enough lighting	141	4.6	13	4.5	.758
4. Cabinet handles or faucet difficult to grasp	141	4.4	12	4.1	.287
5. Shelves and storage units out of reach	129	4.1	12	3.9	.583
6. Not enough space on counter or table	125	3.9	10	3.8	.788
7. No seating area for food preparation	115	3.6	10	2.7	* .042
<u>Other interior features</u>					
1. Furniture arrangements that restrict movement	125	4.0	9	3.1	* .046
2. Throw rugs that cause tripping	111	4.2	9	3.2	* .007
3. Glare from windows or bare light bulb	109	4.4	7	4.0	.274
4. Not enough natural light	115	4.4	10	3.9	.099
5. Light switches difficult to find	121	4.4	10	4.5	.966
6. Windows that are difficult to open or lock	141	4.2	12	3.2	* .002
7. Counters or furniture with sharp edges	108	4.1	9	3.2	* .032
8. Presence of insects or rodents	126	3.1	9	2.2	* .048

Note Difficulty degree: 1 = great difficulty, 5 = no difficulty
Activity level groups: group1 = more active group and group2 = less active group
* p < .05 = significant difference

Second, the four instrumental activities of daily living (IADL) were examined. The respondents were separated into (1) less active group and (2) more active group by their instrumental activity levels. The respondents who could easily perform four instrumental activities of daily living by themselves were included in the more active group (group 1) while the respondents who needed help, who could not easily perform, or who never do any instrumental activities of daily living were included in the less active group (group 2). One-way analyses of variance were performed in the first test to find a difference, but no difference were found.

The second test was conducted excluding some respondents who never did any IADL by themselves from the less active group (group 2). Some respondents could easily perform IADL by themselves, but they may have someone (family or paid help) who actually did the IADL for them. For example, the proportion who never prepared meals may have reported this because their spouse, child, or household help completed this task and had done this as a routine for many years. Their reported degree of difficulty may affect the overall results of the less active group so that their responses were excluded. Therefore, the respondents who could easily perform four IADL by themselves were included in the more active group (group 1) while the respondents who needed help or who could not easily perform any the four IADL were included in the less active group (group 2).

Mean scores of degrees of difficulty were compared between the less active group and the more active group of instrumental activities of daily living by using a one-way ANOVA and a Tukey's procedure (see Table 10). There was no difference in degree of difficulty with safety and usability features in the entrance and stairs, bedroom, bathroom, and kitchen between respondents' IADL levels. Responses of these groups indicated significant difference in the following features.

1. Not enough natural light in the home ($p = .006$).
2. Throw rugs that cause tripping ($p = .014$).
3. Windows that are difficult to open or lock ($p = .041$).

In the first item "not enough natural light in the home", 80.4% of the older adults had vision problem so adequate light is important to help older adults performing tasks such as housekeeping, preparing meal, and doing laundry. Throw rugs that

cause tripping and windows that are difficult to open or lock were found to create difficulty for the less active group of both ADL and IADL levels. From 35 safety and usability items, few were difficult for the older adults who could not easily perform IADL. In summary, the older adults who could not perform IADLs well had more difficulty with not enough natural light, throw rugs, and windows that are difficult to open or lock more than the older adults who could easily perform IADLs.

Hypothesis three. There would be a difference in the area of the home that has the most problems.

Total mean scores of five areas in the home were compared by using a one-way ANOVA and a Tukey's procedure. The five areas were the entrance and stairs, the bedroom, the bathroom, the kitchen, and other interior features. The results were presented in Table 11. Significant differences were found among the five areas. "Other interior features" was found to have the most problem (mean = 3.99); conversely, the entrance and stairs were found to have fewer problem (mean = 4.55). The "other interior features" section contained some major difficulties respondents had with interior environmental features such as presence of insects or rodents, furniture arrangements that restrict movements, counter or furniture with sharp edges, throw rugs that cause tripping, and windows that are difficult to open or lock. Therefore, the older adults should pay attention to these interior environmental features and make modifications to fit their needs.

The kitchen was found to be the room with the most problems when compared to other rooms (mean 4.13). The reported problems in the kitchen were no seating area for food preparation, not enough space on counters or tables, shelves and storage units out of reach, and not enough space to move around. From the research related to Thai older people and home accidents (Mahidol University, 1995), home accidents happened in the kitchen more than other places in the dwellings. Some respondents had already modified their bathrooms, but fewer modifications had been done in the kitchen. Kitchen modifications should be done to provide safer environments.

Table 10
One-Way ANOVA of Mean Scores of Degree of Difficulty Compared Between Two Groups of IADL Levels

Interior environmental feature	Group 1		Group 2		P
	N	Mean	N	Mean	
<u>Entrance and stair</u>					
1. Steep stairs or high thresholds at entrance	49	4.5	7	4.0	.169
2. Not enough lighting at the entrance	61	4.6	13	4.5	.695
3. Door handles or door locks difficult to use	60	4.5	13	4.5	.961
4. Door need a great force to open	51	4.5	13	4.4	.868
5. Steep stairs	44	4.3	9	3.8	.256
6. No railings or handrail on both sides of stairs	48	4.5	9	4.2	.408
7. Not enough lighting on the stairs	59	4.5	12	4.5	.743
8. No light switches at both the top and bottom of the stair	44	4.6	10	4.4	.555
<u>Bedroom</u>					
1. Not enough space to move around	61	4.3	15	4.2	.671
2. Not enough space to make the bed	58	4.1	15	4.2	.935
3. No telephone near your bed	40	4.1	12	4.5	.393
4. No lamp near your bed	42	4.5	12	4.4	.819
5. Too hard or too soft mattress	59	4.5	14	4.3	.559
6. Too much noise affecting sleep patterns	53	3.8	11	3.3	.272
<u>Bathroom</u>					
1. Not enough space to move around	55	4.3	14	4.1	.592
2. Slippery floor	53	4.2	11	3.6	.097
3. Not enough lighting	59	4.6	15	4.5	.745
4. Difficulty operating faucets	59	4.5	15	4.3	.446
5. Difficulty getting on or off the toilet	60	4.5	15	4.4	.547
6. No seat in shower	33	4.3	10	4.4	.987
<u>Kitchen</u>					
1. Not enough space to move around	60	4.1	14	4.2	.642
2. Slippery floor	54	4.2	12	4.0	.582
3. Not enough lighting	59	4.5	16	4.4	.625
4. Cabinet handles or faucet difficult to grasp	60	4.3	16	4.0	.332
5. Shelves and storage units out of reach	53	4.0	12	3.3	.068
6. Not enough space on counter or table	54	3.9	12	3.7	.719
7. No seating area for food preparation	50	3.6	12	3.2	.460
<u>Other interior features</u>					
1. Furniture arrangements that restrict movement	52	3.9	11	3.3	.185
2. Throw rugs that cause tripping	46	4.1	11	3.0	* .014
3. Glare from windows or bare light bulb	46	4.2	7	4.1	.767
4. Not enough natural light	46	4.5	9	3.4	* .006
5. Light switches difficult to find	51	4.5	10	4.3	.508
6. Windows that are difficult to open or lock	59	4.3	14	3.7	* .041
7. Counters or furniture with sharp edges	46	3.9	9	3.4	.304
8. Presence of insects or rodents	54	3.0	12	2.1	.060

Note Difficulty degree: 1 = great difficulty, 5 = no difficulty
 Activity level groups: group1 = more active group and group2 = less active group
 * p < .05 = significant difference

Table 11
One-Way ANOVA of Mean Scores of Degree of Difficulty Compared Among Areas in the Home

Area in the home	N	Mean	StDev	F	P
1. Entrance and stairs	161	4.55	.62		
2. Bedroom	160	4.32	.81		
3. Bathroom	162	4.46	.77		
4. Kitchen	160	4.13	.94		
5. Other interior features	161	3.99	.92		
				12.51	* .000

Note Difficulty degree: 1 = great difficulty, 5 = no difficulty

* p < .05 = significant difference

CHAPTER V

Summary, Conclusions, Design Recommendations, Implications, and Recommendations for Further Research

This chapter begins with a summary of this study. Then, conclusion from the findings are presented. Next, design recommendations and implications of the study are discussed. This chapter ends with recommendations for further research.

Summary

The purpose of this study was to explain the safety and usability problems in the residential interior environment of Thai older adults. The objectives of this study were: 1) to describe the demographics, housing characteristics, and health conditions of Thai older adults, 2) to describe the interior environmental features in the home that create safety and usability problems for older adults in Thailand, 3) to investigate the relationship of age and the activity level of Thai older adults with interior environment features, and 4) to make recommendations for safety and usability in the Thai older adults interior home environment. A convenience sample of 264 retired government employees who live in Bangkok, Thailand, were asked to complete the survey. A self-administered mailed survey questionnaire was developed, pretested, and revised. The questionnaire included five sections: (1) housing characteristics, (2) interior environmental features, (3) personal information, (4) health conditions, and 5) activity levels. It was sent to the 264 Thai retirees in June, 1997. A total of 163 usable responses were obtained from the first mailing and one follow-up mailing. The response rate was 68.6%. The data were analyzed using frequencies, percentage, and means as descriptive statistics and one-way analyses of variance.

The majority of the participants live in their own two-story detached houses. Most of the participants had lived in their current dwelling more than ten years. Almost half of the participants occupied three-bedroom dwellings. Only one fourth of the older adults had their own bedroom located on the first floor of the dwellings. Almost all respondents lived with their family members. The majority of the respondents had their children or their spouses living with them and received help in doing activities of daily living from their spouses, their children, or housekeepers.

The respondents consisted almost equal numbers of males and females. Their age ranged from 60 to 93 years with the mean age being 68.1 years. Around one-third of the respondents were 60 - 64 years of age. The Thai older adults had small body builds with average heights of 5' 5" in males and 5' in females. The average weights were 143 pounds for males and 123 pounds for females. Most of the respondents had vision problems. Almost one third of the respondents had back pain and difficulty bending and kneeling. Almost all respondents could easily perform the nine basic activities of daily living by themselves. More respondents experienced difficulty climbing stairs than with other basic activities of daily living. Around half of the respondents experienced difficulties or had caregivers doing instrumental activities of daily living for them (housekeeping, laundry, or preparing meals). More respondents experienced difficulties with housekeeping than with doing laundry and preparing meals.

To describe the interior environmental features in the home that create safety and usability problems for older adults in Thailand, the degree of difficulty with each feature was measured on a five-point Likert scale. Mean values for age groups and activity levels were calculated. The respondents identified the following five items as the most difficult features in their homes:

1. presence of insects or rodents;
2. no seating area in the kitchen for food preparation;
3. not enough space on counter or table in the kitchen;
4. too much noise affecting sleep patterns; and
5. furniture arrangements that restrict movement.

Some respondents had already improved their homes to fit their needs; therefore, the partial closed-ended questions were used to determine what modifications the respondent had done in their homes and what the modifications were intended. Almost half of the respondents had changed their mattresses and removed furniture that restricted their movements. Also, the modifications respondents intended to make were: installation of an air-conditioning unit in the bedroom, installation of grab bars in the bathroom, increased kitchen space, and

improved air ventilation in the bathroom. The most frequent general suggestions about safety and usability in the home from the respondents were the following:

1. the house should have enough lighting and natural light; light bulbs that save energy should be installed;
2. furniture should not restrict movements; there should be enough space for movements in the house;
3. there should be nonslip floor tiles on the bathroom floor;
4. the house should have only one floor level or fewer floor levels;
5. grab bars should be installed in the bathroom; and
6. the house should be airy and have good ventilation.

To investigate the relationships of age and the activity level of Thai older adults with interior environment features, one-way analyses of variance were used to test three research hypotheses. The first hypothesis was: there is a difference among age groups in the degree of difficulty with safety and usability features in: (a) entrance and stairs, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features. Significant differences between age groups were found in one item related to the bedroom and one item related to other interior features. The 75 year old and over group had more difficulty with the softness of the mattress than the 60 - 64 year old group. The 60 - 64 year old group had less difficulty with throw rugs than the 65 - 69 year old group.

The second hypothesis was: there is a difference in degree of difficulty with safety and usability features in (a) entrance and stairs, (b) bedroom, (c) bathroom, (d) kitchen, and (e) other interior features among activity levels. Significant differences between levels of basic activities of daily living were found in one item in the entrance and stairs section, one item in the kitchen section, and five items in the other interior feature section. The findings indicated that older adults who could not perform any one of the basic activities of daily living well had more difficulty with:

1. windows that are difficult to open or lock;
2. throw rugs that cause tripping;
3. counters or furniture with sharp edges;

4. no seating area for food preparation;
5. steep stairs;
6. furniture arrangements that restrict movements; and
7. presence of insects or rodents.

Significant differences between levels of instrumental activities of daily living were found in three items of other interior features. The findings revealed that older adults who could not perform any one of the instrumental activities of daily living well had more difficulty with:

1. not enough natural light in the home;
2. throw rugs that cause tripping; and
3. windows that are difficult to open or lock.

The findings from hypothesis three showed that the other interior features section of the survey had the most items that were safety and usability problems. When comparing rooms, the kitchen had more items that were safety and usability problems than any other room.

Conclusions

Based on the findings of the study, most retired government employees lived in their own two-story detached houses for more than ten years with their family members. These results confirmed the fact that most Thai older adults age in place; therefore, home environments play an important role in their lives. The older adults had some health problems, such as vision problems, back pain, or difficulty bending and kneeling. Their health conditions could impact their routine activities and require increased attention to the environment. Almost all Thai older adults could easily perform most basic activities of daily living by themselves. Half of the Thai older adults could do instrumental activities of daily living by themselves. Some of them experienced difficulties doing IADL. The findings showed strong family support and that most Thai older adults received help when needed in doing IADL from their family members.

Most Thai older adults did not have problems with their home environment. Most of them rated no difficulty with potential safety and usability problems in their homes. Many older adults reported that they had modified their homes to meet their

needs. Of the 35 safety and usability items, few were found to create problems for the older adults. Most problems concerned space arrangement, circulation, material and furniture selection, and lighting. Also, most older adults had the bedroom located on the second floor of the house. Safety and usability problems which Thai older adults had can be solved by making modifications; for example, move the bedroom from the second floor to the first floor, remove furniture from walkways, change bathroom floor material, add a seating area in the kitchen, or install more light fixtures in task areas. The older adults and their family members should understand what make suitable environments for the older adults and how to modify their homes to meet their needs. In addition, interior designers and home builders should provide supportive home environments for older adults from the beginning of the planning and construction process. Awareness of universal design should be increased in the residents as well as home designers, builders, and policy makers.

Design Recommendations

One of the objectives of the study was to make recommendations for safety and usability in the Thai older adult interior home environment. Since Thai dwellings have some features which differ from western dwellings, design recommendations were adapted from the residential interior environment section in the literature review to fit Thai housing and Thai older adults' needs. Based on the findings of the study, the following design recommendations should be applicable to home environments to reduce safety and usability problems for the older adult. The design recommendations consist of two parts: the first part offers design recommendations for new houses and the second part offers a list of modification recommendations for improving existing houses. Each list of recommendations includes five sections: entrance and stairs, bedroom, bathroom, kitchen, and other interior features. The following list presents design recommendations for use by interior designers in designing new dwellings for the older adult.

Entrance and stairs design recommendations

1. The riser and treads of stairs should be consistent. Avoid steep stairs.
2. Select nonslip floor material on the porch and make sure that the porch floor is not slippery when raining.

3. Use lever handles on doors.

Bedroom design recommendations

1. Provide enough space to move around in the bedroom.
2. Select materials that protect the bedroom from heat and the sun's rays from outside.
3. Provide windows on the north and south for cross ventilation throughout the bedroom.
4. Provide a vine-covered trellis outside the bedroom to block the sun, noise, and dust. Suggest that the older adult plant trees which have dense foliage to shade the bedroom.
5. Provide a telephone jack near a sleeping area.
6. Provide an alarm bell with in easy reach of the bed.

Bathroom design recommendations

1. Select nonslip floor material on the bathroom floor.
2. Separate the shower area from the toilet and the basin area. Provide a shower room or a shower door so that other areas in the bathroom will not be wet.
3. Provide grab bars in the shower area and near the toilet. Reinforce bathroom walls for installing grab bars. Grab bars should be attached firmly in appropriate height and position.
4. Locate the bathroom near the bedroom.
5. Provide a shower seat in the shower area.
6. Provide an alarm bell with in easy reach.
7. Provide a window or an exhaust fan.

Kitchen design recommendations

1. Provide a seating area in the kitchen for food preparation.
2. Provide enough space on counter or table for placing all appliances and for food preparation.
3. Provide a hood or an exhaust fan, or a chimney.
4. Provide general lighting and task lighting.

5. Provide kitchen cabinets.
6. Provide enough floor space in the kitchen.

Other interior feature design recommendations

1. Install insect screens in every room and provide termite protection.
2. Select a type of windows that is easy to open or lock such as sliding windows.
3. Select counter tops and furniture with round edges.
4. Provide enough circulation space in every room.
5. Provide general lighting, task lighting, and natural light in the house.
6. Either design the house to have only one floor level or plan a bedroom on the first floor.
7. Provide windows on the north and south for natural light and cross ventilation throughout the house.
8. Shade west walls by the porch, garage, or trees.

Modification Recommendations

This part contains modification recommendations for existing houses of the older adult. This recommendation list is based on the findings of the study. The older adults and their family members can use this list as a guideline for improving their houses to fit their needs.

Entrance and stairs modification recommendations

1. Rebuild steps if too steep. Attach handrails on both sides of stairs.
2. Put nonslip floor material on the porch and make sure that the porch floor is not slippery when raining.
3. Replace door knobs with lever-type door handles and improve door locks for easier manipulation.

Bedroom modification recommendations

1. Relocate the bedroom from the second floor to the first floor.
2. Change the mattress if needed. Mattresses should range from medium to firm. The under springing should be firm and not allow sagging.
3. Relocate or remove furniture to increase circulation space.

4. Install an electric fan or an air-conditioning unit to cool the bedroom.
5. Install more windows in the north and south to get wind.
6. Plant trees which have dense foliage or install a vine-covered trellis outside the bedroom to block sun, noise, and dust.
7. Place a telephone near the bed.
8. Install an alarm bell within easy reach.

Bathroom modification recommendations

1. Place nonslip rubber mats on the bathroom floor or change the bathroom floor tiles to nonslip floor tiles, and make sure that the bathroom floor is not slippery when wet.
2. Install a shower door so that other areas in the bathroom will not be wet when showering.
3. Add grab bars in the shower area and near the toilet. Grab bars should be attached firmly to wall studs at appropriate height and position.
4. Add an exhaust fan to increase ventilation in the bathroom.
5. Add a shower seat in the shower area.
6. Install an alarm bell within easy reach.

Kitchen modification recommendations

1. Add a seating area in the kitchen for food preparation.
2. Add more counter or table space for placing all appliances and for food preparation.
3. Install a hood or an exhaust fan, or a chimney.
4. Install more light fixtures on task areas.
5. Install more kitchen cabinets.

Other interior feature modification recommendations

1. Install insect screens and insect elimination should be done regularly and frequently.
2. Eliminate throw rugs.
3. Repair windows that do not open or close easily. Install better locking mechanisms on windows such as sliding windows.

4. Select furniture and counter tops with round edges.
5. Rearrange furniture to facilitate greater mobility. Remove furniture that restricts movement or donate unused furniture.
6. Install more windows or skylight windows on the ceiling or install glass block on walls to increase natural light in the house. Add lighting fixtures in task areas. Use light bulbs that save energy.
7. Install blinds or curtains at the window to prevent glare, noise, and dust.
8. Increase volume of door bell and telephone ringer.
9. Plant more trees, shrubs, lawns, and gardens to protect the house from dust and noise from outside.
10. Install more window on the north and south for cross ventilation throughout the house.
11. Install an exhaust fan to increase ventilation.

Implications

The findings of this study lead to the following implications for residents, designers, educators, policy makers, and researchers.

For residents. The information from this study may be useful for older adults and their family members who are buying, building, or modifying single-family detached housing. The modification recommendation list provides a guideline for home modifications for the older adults. Residential interior environments should be adapted to fit older adults' needs, health conditions, and activity levels. The information of safety and usability features in the home for the older adult should be available for both older adults and caregivers.

For designers. The findings and the design recommendation list of this study offer information about Thai older adults' needs which could be used by interior designers, architects, and builders to provide safe and suitable environments in the dwellings of the older adults and more universal features that will facilitate aging in place. The information from this study may increase awareness of special needs of the older adults in home environments.

For educators. Educators in interior design classes, gerontology classes, or housing classes may use the findings and design recommendations of this study as

information for students who study the environments for the older adult. To provide information and knowledge about suitable environments for the older adult, home modification education programs should be developed for the older adult, the caregiver, and family members. Give information about home modification and safe home environments to people before they retire so that they can prepare their dwelling for retirement. Give home modification information that matches the older adult's health conditions.

For policy makers. Most Thai do not go into institutional settings, but age in place. Thai policy makers should develop standards or design guidelines to provide safe and suitable residential environments for the older adults. Building codes should be enforced seriously. Residence inspection should be done regularly by government officers during the building process. There should be services that are brought into the homes for Thai older adults, such as home modification assistance, assistance with instrumental activities of daily living (housekeeping, doing laundry, and preparing meals), and monitoring service. Policy makers should encourage manufacturers to produce safe and usable home products for the older adult at affordable prices.

Recommendations for Further Research

Based on the findings, the following issues are recommended for additional research.

1. In order to get more exact data, the instrument should be administered using both survey questionnaire and behavioral observation.
2. Research using the person's capabilities to perform specific types of actions and postures (such as lift, carry, pull, bend, and reach) to examine the performance of home activities, instead of analyzing the performance of basic activities of daily living and instrumental activities of daily living.
3. In this study, the data were collected utilizing the convenient sampling method. To represent a larger population, a sample should be randomly selected and other groups of older adults should be surveyed to confirm the findings of the study.

4. Comparative research should be conducted on the safety and usability problems of older adults residing in single-family detached houses and other kinds of dwellings: townhouses, shophouses, and condominiums.
5. Research should be conducted in other regions of Thailand including both urban and rural areas so that the findings can be compared to Bangkok.
6. Specific rooms like the kitchen and the bathroom should be researched to determine appropriate user needs and design guidelines.
7. Further research should explore problems that influence home modifications being made.
8. To provide more useful education programs for the older adults, research should be done on the effectiveness of home modification education programs.
9. Research exploring the awareness of other family members who live with older adults on safety and usability problems in home environments should be conducted.
10. Older adults in the future may have different lifestyles from older adults in the current generation, so research on trends of modifications in future dwellings should be done.

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Appendix A
Background on Thailand

Appendix A

Background on Thailand

Thailand is situated in the heart of the Southeast Asian mainland and covers an area of 513,115 square kilometers. Thailand is about the size of the state of Texas. The country sits like a reverse comma between the Indian Ocean and the South China Sea. Thailand is a warm and rather humid tropical country. The climate is monsoonal, marked by a pronounced rainy season lasting from May to September and a relatively dry season for the remainder of the year. The average temperature is 80F to 90F.

Bangkok, the capital of Thailand, is located in the basin of the Chao Phraya River. The metropolitan area now covers some 1,537 square kilometers on both sides of the Chao Phraya River. Almost all major domestic and foreign companies are located in the capital, as are all government ministries and most of the country's leading educational, sporting, and cultural facilities. The greater part of Thailand's imports and exports pass through Bangkok and 90 per cent of the motor vehicles in the nation are registered there. It is the focal point of Thailand's aviation, railroad, and communications network, as well as the chief destination for the majority of tourists. Bangkok acts as a magnet for people from all parts of the country. They come to be educated at its schools, colleges, and universities, to find employment in its numerous factories and commercial firms. One out of ten Thais lives in Bangkok, which is 45 times bigger than Chiang Mai, the second most populous city (Office of the Prime Minister, Royal Thai Government, 1991). The registered population of Bangkok in mid 1985 was already put at 5.9 million people. But the conurbation now extends into the neighboring provinces, and by 1994 it was estimated to contain as many as 10 million people (Economist Intelligence Unit, 1996).

Appendix B

Original Survey Instrument: English Version

Survey # _____

**RESIDENTIAL INTERIOR ENVIRONMENTS
OF
THAI OLDER ADULTS**

Because of physical changes in aging, older adults may experience problems with activities of daily living. The residential interior environment can be adapted to promote safety and support human activities. Your help is appreciated in completing this questionnaire which will assist us to understand what features create safety and usability problems in the home for older adults in Thailand. If you wish to comment on any questions, please feel free to use the space in the margins. Your comments will be read and taken into account.

Conducted by: Benjamas Kutintara
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Please fill in the blank or check (X) in front of appropriate response

Housing Characteristic

1. What type of dwelling do you live in? **(Please check one)**
_____ 1) Single detached house
_____ 2) Townhouse
_____ 3) Shophouse
_____ 4) Apartment, flat or condominium
_____ 5) Other (Please describe) _____

2. Who is the owner of the dwelling in which you live?
(Please check one)
_____ 1) Yourself or your spouse
_____ 2) Your child or his/her spouse
_____ 3) Your relative
_____ 4) Rent
_____ 5) Other (Please describe) _____

3. Who lives in the house with you? **(Please check all that apply)**
_____ 1) Your spouse
_____ 2) Your child(ren)
_____ 3) Your grandchild(ren)
_____ 4) Your sibling(s)
_____ 5) Your relative(s)
_____ 6) Your in-law(s)
_____ 7) Your housekeeper(s)
_____ 8) Other (Please describe) _____

4. How many years have you lived in your current dwelling? ____ years

Interior environmental features (Please fill in the blanks)

5. How many stories does your house have? _____
6. How many bedrooms does your house have? _____
7. How many bathrooms does your house have? _____

8. Where is your bedroom in your house? **(Please check one)**
_____ 1) On the first floor
_____ 2) On the second floor
_____ 3) Other (please describe) _____

General interior environment

9. Do you have any of the following problems in your home?
(Please check all that apply)

- _____ 1) Not enough room to move around
- _____ 2) Furniture arrangement that restricts movement
- _____ 3) Slippery floors
- _____ 4) Throw rugs that cause tripping
- _____ 5) Glare from windows or bare light bulb
- _____ 6) Not enough natural light
- _____ 7) Not enough artificial lighting
- _____ 8) Light switches difficult to find
- _____ 9) Not enough electrical outlets
- _____ 10) Windows that are difficult to open or lock
- _____ 11) Counter edges with sharp edges
- _____ 12) Seating that is difficult to get in and out off
- _____ 13) Too much noise from outside the house
- _____ 14) Too much noise from inside the house
- _____ 15) Telephone difficult to use
- _____ 16) Room ventilation poor
- _____ 17) Presence of insects or rodents
- _____ 18) Other problems (Please describe)_____

10. Would you like to change anything about your home?

(Please describe)_____

Entrance and stair

11. Do you have any of the following problems with your entrances?
(Please check all that apply)

- _____ 1) Extremely narrow door openings
- _____ 2) Not enough room to move in front of doors
- _____ 3) Steep stairs at entrance
- _____ 4) Not enough lighting at the entrance
- _____ 5) Door handles difficult to use
- _____ 6) Doors need a great force to open
- _____ 7) Other problems (Please describe)_____

12. Do you have any of the following problems with the stairs in your house? (Please check all that apply)

- _____ 1) Stairs too narrow
- _____ 2) Slippery surfaces on stairs
- _____ 3) Steep stairs
- _____ 4) Irregular height stairs
- _____ 5) Steps have narrow or irregular depth
- _____ 6) Edges of stairs unclear or confusing
- _____ 7) Not enough lighting on the stairs
- _____ 8) No light switches at the top and bottom of the stairs
- _____ 9) No railings or handrail extensions
- _____ 10) Railing too high or too low
- _____ 11) Slippery handrail
- _____ 12) Difficult moving from one part of the house to another because of the presence of steps or stairs
- _____ 13) Other problems (Please describe)_____

13. Would you like to change anything about your entrances and stairs?

(Please describe)_____

Bedroom

14. Do you have any of the following problems when using the bedroom? (Please check all that apply)

- _____ 1) Not enough space to move around
- _____ 2) Not enough space to make the bed
- _____ 3) No telephone near your sleeping area
- _____ 4) No lamp near your sleeping area
- _____ 5) Lamp controls difficult to use
- _____ 6) Too high bed
- _____ 7) Too low bed
- _____ 8) Too hard mattress
- _____ 9) Too soft mattress
- _____ 10) Too much noise affecting sleep patterns
- _____ 11) Other problems (Please describe)_____

15. Would you like to change anything about your bedroom?
(Please describe) _____

Bathroom

16. Do you have any of the following problems when using the bathroom?
(Please check all that apply)

- _____ 1) Not enough space to move around
- _____ 2) Slippery floor
- _____ 3) Slippery bathtub
- _____ 4) Not enough general lighting
- _____ 5) Not enough lighting in basin or vanity area
- _____ 6) Difficult to operate shower/tub controls
- _____ 7) Difficult to get on or off the toilet
- _____ 8) Difficult to get in or out of the shower
- _____ 9) Difficult to get in or out of the tub
- _____ 10) No seat in shower or bath tub
- _____ 11) Bathroom difficult to reach because it is on another story of house
- _____ 12) Other problems (Please describe) _____

17. Would you like to change anything about your bathroom?
(Please describe) _____

Kitchen

18. Do you have any of the following problems when using the kitchen? (Please check all that apply)

- _____ 1) Not enough space to move around
- _____ 2) Slippery floor
- _____ 3) Not enough general lighting
- _____ 4) Not enough lighting over counter areas
- _____ 5) Drawer or cabinet handles difficult to grasp
- _____ 6) Shelves and storage units out of reach
- _____ 7) Shelving cannot be adjusted
- _____ 8) Kitchen appliance dials, faucets difficult to read or to operate

- _____ 9) No counter space or inadequate counter space on latch side of refrigerator
- _____ 10) Not enough counter space on each side of range
- _____ 11) Not enough counter space on each side of the sink
- _____ 12) Not enough counter space for portable appliances
- _____ 13) No seating area in the kitchen that can be used for food preparation
- _____ 14) Other problems (Please describe) _____

19. Would you like to change anything about your kitchen?
(Please describe) _____

Personal Information (Please fill in the blanks)

20. What is your gender? _____ 1) Male
_____ 2) Female

21. What is your age? _____ years old

22. What is your height? (approximately) _____ cm.

23. What is your weight? (approximately) _____ kg.

Health Conditions

24. Do you have any of the following health problems?
(Please check all that apply)

- _____ 1) Vision (wearing glasses, glare, etc.)
- _____ 2) Hearing (hard of hearing, etc.)
- _____ 3) Mobility (reliance on walking aids, etc.)
- _____ 4) Balance (Dizziness, etc.)
- _____ 5) Dexterity (arthritis, etc.)
- _____ 6) Limitations of stamina (low energy level)
- _____ 7) Difficulty bending, kneeling, etc.
- _____ 8) Sensitivity to touch, temperature
- _____ 9) Forgetfulness
- _____ 10) Insomnia
- _____ 11) Other (Please describe) _____

Appendix C
Original Survey Instrument: Thai Version



สภาพแวดล้อมภายในบ้านของผู้สูงอายุ

เมื่อเข้าสู่วัยสูงอายุ สภาพร่างกายที่เคยสมบูรณ์ก็เสื่อมถอยลง ซึ่งอาจทำให้ผู้สูงอายุประสบปัญหาในการทำกิจวัตรประจำวัน การปรับปรุงสภาพแวดล้อมภายในบ้านสามารถช่วยสร้างความปลอดภัยและช่วยส่งเสริมให้การทำกิจวัตรประจำวันของผู้สูงอายุเป็นไปอย่างราบรื่น แบบสอบถามนี้จัดทำขึ้นเพื่อต้องการทราบถึงสิ่งที่เป็นอุปสรรคในการทำกิจวัตรประจำวันและสิ่งที่จะนำมาซึ่งอุบัติเหตุภายในบ้าน ดังนั้นจึงขอความกรุณาจากท่านช่วยตอบแบบสอบถามนี้ด้วย ถ้าท่านมีข้อคิดเห็นประการใด โปรดเขียนข้อคิดเห็นของท่านลงบนที่ว่างในแบบสอบถาม

จัดทำโดย นางสาวบุญมาศ กุญอินทร์

คำตอบของท่านจะเป็นประโยชน์ต่อการป้องกันอุบัติเหตุภายในบ้านในอนาคต กรุณาตอบคำถามทุกข้อ ขอขอบพระคุณเป็นอย่างสูง กรุณาเติมคำตอบลงในช่องว่าง หรือกากบาทหน้าคำตอบ ลักษณะที่หัดอาศัย

1. ที่พักอาศัยของท่านเป็นลักษณะใด (โปรดกากบาทหน้าคำตอบ)

-1) บ้านเดี่ยว
-2) ทาวน์เฮ้าส์
-3) ตึกแถว
-4) อพาร์ทเมนต์, แฟลต หรือคอนโดมิเนียม

2. ใครเป็นเจ้าของที่พักอาศัยที่ท่านอยู่ (โปรดกากบาทหน้าคำตอบ)

-1) ตัวท่านหรือคู่สมรสของท่าน
-2) ลูก ลูกสะใภ้ หรือลูกเขย ของท่าน
-3)ญาติ
-4)เช่า
-5) บุคคลอื่น (โปรดระบุ).....

3. กรุณากากบาท (X) หน้าบุคคลทุกคนที่อยู่บ้านเดียวกับท่าน

-1) คู่สมรส
-2) ลูก
-3) หลาน
-4) พี่น้อง
-5) ญาติ
-6) เขย หรือสะใภ้
-7) ลูกจ้างช่วยงานบ้าน
-8) บุคคลอื่น ๆ (โปรดระบุ)

4. ท่านอาศัยอยู่ในที่อยู่ปัจจุบันมานานเท่าไร.....ปี

ลักษณะสภาพแวดล้อมภายในบ้าน

- 5. บ้านของท่านมีกี่ชั้นชั้น
- 6. ห้องนอนในบ้านของท่านมีกี่ห้องห้องนอน
- 7. ห้องน้ำในบ้านของท่านมีกี่ห้องห้องน้ำ
- 8. ห้องนอนของท่านอยู่ชั้นไหนในบ้าน (กากบาทหน้าคำตอบ)
 -1) ชั้นล่าง หรือชั้น 1
 -2) ชั้นบน หรือชั้น 2
 -3) ชั้นอื่น (โปรดระบุ).....

สภาพแวดล้อมทั่วไปภายในบ้าน

9. กรุณากากบาท (X) หน้าทุกปัญหาที่ท่านพบภายในบ้านของท่าน

-1) พื้นซึ่งทางเดินภายในบ้านแฉกเกินไป ทำให้เดินไม่สะดวก
-2) เครื่องเรือนกีดขวางทางเดินในบ้าน
-3) พื้นลื่น
-4) พบแมลงหรือสัตว์อื่นทำให้ระคายเคือง
-5) แสงจ้าจากหน้าต่างหรือหลอดไฟทำให้ตาพร่า
-6) ห้องมืดเพราะได้รับแสงสว่างจากหน้าต่างไม่เพียงพอ
-7) แสงไฟในบ้านมืดเกินไป
-8) หาสวิชไฟไม่เจอในที่มืด
-9) ปลั๊กไฟในบ้านมีน้อยเกินไป
-10) เปิดปิดหน้าต่างลำบาก
-11) ขอบเครื่องเรือนแหลมเป็นมุมทำให้กระแทกได้ง่าย
-12) ที่นั่งสูงหรือต่ำเกินไปทำให้ลุกนั่งลำบาก
-13) มีเสียงดังรบกวนจากภายนอกบ้าน
-14) มีเสียงดังรบกวนจากภายในบ้าน
-15) โทรศัพท์ใช้ไม่ได้ไม่สะดวก เช่น ตัวเลขเล็กเกินไป
-16) ห้องอับ อากาศไม่ถ่ายเท
-17) มีแมลง เช่น งู งู นก รบกวนภายในบ้าน
-18) ปัญหาอื่น ๆ (โปรดอธิบาย).....

10. ท่านอยากปรับปรุงอะไรในบ้าน (ส่วนห้องรับแขก, ห้องทานข้าว)

ทางเข้าออก และบันได

11. กรุณากากบาท (X) หน้าทุกปัญหาที่ท่านพบบริเวณทางเข้าออกภายในตัวบ้าน

-1) ช่องประตูแคบเกินไป
-2) พื้นหน้าประตูแคบเกินไป
-3) มีบันไดชันหรือธรณีประตูหน้าทางเข้าภายในตัวบ้าน
-4) แสงบริเวณทางเข้า-ออกมืดเกินไป
-5) เปิด-ปิดลูกบิดหรือกอนประตูไม่สะดวก
-6) ประตูหนัก ต้องใช้แรงมากในการเปิดปิด
-7) ปัญหาอื่น ๆ เกี่ยวกับทางเข้า-ออกและประตู (โปรดอธิบาย)

12. กรุณากากบาท (X) หน้าทุกปัญหาที่ท่านพบเกี่ยวกับบันไดภายในบ้าน

-1) บันไดแคบเกินไป
-2) พื้นบันไดลื่น
-3) บันไดชันเกินไป
-4) ขึ้นบันไดแล้วจะขึ้นสูงเกินไป
-5) ลูกนอนของบันไดลื่นไป วางเท้าได้ไม่พอ
-6) ขอบบันไดของกันไม่ชัด
-7) แสงไฟบริเวณบันไดมืดเกินไป
-8) ไม่มีสวิชไฟที่ส่วนบนสุดและส่วนล่างสุดของบันได
-9) ไม่มีราวบันได หรือมีราวบันไดเพียงด้านเดียว
-10) ราวบันไดสูงหรือต่ำเกินไป ทำให้จับไม่ถนัด
-11) ราวบันไดลื่น ทำให้จับไม่ติด
-12) คอ้งขึ้นลงบันไดคือไปยึดที่ต่าง ๆ ในบ้านทำให้ลำบาก
-13) ปัญหาอื่น ๆ เกี่ยวกับบันไดภายในบ้าน (โปรดอธิบาย)

13. ท่านอยากปรับปรุงอะไรในบ้านเกี่ยวกับทางเข้า-ออก ประตูและบันไดภายในบ้าน

ห้องนอน

14. กรุณา กากบาท (X) หน้าทุกปัญหาที่ท่านพบในห้องนอนของท่าน

-1) พื้นซึ่งเคยไปทำให้เดินไม่สะดวก
-2) พื้นหรือมื่อมแคบทำให้ปูหรือเก็บที่นอนลำบาก
-3) โทรศัพท์ไม่ได้วางไว้ใกล้หัวนอน
-4) ไม่มีโคมไฟที่หัวเตียง
-5) มุมเปิด-ปิดโคมไฟที่หัวนอน ไม่สะดวกในการเปิด-ปิด
-6) เตียงสูงเกินไป
-7) เตียงลื่นเกินไป
-8) ที่นอนแข็งเกินไป
-9) ที่นอนนุ่มเกินไป
-10) มีเสียงรบกวนทำให้นอนไม่หลับ
-11) ปัญหาอื่น ๆ ในห้องนอน (โปรดอธิบาย).....

15. ท่านอยากจะปรับปรุงอะไรบางอย่างในห้องนอนของท่าน

ห้องน้ำ

16. กรุณากากบาท (X) หน้าทุกปัญหาที่ท่านพบในห้องน้ำ

-1) พื้นในห้องน้ำลื่นเกินไป ทำให้ลื่นล้ม
-2) พื้นห้องน้ำลื่น
-3) พื้นอ่างอาบน้ำลื่น
-4) แสงไฟในห้องน้ำมืดเกินไป
-5) แสงไฟที่อ่างล้างหน้ามืดเกินไป
-6) ก๊อกน้ำหมุนเปิดปิดลำบาก
-7) ลูก-นั่งจากโถส้วมลำบาก
-8) เข้าออกจากส่วนอาบน้ำฝักบัวลำบาก
-9) เข้าออกจากอ่างอาบน้ำลำบาก
-10) ไม่มีที่นั่งในบริเวณอาบน้ำฝักบัวหรืออ่างอาบน้ำ
-11) ไปห้องน้ำไม่สะดวกเพราะห้องน้ำอยู่ไกล
-12) ปัญหาอื่น ๆ ในห้องน้ำ (โปรดอธิบาย).....

17. ท่านอยากจะปรับปรุงอะไรบางอย่างในห้องน้ำของท่าน

ห้องครัว

18. กรุณากากบาท (X) หน้าทุกปัญหาที่ท่านพบในครัว

-1) พื้นในครัวลื่นเกินไป ทำให้ลื่นล้ม
-2) พื้นห้องครัวลื่น
-3) แสงในห้องครัวมืดเกินไป
-4) แสงในส่วนเตรียมปรุงอาหารมืดเกินไป
-5) มือจับตู้ในครัวจับไม่สะดวก
-6) ตู้ในครัวสูงเกินเอื้อม
-7) ชั้นครัวปรับระดับความสูงไม่ได้
-8) ตัวเลขและปุ่มเปิด-ปิดเครื่องใช้ไฟฟ้าอ่านยาก และเปิดปิดลำบาก

-9) พื้นที่เตรียมอาหารข้างตู้เย็นลื่นเกินไปหรือไม่มีเลข
-10) พื้นที่เตรียมอาหารข้างเตาลื่นเกินไป
-11) พื้นที่เตรียมอาหารข้างอ่างล้างจานลื่นเกินไป
-12) พื้นที่ยางเครื่องใช้ไฟฟ้า (เช่น หม้อหุงข้าว) ไม่เพียงพอ
-13) ไม่มีที่นั่งในครัวที่ใช้งานเตรียมอาหารได้
-14) ปัญหาอื่น ๆ ในห้องครัว (โปรดอธิบาย).....

19. ท่านอยากจะปรับปรุงอะไรบางอย่างในห้องครัวของท่าน

ข้อมูลเกี่ยวกับตัวท่าน (กรุณาเติมคำตอบลงในช่องว่าง)

- 20. โปรดระบุเพศของท่าน1) ชาย
.....2) หญิง
- 21. ท่านอายุกี่ปี.....ปี
- 22. ท่านมีความสูงเท่าไร (โดยประมาณ).....เซ็นติเมตร
- 23. ท่านมีน้ำหนักเท่าไร (โดยประมาณ).....กิโลกรัม

สุขภาพ

24. กรุณากากบาท (X) หน้าทุกข้อที่เป็นปัญหาสุขภาพของท่าน

-1) สายตา (สวมแว่นตา, ตาพร่า)
-2) การได้ยิน
-3) เดินไม่สะดวก
-4) การทรงตัว
-5) การหยิบจับ
-6) ไม่มีแรง
-7) ก้ม, ผาย, ลูก-นั่งไม่ถนัด
-8) ศีรษะบางเป็นแผลง่าย
-9) หงุดหงิด
-10) นอนไม่หลับ
-11) ปัญหาสุขภาพอื่น ๆ (โปรดอธิบาย).....

25. กรุณากากบาท (X) หน้าทุกข้อที่เป็นอุปกรณ์ช่วยในการเดินที่ท่านใช้
-1) ไม่ทำ
-2) เครื่องช่วยเดิน (walker)
-3) รถเข็น
-4) ไม้ผู้สูงอายุทรงงู
-5) ไม้ค้ำช่วยผู้พิการช่วยในการเดิน
-6) ใช้อุปกรณ์แบบอื่น (โปรดระบุ).....

กิจวัตรประจำวัน

26. ท่านมีกิจวัตรประจำวันใดหรือไมที่ท่านเคยทำ แล้วต้องเลิกทำ เนื่องจากปัญหาสุขภาพของท่าน
-1) ไม่มี
-2) มี (กรุณานอกปัญหาสุขภาพและกิจกรรมที่เลิกทำ)

27. ท่านสามารถทำกิจวัตรประจำวันเหล่านี้ได้เพียงใด (กรุณากากบาท (X) ในช่องว่าง)

	ต้องไม่ ผู้อื่นช่วย	ทำได้เอง แค่ลำบาก	ทำได้ดี ด้วยตนเอง	ไม่ต้องทำ กิจวัตรนี้
1) ตาข่าย
2) แต่งตัว
3) ลูก-นั่งจากโถส้วม
4) รับประทานอาหาร
5) ลูก-นั่งจากเตียง
6) ลูก-นั่งจากเก้าอี้
7) ลูก-นั่งจากโซฟา
8) เดินไปมาภายในบ้าน
9) เดิน
10) ขึ้น-ลงบันได
11) ใช้โทรศัพท์
12) ทำอาหาร
13) นึกความคิดตัดสินใจ
14) ซักผ้า
15) อื่น ๆ (โปรดระบุ)

28. ใครช่วยท่านเมื่อท่านต้องการความช่วยเหลือในการทำกิจวัตรประจำวัน

29. กรุณาเขียนความคิดเห็นอื่น ๆ ของท่านเกี่ยวกับการป้องกันอุบัติเหตุและ
การสร้างความปลอดภัยภายในบ้าน

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ขอพระคุณเป็นอย่างยิ่งที่ท่านสละเวลาตอบแบบสอบถามนี้ ถ้า
ท่านต้องการทราบข้อสรุปของการทำวิจัยนี้ โปรดเขียนชื่อ และที่อยู่ของท่าน
ลงบนด้านหลังของซองที่แนบมาด้วย

เมื่อท่านทำแบบสอบถามเสร็จ กรุณาส่งกลับคืนในซองที่แนบมา
ภายในวันที่ 22 เมษายน 2540

ขอพระคุณ

นางสาวเบญจมาศ ภูอินทร์

4/039 เมืองทอง I แจ้งวัฒนะ

ดอนเมือง กทม. 10210

Appendix D
Revised Survey Instrument: English Version

Survey # _____



**RESIDENTIAL INTERIOR ENVIRONMENTS
OF
THAI OLDER ADULTS**

Because of physical changes in aging, older adults may experience problems with activities of daily living. The residential interior environment can be adapted to promote safety and support human activities. Your help is appreciated in completing this questionnaire which will assist us to understand what features create safety and usability problems in the home for older adults in Thailand. If you wish to comment on any questions, please feel free to use the space in the margins. Your comments will be read and taken into account.

Conducted by: Benjamas Kutintara
Department of Housing, Interior Design and Resource Management
Virginia Polytechnic Institute and State University
Blacksburg, Virginia, USA

Please mark with a check (X) in the space in front of the appropriate responses.

1. What type of dwelling do you live in? **(Please check one)**

- 1) Single detached house
- 2) Townhouse
- 3) Shophouse
- 4) Apartment, flat or condominium
- 5) Other (Please describe) _____

2. Who is the owner of the dwelling in which you live? **(Please check one)**

- 1) Yourself or your spouse
- 2) Your child or his/her spouse
- 3) Your relative
- 4) Rent
- 5) Other (Please describe) _____

3. Who lives in the house with you? **(Please check all that apply)**

- 1) Your spouse
- 2) Your child(ren)
- 3) Your grandchild(ren)
- 4) Your sibling(s)
- 5) Your relative(s)
- 6) Your in-law(s)
- 7) Your housekeeper(s) or helper(s)
- 8) Other (Please describe) _____

Interior Environmental Features (Please fill in the blanks)

4. How many years have you lived in your current dwelling? _____ years

5. How many stories does your house have? _____

6. How many bedrooms does your house have? _____

7. How many bathrooms does your house have? _____

8. Where is your bedroom in your house? **(Please check one)**

- 1) On the first floor
- 2) On the second floor
- 3) Other (Please describe) _____

Entrance and Stair

9. How much difficulty do you have with the following features in your entrances and stairs? (**Please circle the appropriate level. 1 = Great difficulty, 5 = No difficulty, N/A = No applicable to my housing.**)

	Great difficulty			No difficulty		N/A
1) Steep stairs or high thresholds at entrance	1	2	3	4	5	_____
2) Not enough lighting at the entrance	1	2	3	4	5	_____
3) Door handles or door locks difficult to use	1	2	3	4	5	_____
4) Doors need a great force to open	1	2	3	4	5	_____
5) Steep stairs	1	2	3	4	5	_____
6) No railings or handrail on both sides of stairs	1	2	3	4	5	_____
7) Not enough lighting on the stairs	1	2	3	4	5	_____
8) No light switches at both the top & bottom of the stairs	1	2	3	4	5	_____

10. Do you have any difficulty using your entrances and stairs? (**Please describe**)

11. Have you ever improved anything in your entrances & stairs? (**Please check all that apply**)

- _____ 1) Changed door handles or door locks
 - _____ 2) Installed more light fixtures
 - _____ 3) Installed handrails
 - _____ 4) Other improvements (Please describe) _____
-

12. Would you like to change anything about your entrance and stairs? (**Please describe**) _____

Bedroom

13. How much difficulty do you have with the following features in your bedroom? (**Please circle the appropriate level. 1 = Great difficulty, 5 = No difficulty, N/A = No applicable to my housing.**)

	Great difficulty			No difficulty		N/A
1) Not enough space to move around	1	2	3	4	5	_____
2) Not enough space to make the bed	1	2	3	4	5	_____
3) No telephone near your bed	1	2	3	4	5	_____
4) No lamp near your bed	1	2	3	4	5	_____
5) Too hard or too soft mattress	1	2	3	4	5	_____
6) Too much noise affecting sleep patterns	1	2	3	4	5	_____

14. Do you have any difficulty using your bedroom? **(Please describe)** _____

15. Have you ever improved anything in your bedroom to fit your need? **(Please check all that apply)** _____ 1) Placed a telephone near your sleeping area
_____ 2) Changed the mattress
_____ 3) Installed more light fixtures
_____ 4) Other improvements (Please describe) _____

16. Would you like to change anything about your bedroom? **(Please describe)**

Bathroom.

17. How much difficulty do you have with the following features in your bathroom? **(Please circle the appropriate level. 1 = Great difficulty, 5 = No difficulty, N/A = No applicable to my housing.)**

	Great difficulty			No difficulty		N/A
1) Not enough space to move around	1	2	3	4	5	_____
2) Slippery floor	1	2	3	4	5	_____
3) Not enough lighting	1	2	3	4	5	_____
4) Difficulty operating faucets	1	2	3	4	5	_____
5) Difficulty getting on or off the toilet	1	2	3	4	5	_____
6) No seat in shower	1	2	3	4	5	_____

18. Do you have any difficulty with your bathroom? **(Please describe)** _____

19. Have you ever improved anything in your bathroom to fit your needs? **(Please check all that apply)** _____ 1) Installed grab bars
_____ 2) Changed bathroom floor tile
_____ 3) Added a shower seat
_____ 4) Other improvements (please describe) _____

20. Would you like to change anything about your bathroom? **(Please describe)**

Kitchen.

21. How much difficulty do you have with the following features in your kitchen?
(Please circle the appropriate level 1 = Great difficulty, 5 = No difficulty, N/A =
No applicable to my housing.)

	Great difficulty			No difficulty		N/A
1) Not enough space to move around	1	2	3	4	5	_____
2) Slippery floor	1	2	3	4	5	_____
3) Not enough lighting	1	2	3	4	5	_____
4) Cabinet handles or faucet difficult to grasp	1	2	3	4	5	_____
5) Shelves and storage units out of reach	1	2	3	4	5	_____
6) Not enough space on counter or table	1	2	3	4	5	_____
7) No seating area for food preparation	1	2	3	4	5	_____

22. Do you have any difficulty using your kitchen? (Please describe) _____

23. Have you ever improved anything in your kitchen to fit your needs? (Please check all that apply)

- _____ 1) Increased amount of table or counter space
- _____ 2) Added a seating area
- _____ 3) Installed more light fixtures
- _____ 4) Other improvements (please describe) _____

24. Would you like to change anything about your kitchen? (Please describe)

Other interior features

25. How much difficulty do you have with the following features in your home?
(Please circle the appropriate level 1 = Great difficulty, 5 = No difficulty, N/A =
No applicable to my housing.)

	Great difficulty			No difficulty		N/A
1) Furniture arrangements that restrict movement	1	2	3	4	5	_____
2) Throw rugs that cause tripping	1	2	3	4	5	_____
3) Glare from windows or bare light bulb	1	2	3	4	5	_____
4) Not enough natural light	1	2	3	4	5	_____
5) Light switches difficult to find	1	2	3	4	5	_____
6) Windows that are difficult to open or lock	1	2	3	4	5	_____
7) Counters or furniture with sharp edges	1	2	3	4	5	_____
8) Presence of insects or rodents	1	2	3	4	5	_____

26. Do you have any difficulty in other interior features in your home? (**Please describe**) _____

27. Have you ever improved any other interior features in your home? (**Please check all that apply**) _____

- _____ 1) Removed furniture that restricts movement
- _____ 2) Installed blind or curtain at windows
- _____ 3) Increased door bell sound or telephone bell sound
- _____ 4) Other improvements (please describe) _____

28. Would you like to change anything about the general interior in your home? (**Please describe**) _____

Personal Information (**Please fill in the blanks**)

29. What is your gender?

- _____ 1) Male
- _____ 2) Female

30. What is your age? _____ years old

31. What is your height? (approximately) _____ cm.

32. What is your weight? (approximately) _____ kg.

Health condition

33. Do you have any problems with the following? (**Please check all that apply**)

- _____ 1) Vision (wearing glasses, cataract, glare, etc.)
- _____ 2) Hearing (hard of hearing, using hearing aid, etc.)
- _____ 3) Mobility or reliance on walking aids
- _____ 4) Balance (Dizziness, etc.)
- _____ 5) Dexterity (arthritis, difficulty in grasping, twisting the wrist, etc.)
- _____ 6) Limitations of stamina (low energy level)
- _____ 7) Difficulty bending, kneeling, etc.
- _____ 8) Sensitivity to touch, temperature
- _____ 9) Back pain
- _____ 10) Insomnia
- _____ 11) Other (please describe) _____

34. Do you need any of the following types of assistance to move around the house?

(Please check all that apply)

- _____ 1) Cane
- _____ 2) Walker
- _____ 3) Wheelchair
- _____ 4) Another person
- _____ 5) Other (Please describe) _____

Activities

35. Have you had to give up any activities that you used to do because of your health?

- _____ 1) No
 - _____ 2) Yes (Please describe activities & your health problems) _____
-

36. How well can you perform the following household and personal care tasks?

(Please check X)

	Only with help	By myself, but it is not easy	Easily by myself	Never do this task
1) Taking a shower	_____	_____	_____	_____
2) Dressing	_____	_____	_____	_____
3) Using the toilet	_____	_____	_____	_____
4) Feeding yourself	_____	_____	_____	_____
5) Transferring from a bed	_____	_____	_____	_____
6) Transferring from a dining chair	_____	_____	_____	_____
7) Transferring from a sofa	_____	_____	_____	_____
8) Walking	_____	_____	_____	_____
9) Climbing stairs	_____	_____	_____	_____
10) Using telephone	_____	_____	_____	_____
11) Preparing meal	_____	_____	_____	_____
12) Housekeeping	_____	_____	_____	_____
13) Laundry	_____	_____	_____	_____
14) Other _____	_____	_____	_____	_____

37. Who helps you with these household personal care task when needed? **(Please**

check all that apply)

- _____ 1) Your spouse
- _____ 2) Your child(ren)
- _____ 3) Your grandchild(ren)
- _____ 4) Your relative(s)
- _____ 6) Your in-law(s)
- _____ 7) Your helper(s) or housekeeper(s)
- _____ 8) Other (Please describe) _____

38. Please make other comments or suggestions that will help to improve safety in the dwelling of Thai older adults. **(Please describe)**

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Your time and effort is greatly appreciated. If you would like a summary of results, please write your name and address on the back of the return envelope (not on this questionnaire).

Please mail this survey back in the enclosed envelope by June 30
THANK YOU VERY MUCH

Benjamas Kutintara
4/039 Maungthong 1 Cheangwattana 14
Donmaung, Bangkok 10210

Appendix E
Revised Survey Instrument: Thai Version

สภาพแวดล้อมภายในบ้านของผู้สูงอายุ

เมื่อเข้าสู่วัยสูงอายุ สภาพร่างกายที่เสื่อมลงก็เสื่อมด้อยลง ซึ่งอาจทำให้ผู้สูงอายุประสบปัญหาในการทำกิจวัตรประจำวัน การปรับปรุงสภาพแวดล้อมภายในบ้านสามารถช่วยสร้างความปลอดภัยและช่วยส่งเสริมให้การทำกิจวัตรประจำวันของผู้สูงอายุเป็นไปอย่างราบรื่น แบบสอบถามนี้จัดทำขึ้นเพื่อต้องการทราบถึงสิ่งที่เป็นอุปสรรคในการทำกิจวัตรประจำวันและสิ่งที่จะนำมาซึ่งอุบัติเหตุภายในบ้าน ดังนั้นจึงขอความกรุณาจากท่านช่วยตอบแบบสอบถาม ถ้าท่านมีข้อคิดเห็นประการใด โปรดเขียนข้อคิดเห็นของท่านลงบนที่ว่างในแบบสอบถามนี้ด้วย

จัดทำโดย นางสาวเบญจมาศ กุญชรินทร์
แบบสอบถามนี้เป็นส่วนหนึ่งของการทำวิทยานิพนธ์
เรื่องสภาพแวดล้อมภายในบ้านของผู้สูงอายุไทย

คำตอบของท่านจะเป็นประโยชน์ต่อการป้องกันอุบัติเหตุภายในบ้านในอนาคต กรุณาตอบคำถามทุกข้อ
กรุณาเติมคำตอบลงในช่องว่าง ภาคบาท หรือ วงกลมหน้าคำตอบ

1. ที่พักอาศัยของท่านเป็นลักษณะใด (โปรดกากบาทหน้าคำตอบ)

.....1) บ้านเดี่ยว

.....2) ทาวน์เฮาส์

.....3) ตึกแถว

.....4) อพาร์ทเมนท์, แฟลต หรือ คอนโดมิเนียม

.....5) ที่พักอาศัยลักษณะอื่น (โปรดระบุ).....

2. ใครเป็นเจ้าของที่พักอาศัยที่ท่านอยู่ (โปรดกากบาทหน้าคำตอบ)

.....1) ตัวท่านหรือคู่สมรสของท่าน

.....2) ลูก ลูกสะใภ้ หรือลูกเขย ของท่าน

.....3)ญาติ

.....4)เช่า

.....5) บุคคลอื่น (โปรดระบุ).....

3. กรุณากากบาท (X) หน้าบุคคลทุกคนที่อยู่บ้านเดียวกับท่าน

.....1) คู่สมรส

.....2) ลูก

.....3) หลาน

.....4) พี่น้อง

.....5) ญาติ

.....6) เขย หรือสะใภ้

.....7) ลูกจ้างช่วยงานบ้าน

.....8) บุคคลอื่น ๆ (โปรดระบุ).....

4. ท่านอาศัยอยู่ในที่อยู่ปัจจุบันมานานเท่าไร.....ปี

ลักษณะสภาพแวดล้อมภายในบ้าน

5. บ้านของท่านมีกี่ชั้นชั้น

6. บ้านของท่านมีห้องนอนกี่ห้องห้องนอน

7. บ้านของท่านมีห้องน้ำกี่ห้องห้องน้ำ

8. ห้องนอนของท่านอยู่ชั้นไหนในบ้าน (กากบาทหน้าคำตอบ)

.....1) ชั้นล่าง หรือชั้น 1

.....2) ชั้นบน หรือชั้น 2

.....3) ชั้นอื่น (โปรดระบุ).....

ทางเข้าออกและบันได

9. ท่านพบความไม่สะดวกมากน้อยเพียงใดบริเวณทางเข้าตัวบ้านและบันไดในบ้านของท่าน
โปรดวงกลมที่หมายเลขที่ตรงกับระดับความคิดเห็นของท่าน เช่น 1 หมายถึง ไม่สะดวก, 5 หมายถึง
สะดวก

ตัวอย่าง	ไม่สะดวก	สะดวก	บ้านไม่มี ส่วนที่ถาม
0) ความกว้างของช่องประตูเข้าตัวบ้าน ถ้าท่านคิดว่าความกว้างของช่องประตูเข้าตัวบ้านของท่านแคบเกินไป ทำให้ค่อนข้างไม่สะดวกเมื่อ เดินผ่าน ก็ให้วงกลมที่หมายเลข 2	1	2	3 4 5

	ไม่สะดวก	สะดวก	บ้านไม่มี ส่วนที่ถาม
1) หน้าทางเข้าภายในตัวบ้านมีบันไดชันหรือธรณีประตู	1	2 3 4 5	.....
2) แสงสว่างบริเวณทางเข้าภายในตัวบ้าน	1	2 3 4 5	.....
3) การเปิด-ปิดลูกบิดหรือกลอนประตู	1	2 3 4 5	.....
4) ประตูหนัก ต้องใช้แรงมากในการเปิดปิด	1	2 3 4 5	.....
5) บันไดชัน	1	2 3 4 5	.....
6) ไม่มีราวบันไดทั้งสองข้าง หรือมีราวบันไดเพียงข้างเดียว	1	2 3 4 5	.....
7) แสงสว่างบริเวณบันได	1	2 3 4 5	.....
8) ไม่มีสวิทซ์ไฟบริเวณบันไดที่เปิดไฟจากทั้งชั้นล่างและชั้นบน	1	2 3 4 5	.....
10. โปรดอธิบายความไม่สะดวกอื่น ๆ ที่ท่านพบเกี่ยวกับทางเข้าตัวบ้าน และบันไดในบ้าน.....			

11. กากบาท (X) หน้าทุกสิ่งที่ท่านเคยปรับปรุงเกี่ยวกับทางเข้าตัวบ้าน และบันไดในบ้าน
-1) เปลี่ยนลูกบิดหรือกลอนประตูให้เปิดปิดได้ง่ายขึ้น
 -2) ติดไฟเพิ่มเพื่อให้บันไดสว่างขึ้น
 -3) ติดราวบันไดเพิ่ม
 -4) ปรับปรุงสิ่งอื่น ๆ (โปรดอธิบาย).....

12. ท่านอยากปรับปรุงสิ่งอื่นใดอีกบ้างเกี่ยวกับทางเข้าตัวบ้าน และบันไดภายในบ้าน (โปรดอธิบาย)

.....
.....

ห้องนอน

13. ท่านพบความไม่สะดวกมากน้อยเพียงใดในห้องนอนของท่าน

โปรดวงกลมที่หมายเลขที่ตรงกับระดับความคิดเห็นของท่าน เช่น 1 หมายถึง ไม่สะดวก, 5 หมายถึง สะดวก

	ไม่สะดวก		สะดวก			บ้านไม่มี ส่วนที่ถาม
1) ความกว้างของพื้นที่ทางเดินในห้องนอน	1	2	3	4	5	.....
2) การใช้พื้นที่บริเวณรอบเตียงเพื่อปูหรือเก็บที่นอน	1	2	3	4	5	.....
3) การใช้โทรศัพท์ในห้องนอน	1	2	3	4	5	.....
4) การใช้คอมพิวเตอร์ที่หัวเตียง	1	2	3	4	5	.....
5) ความแข็งหรือนุ่มของที่นอน	1	2	3	4	5	.....
6) มีเสียงรบกวนจากภายนอกเข้ามาในห้องนอน	1	2	3	4	5	.....

14. โปรดอธิบายความไม่สะดวกอื่น ๆ ที่ท่านพบในห้องนอน.....

.....

15. กากบาท (X) หน้าทุกสิ่งที่ท่านเคยปรับปรุงในห้องนอนของท่าน

.....1) วางโทรศัพท์ไว้ใกล้หัวนอน

.....2) เปลี่ยนที่นอนให้มีความนุ่มหรือแข็งพอเหมาะ

.....3) ติดไฟเพิ่มให้สว่างขึ้น

.....4) ปรับปรุงสิ่งอื่น ๆ (โปรดอธิบาย).....

.....

16. ท่านอยากปรับปรุงสิ่งอื่นใดอีกบ้างในห้องนอนของท่าน (โปรดอธิบาย).....

.....
.....

ห้องน้ำ

17. ท่านพบความไม่สะดวกมากน้อยเพียงใดในห้องน้ำของท่าน

โปรดวงกลมที่หมายเลขที่ตรงกับระดับความคิดเห็นของท่าน เช่น 1 หมายถึง ไม่สะดวก, 5 หมายถึง สะดวก

	ไม่สะดวก		สะดวก			บ้านไม่มี ส่วนที่ถาม
1) พื้นในห้องน้ำแคบ	1	2	3	4	5	.....
2) ความชื้นของพื้นห้องน้ำ	1	2	3	4	5	.....
3) แสงสว่างในห้องน้ำ	1	2	3	4	5	.....
4) การเปิด-ปิดก๊อกน้ำ	1	2	3	4	5	.....
5) การดู-นั่งจากโถส้วม	1	2	3	4	5	.....
6) การไขที่นั่งขณะอาบน้ำ	1	2	3	4	5	.....

18. โปรดอธิบายความไม่สะดวกอื่น ๆ ที่ท่านพบในห้องน้ำ.....
.....

19. ภาคนาบท (X) หน้าที่ทุกสิ่งที่ท่านเคยปรับปรุงเกี่ยวกับห้องน้ำ

-1) คิดรวจับในห้องน้ำ
 -2) เปลี่ยนกระเบื้องปูพื้นในห้องน้ำเป็นแบบกันลื่น
 -3) จัดให้มีที่นั่งอาบน้ำในห้องน้ำ
 -4) ปรับปรุงสิ่งอื่น ๆ (โปรดอธิบาย).....
-

20. ท่านอยากปรับปรุงสิ่งอื่นใดอีกบ้างในห้องน้ำ (โปรดอธิบาย).....
.....
.....

ห้องครัว

21. ท่านพบความไม่สะดวกมากน้อยเพียงใดในห้องครัวของท่าน

โปรดวงกลมที่หมายเลขที่ตรงกับระดับความคิดเห็นของท่าน เช่น 1 หมายถึง ไม่สะดวก, 5 หมายถึง สะดวก

	ไม่สะดวก		สะดวก			บ้านไม่มี ส่วนที่ถาม
1) ความกว้างของทางเดินในห้องครัว	1	2	3	4	5	.....
2) ความร้อนของพื้นห้องครัว	1	2	3	4	5	.....
3) แสงสว่างในห้องครัว	1	2	3	4	5	.....
4) การเปิด-ปิดตู้ในครัว	1	2	3	4	5	.....
5) การเอื้อมหยิบของจากตู้สูงในครัว	1	2	3	4	5	.....
6) ขนาดพื้นที่เตรียมอาหารบนโต๊ะหรือเคาน์เตอร์แคบ	1	2	3	4	5	.....
7) ไม่มีที่นั่งในครัวที่ไ่มั่งเตรียมอาหารได้	1	2	3	4	5	.....

22. โปรดอธิบายความไม่สะดวกอื่น ๆ ที่ท่านพบในห้องครัว.....

23. กากบาท (X) หน้าทุกสิ่งที่ท่านเคยปรับปรุงเกี่ยวกับห้องครัว

.....1) เพิ่มพื้นที่เตรียมอาหารบนโต๊ะ หรือ เคาน์เตอร์

.....2) จัดที่นั่งเตรียมอาหารในครัว

.....3) ติดไฟเพิ่มเพื่อให้ห้องครัวสว่างขึ้น

.....4) ปรับปรุงสิ่งอื่น ๆ (โปรดอธิบาย).....

20. ท่านอยากปรับปรุงสิ่งอื่นใดอีกบ้างในห้องครัว (โปรดอธิบาย).....

ส่วนอื่น ๆ ภายในบ้าน

25. ท่านพบความไม่สะดวกมากน้อยเพียงใดกับส่วนอื่น ๆ ในบ้านของท่าน

โปรดวงกลมที่หมายเลขที่ตรงกับระดับความคิดเห็นของท่าน เช่น 1 หมายถึง ไม่สะดวก, 5 หมายถึง สะดวก

	ไม่สะดวก		สะดวก			บ้านไม่มี ส่วนที่ถาม
	1	2	3	4	5	.....
1) เครื่องเรือนกีดขวางทางเดินในบ้าน	1	2	3	4	5	.....
2) พรมหรือผ้าเช็ดเท้าทำให้สะดุดหกล้ม	1	2	3	4	5	.....
3) แสงจ้าจากหน้าต่างหรือหลอดไฟทำให้ตาพร่า	1	2	3	4	5	.....
4) ห้องมืดเพราะ ได้รับแสงสว่างจากหน้าต่างไม่เพียงพอ	1	2	3	4	5	.....
5) หาสวิทช์ไฟไม่เจอในที่มืด	1	2	3	4	5	.....
6) การเปิด-ปิดหน้าต่าง	1	2	3	4	5	.....
7) ขอบเครื่องเรือนแหลมเป็นมุมอาจกระแทกหรือเฉไฉโดน	1	2	3	4	5	.....
8) มีแมลง เช่น ผึ้ง มด รบกวนภายในบ้าน	1	2	3	4	5	.....

26. โปรดอธิบายความไม่สะดวกอื่น ๆ ที่ท่านพบในส่วนอื่น ๆ ของบ้าน

.....

27. กรุณากากบาท (X) หน้าทุกสิ่งที่ท่านเคยปรับปรุงในส่วนอื่น ๆ ของบ้าน

.....1) ย้ายเครื่องเรือนไม่ให้กีดขวางทางเดิน

.....2) ดึงมู่ลี่หรือม่านกรองแสงจ้าจากหน้าต่าง

.....3) เพิ่มเสียงกริ่งที่ประตูบ้านหรือกริ่งโทรศัพท์ให้ดังฟังชัดขึ้น

.....4) ปรับปรุงสิ่งอื่น ๆ (โปรดอธิบาย).....

.....

28. ท่านอยากปรับปรุงสิ่งอื่นใดอีกบ้างในส่วนอื่น ๆ ของบ้าน (โปรดอธิบาย).....

.....

.....

ข้อมูลเกี่ยวกับตัวท่าน (กรุณาเติมคำตอบลงในช่องว่าง)

29. โปรดระบุเพศของท่าน1) ชาย

.....2) หญิง

30. ท่านอายุกี่ปี.....ปี

31. ท่านมีความสูงเท่าไร (โดยประมาณ).....เซ็นติเมตร

32. ท่านมีน้ำหนักเท่าไร (โดยประมาณ).....กิโลกรัม

สุขภาพ

33. กรุณากากบาท (X) หน้าทุกข้อที่เป็นปัญหาสุขภาพของท่าน

.....1) สายตา (สวมแว่นตา, คาพราหลังมองแสงจ้า, ต้อกระจก, ฯลฯ)

.....2) การได้ยิน (ใช้เครื่องช่วยฟัง, ได้ยินไม่ถนัด, ฯลฯ)

.....3) เดินไม่สะดวก หรือ ใช้เครื่องช่วยเดิน

.....4) การทรงตัว (หน้ามืด, เวียนหัว, ฯลฯ)

.....5) การหยิบจับไม่ถนัด

.....6) ไม่มีแรง

.....7) ก้ม, เงย, ลุก-นั่งไม่ถนัด, งอเข่าไม่สะดวก

.....8) สิวหนังบาง, แผลง่าย

.....9) ปวดหลัง

.....10) นอนไม่หลับ

.....11) ปัญหาสุขภาพอื่น ๆ (โปรดอธิบาย).....

34. กรุณากากบาท (X) หน้าทุกข้อที่เป็นอุปกรณ์ช่วยในการเดินที่ท่านใช้

.....1) ไม่ต้องใช้อุปกรณ์ช่วยในการเดิน

.....2) ไม่ทำ

.....3) เครื่องช่วยพยุงเดิน (walker)

.....4) รถเข็น

.....5) ให้ผู้อื่นช่วยพยุงเดิน

.....6) ใช้อุปกรณ์แบบอื่น (โปรดระบุ).....

กิจวัตรประจำวัน

35. ท่านมีกิจวัตรประจำวันใดที่ท่านเคยทำ แล้วต้องเลิกทำเนื่องจากปัญหาสุขภาพของท่าน

.....1) ไม่มี

.....2) มี (กรุณายกปัญหาสุขภาพและกิจวัตรที่เลิกทำ).....

36. ท่านสามารถทำกิจวัตรประจำวันเหล่านี้ได้เพียงใด (กรุณากากบาทในช่องว่าง)

	ต้องให้ ผู้อื่นช่วย	ทำได้เอง แต่ลำบาก	ทำได้ดี ด้วยตนเอง	ไม่ต้องทำ กิจวัตรนี้
1) อาบน้ำ
2) แต่งตัว
3) ลุก-นั่งจากโถส้วม
4) รับประทานอาหาร
5) ลุก-นั่งจากเตียง
6) ลุก-นั่งจากเก้าอี้ของโต๊ะอาหาร
7) ลุก-นั่งจากโซฟา
8) เดิน
9) ขึ้น-ลงบันได
10) ใช้โทรศัพท์
11) ทำอาหาร
12) บิดกวาดเช็ดถูบ้าน
13) ซักผ้า
14) อื่น ๆ (โปรดระบุ).....

37 ใครช่วยท่านเมื่อท่านต้องการความช่วยเหลือ ในการทำกิจวัตรประจำวัน

.....1) คู่สมรส

.....2) ลูก

.....3) หลาน

.....4) พี่น้อง

.....5) ญาติ

.....6) เจอ หรือสะโง่

.....7) ลูกจ้าง

.....8) บุคคลอื่น ๆ (โปรดระบุ).....

38. กรุณาเขียนความคิดเห็นอื่น ๆ ของท่านเกี่ยวกับการป้องกันอุบัติเหตุและการสร้างความปลอดภัย
ภายในบ้าน

ขอขอบคุณเป็นอย่างยิ่งที่ท่านสละเวลาตอบแบบสอบถามนี้ ถ้าท่านต้องการทราบข้อสรุปของการวิจัย
นี้ โปรดเขียนชื่อ และที่อยู่ของท่านลงบนด้านหลังของซองที่แนบมาด้วย

เมื่อท่านทำแบบสอบถามเสร็จ กรุณาส่งกลับคืนในซองที่แนบมาภายในวันที่ 30 มิถุนายน 2540

ขอขอบคุณ

นางสาวเบญจมาศ ภูอินทร์

4/039 เมืองทอง 1 แขวงวิเศษฯ 14 คอนโดเมือง กทม.10210

Appendix F
Letter of Introduction: English Version

June 10, 1997

Address

The increase in the aging population is one of the key demographic phenomena that Thailand faces over the next few decades. By the year 2015, the number of people in Thailand who are 60 or older will double from 4 million in to around 8 million. This demographic factor will certainly affect the type and quality of housing available to retirees. The home interior can play a significant role in supporting the activities of retirees. Interior designers want to design houses that will make life safe and easy. However, no one really knows what features in Thai homes create safety and usability problems for older adults.

You are one of a small number of Thai retired government employees who are being asked to participate in a study on housing for older adults. Your response will help in obtaining findings which will represent the opinions of retirees in Bangkok. It is important that each questionnaire be completed and returned. Information provided in the questionnaire will be regarded as confidential and will never be released to anyone. An identification number on the questionnaire allows me to track responses, but will not be used in reporting the findings. Please take a few minutes to answer the questions.

I would be most happy to answer any questions you might have. Please write or call me at 573-7312.

Thank you for your assistance.

Sincerely,

Benjamas Kutintara

Appendix G
Letter of Introduction: Thai Version

4/039 เมืองทอง 1 แจ้งวัฒนะ 14
คอนเมือง กรุงเทพฯ 10210

10 มิถุนายน 2540

เรื่อง ขอความอนุเคราะห์ในการช่วยตอบแบบสอบถาม

เรียน

ด้วยดิฉันมีความจำเป็นต้องเก็บข้อมูลเพื่อทำวิทยานิพนธ์ในระดับปริญญาโทเกี่ยวกับการออกแบบและปรับปรุงบ้านสำหรับผู้สูงอายุ โดยจะศึกษาลักษณะสภาพภายในบ้านที่เหมาะสมสำหรับผู้สูงอายุ และการปรับปรุงบ้านเพื่อให้ผู้สูงอายุทำกิจวัตรประจำวันในบ้าน ได้สะดวกขึ้น

แบบสอบถามนี้ต้องการทราบถึงสิ่งซึ่งเป็นอุปสรรคก่อให้เกิดความไม่สะดวกและสิ่งที่ยากก่อให้เกิดอุบัติเหตุภายในบ้าน จึงขอความกรุณาจากท่านช่วยสละเวลาตอบคำถามเกี่ยวกับสภาพภายในบ้านที่ท่านอยู่ คำตอบของท่านจะเป็นประโยชน์ต่อการออกแบบและปรับปรุงบ้านสำหรับผู้สูงอายุไทยในอนาคต ท่านเป็นตัวแทนจำนวนน้อยของผู้สูงอายุที่ถูกคัดเลือกให้แสดงความคิดเห็น คำตอบของท่านมีความสำคัญอย่างยิ่ง คึงนั้นโปรดอ่านและตอบคำถามทุกข้ออย่างละเอียด และส่งกลับคืนในซองติดแสตมป์ที่แนบมาภายในวันที่ 30 มิถุนายน 2540 คำตอบของท่านจะถูกนำมาใช้เฉพาะในการทำวิทยานิพนธ์นี้เท่านั้น หากท่านมีข้อสงสัยเกี่ยวกับแบบสอบถามนี้สามารถสอบถามรายละเอียดได้ที่หมายเลขโทรศัพท์ 573-7312

จึงเรียนมาเพื่อโปรดให้ความอนุเคราะห์ และขอขอบพระคุณที่ท่านกรุณาสละเวลาตอบแบบสอบถามมา ณ โอกาสนี้

ขอแสดงความนับถือ

เบญจมาศ กุญชรินทร์

(นางสาวเบญจมาศ กุญชรินทร์)

Appendix H
Follow-up Postcard: English Version

June 24, 1997

Two weeks ago a questionnaire seeking information about home interiors was mailed to you. You are one of a small number of retired government employees who is being asked to participate in this study.

If you have already completed and returned it to me, please accept my sincere thanks. If not, please do so today. Because it has been sent to only a small number of retired government employees in Bangkok it is extremely important that yours be included in the study so that the results accurately represent the current housing situations.

If by some chance you did not receive the questionnaire, or if it got misplaced, please call me right now at 573-7312 and I will mail another one to you today.

Sincerely,

Benjamas Kutintara

Appendix I
Follow-up Postcard: Thai Version



ชื่อและที่อยู่ผู้ฝาก



ชื่อและที่อยู่ผู้รับ

ไปรษณียบัตร



น.ส. เบญจมาศ กุฎอินทร์
4/039 เมืองทอง 1 แขวงวัดนะ 14
ดอนเมือง กรุงเทพฯ 10210

คุณจรรยา แล้วศิริ
40 ซ. วัฒนธรรม 2 (สุขุมวิท 85)
พร.เอกมัย บางนา

กทม.

1 0 2 5 0

เมื่อ 2 สัปดาห์ที่ผ่านมา คิฉิน นางสาวเบญจมาศ กุฎอินทร์ ได้ส่งแบบสอบถามเกี่ยวกับลักษณะภายในบ้านของผู้สูงอายุมาถึงท่าน ท่านเป็นตัวแทนจำนวนน้อยที่ได้รับคัดเลือกให้แสดงความคิดเห็น คำตอบของท่านจะเป็นข้อมูลสำคัญในการทำวิทยานิพนธ์เรื่องการออกแบบและปรับปรุงบ้านสำหรับผู้สูงอายุ

หากท่านได้ส่งแบบสอบถามกลับคืนแล้ว คิฉินขอขอบพระคุณเป็นอย่างยิ่ง ถ้าท่านยังมีได้ตอบแบบสอบถามนี้ โปรดให้ความอนุเคราะห์ช่วยกรุณาตอบและส่งแบบสอบถามดังกล่าวกลับคืนด้วยจะเป็นพระคุณอย่างยิ่ง

ขอแสดงความนับถือ

เบญจมาศ กุฎอินทร์

Appendix J
Open-Ended Responses to Other Difficulties

Appendix J
Open-Ended Responses to Other Difficulties

Difficulty	N
<u>Entrance</u>	
Floors on terraces are slippery when raining	3
High threshold at the entrance	2
Narrow entrance	1
Door knob difficult to operate	1
Doors are hard to open in the rainy season	1
Security door screen makes it difficult to open the door	1
<u>Stairs</u>	
Steep stairs	6
Irregular stair treads	4
No railing on both sides of stairs	2
Railing on only one side of stairs	2
Narrow stairs	1
Not enough lighting on the stairs	1
Not enough natural light on the stairs	1
Stairs are slippery when they are wet	1
Elevators are often out of order (living in condominium)	1

(table continued)

Difficulty (continued)	N
<u>Bedroom</u>	
Not enough space to move around, bedrooms are too small because of having much furniture	15
Hot, stuffy, bad ventilation, or not enough windows	8
Too much noise and dust from streets, express ways, or a factory near by	7
No bathroom within the bedroom (have to use a urinal pot)	4
Wall of bedrooms get strong sunlight	3
Must close curtains all the times because of having too many windows	2
No space to make a bed	2
Difficult to rearrange furniture because of built-in furniture design	1
A Buddha room in a bedroom(want to have a separate room for Buddha images)	1
Do not like an air condition but have to use because of hot temperature	1
No electrical outlet near a bed	1
No telephone in the bedroom	1
The bedroom is on the second floor	1
Not enough light, Dark	1
Difficult to open or close a bedroom's door	1
Mosquitoes fly into the bedroom when opening the bedroom door	1
Rats live over a ceiling	1

(table continued)

Difficulty (continued)	N
<u>Bathroom</u>	
Slippery floor	8
A shower area is no shower curtain so that the other area is wet	5
No grab bar	4
Bathrooms are too small, not enough space	4
Water supply does not have good flow rate and cannot reach upstairs level	4
No seat in a shower	3
Cleaned very often to prevent slippery	3
Hot, no window, no air ventilation, stuffy	3
Too many steps in the bathroom	1
Rough floor	1
Never use a bath tub	1
Have difficulty when taking a shower in a bath tub	1
Slippery bath tub	1
An unsecured shower seat	1
A shower seat which has unsuitable height	1
No seat near a basin	1
A toilet in eastern style is difficult to use	1
No cabinet or closet to store towel-robe	1
Far from the bedroom	1
A bathroom is too big to clean easily	1
No book shelf, telephone, television, radio	1
Water drains slowly	1
Water in the toilet flow slowly	1
Bathroom equipment is broken easily (low quality equipment)	1

(table continued)

Difficulty (continued)	N
<u>Kitchen</u>	
The kitchen is too small	11
Not enough space on counter or table	5
Stuffy, bad ventilation, have much smoke when cooking	4
No kitchen or pantry in the same building or other room	3
No seating areas in kitchen	2
Slippery floor	2
Oil spray on walls and floor	2
Dogs come inside the kitchen	2
Presence of cockroaches or rodents	2
Must cook some kinds of food outside the kitchen	2
No kitchen. Have only the pantry	1
No sink in the kitchen	1
A sink is far from a stove	1
A gas tank is located too close to a stove	1
No cabinet	1
Have too many cabinets	1
No food cabinet	1
Not enough wall space for hanging cooking utensils	1
No hanging cabinet because of having too much windows	1
Cabinets were placed too high to reach	1
Too much opening and windy	1
Bad quality of plumbing system	1
The rain leaks in through the window	1
Leaking roof due to small roofing slope	1

(table continued)

Difficulty (continued)	N
<u>Other Interior Features</u>	
Presence of ants, cockroaches, mosquitoes, termites, rodents, lizards	13
Have too much furniture	7
Too much dust and pollen	3
Bump into the furniture	2
Odor from the toilet and drainage pipes	2
The rain leaks in through the window	2
Furniture is big and heavy	1
Not enough space in a living room	1
Not enough laundry space	1
No place to store golf bags	1
Not enough parking space	1
Too big house because children moved out	1
Too many steps in the house	1
Slippery terrace floor	1
Too low ceiling	1
Temperature is too high	1
Too much noise from outside	1
Differential settlement of home structure	1
Water leakage at the connection	1
Flood	1

Appendix K
Open-Ended Responses to Other Modifications

Appendix K

Open-Ended Responses to Other Modifications

Modification	N
<u>Entrance</u>	
Changed floor materials to non-slip materials at the entrance or place a non-slip doormat in front of an entrance	3
Installed an iron screen door or Installed more locks at an entrance door to prevent robbery	2
Installed slide doors at an entrance or lubricant at steel door for easy opening	2
Installed grab bars near doorways	2
Installed an insect screen door	1
Built a roof to cover a terrace at a front door	1
Rebuild floor slope to improve water draining	1
<u>Stair</u>	
Rebuilt stairs, changed linear staircase to be dog-leg staircase, built a stair landing, or built another new stair.	5
Made solid stair risers for ease maintenance	2
Installed light switches at both the top and the bottom of stairs	1
Used glass blocks in a wall to increase natural light into stairs	1
Changed stair floor materials to non-slip materials	1

(table continued)

Modification (continued)	N
<u>Bedroom</u>	
Installed an air condition, an electric fan to cool the bedroom	6
Relocated the bed and the closet for correct orientation and increasing more room space	6
Installed an air filter	3
Put a stereo or put a television in the bedroom	3
Increased closet space	2
Installed an emergency bell	1
Changed a bedroom from the second floor to the first floor	1
Built pantry for installing a refrigerator	1
Installed more electrical outlet for convenience	1
Planted trees and vines outside bedroom's walls to shade sunlight	1
<u>Bathroom</u>	
Replaced toilets from an eastern style to a western style	8
Placed rubber mats on bathroom floors, the bottom of the tub, or under a rug to prevent slipping	7
Installed more towel rails	2
Installed a shelf	2
Installed water containers in bathrooms	2
Relocated a basin that restricted movement	1
Built a door that is connected to the bedroom	1
Built a partition for showering area	1
Built more bathrooms	1
Took out the bathtub	1
Installed an exhaust fan	1
Changed a faucet, used a level handle faucet	1
Changed the previous material of toilet wall to be ceramic tile	1
Repainted walls by using a light color	1
Used light bulbs that save energy	1

(table continued)

Modification (continued)	N
<u>Kitchen</u>	
Installed a hood or an exhaust fan or build a chimney	5
Installed an electric fan	3
Increased kitchen spaces	2
Installed ceramic tiles on kitchen floor and walls for easy cleaning	2
Increased natural light by using clear color roof tiles	1
Installed grab bars near steps	1
Got rid of ants, insects, and rodents	1
Changed a kitchen wall to a counter to increase spaciousness	1
Changed a kitchen floor material to rubber tiles for easy cleaning	1
Installed hangers	1
Placed pictures on kitchen's walls to have good atmosphere	1
Change color and pattern of vinyl floor	1
<u>Other interior features</u>	
Built a new porch or enlarged a porch	4
Repainted walls by using a light color	4
Replaced electric wire	3
Installed more light fixtures	3
Built more rooms	3
Installed an air condition or an electric fan, placed micro fiber over ceilings to prevent heat	3
Installed insect screens	2
Bought new furniture	2
Rearranged furniture	1
Remodeled the house to have fewer floor levels	1
Installed grab bars in every room, bedroom, bathroom, living room, kitchen	1
Installed telephones in other rooms in the house	1
Planted trees to shade windows	1

(table continued)

Modification (continued)	N
<u>Other interior features (continued)</u>	
Installed a safety cutout	1
Installed a water pump and a water tank	1
Installed iron screens at windows and doors to prevent robbery	1
Replaced new windows for easy opening and closing	1
Put soft covers on the sharp edges of furniture to prevent bumping	1
Built roofs over paths around the house	1
Built a room for dogs and cats	1

Appendix L
Open-Ended Responses to Intended Modifications

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Open-Ended Responses to Intended Modifications

Intended Modification	N
<u>Entrance</u>	
Change the door for easy closing and opening	3
Install a light fixture or increase light level at the entrance	2
Enlarge an entrance door	1
Install an iron screen door to prevent robbery	1
Change a glass door to be a timber door and remove security screen	1
Change the floor material from terrazzo to non-slip materials	1
<u>Stair</u>	
Rebuild the stairs (decrease a stair pitch, build a stair landing, and enlarge the stairs)	3
Change stair floor materials to non-slip materials	1
Close stair risers with solid panels	1
Build a storage under the stair	1
<u>Bedroom</u>	
Install an air condition	12
Improve air ventilation in the bedroom by building more windows in right directions to get wind and install an air ventilation fan	6
Increase more space in a bedroom	6
Build a walk-in closet and separate a closet and a dressing room from the bedroom	8
Have a telephone in the bedroom	4
Have a television in the bedroom	3
Move a bed	1
Change a bed	1
Build a bathroom in a bedroom	1

(table continued)

Intended Modifications (continued)	N
<u>Bedroom</u> (continued)	
Build a buddha room	1
Install more light fixtures	1
Change light bulbs to fluorescent light bulbs	1
Plant trees to cover the bedroom from sunlight	1
Do not want mosquitoes to get in while opening the door	1
Can contact polices easily in case of emergency	1
Repainted bedroom's walls in a light color	1
Improve the bedroom to look lovely	1
Have an extra bed in the bedroom for a caregiver when need help	1
Have an air filter	1
Have a night table	1
Have a book shelf	1
Have a stereo	1
Install a home theater and a video control station	1
<u>Bathroom</u>	
Install grab bars	12
Improve an air ventilation (install an electrical fan, install a exhaust fan, have more windows)	9
Increase bathroom space	6
Add a shower seat	5
Build a shower room that is separated from a toilet room or have doors at shower areas	5
Change from a bath tub to a shower area or a shower closet	4
Change toilets from the eastern type to the western type	3
Rebuild floor slope to improve water draining	3
Install more towel bars or electrical towel bar	3
Change bathroom floor tile	2

(table continued)

Intended Modifications (continued)	N
<u>Bathroom (continued)</u>	
Place non-slip rubber mats on a bathroom floor	2
Install more light fixtures	2
Install an emergency bell	2
Install a heating water equipment	2
Install solar cells for heating water	1
Change a shower seat to the one which is secure and has suitable height (stone chair)	1
Change the toilet to the one that has a higher seat	1
Change the toilet to improve flushing quality	1
Install a urinal ware	1
Have more areas on the shelves and the dressing counter	1
Make the bathroom smaller	1
Install a water pump	1
Install a bath tub	1
Have a radio in the bathroom	1
Install an iron screen at the window to prevent robbery	1
<u>Kitchen</u>	
Increase kitchen space	10
Install more cabinets	7
Install a hood	5
Add a seating area in the kitchen	5
Increase counter or table spaces	5
Build more windows or install an electric fan in the kitchen	3
Build a sink in the kitchen	2
Relocate furniture in the kitchen for easy use	2
Install a grease trap or a sink with grease trap	2
Install utensil hangers	2

(table continued)

Intended Modifications (continued)	N
<u>Kitchen (continued)</u>	
Have a microwave oven	2
Install an oven	2
Attach rubber around cabinet doors to prevent insects	1
Move plates and bowls from the high cabinets	1
Change the floor material to non-slippery floor tiles	1
Relocate the kitchen that is separated from the house to next to the house	1
Build a new kitchen roof which has skylight windows	1
Make a kitchen ceiling higher	1
Build more kitchen walls	1
<u>Other interior features</u>	
Increase space in the house, build more rooms	4
Plant more trees, shrubs, and gardens to prevent the house from dust and noise	4
Build a storage	3
Enlarge a parking space	3
Rearrange furniture, move it out of a room, or furniture which is not used	3
Improve plumping system, install a water pump, install more water tanks	3
Improve the roof	3
The house should have only one level	2
Build a roof or awning over the porch to prevent slippery floor after raining	2
Increase book shelves and showcases or build a library	2
Plant more lawns	2
Improve drainage pipes	2
Build a new house	2
Build a ramp	1
Install an elevator in the house which has four stories	1
Place a day bed in the living room	1
Place a coffee table in the living room	1

(table continued)

Intended Modifications (continued)	N
<hr/>	
<u>Other interior features</u> (continued)	
Change a floor material from wood to marble	1
Install an air condition	1
Install a safety cutout	1
Use solar power to replace electric power	1
Make the floor level higher to prevent flood	1
Install an automatic front door	1

Appendix M

General Comments and Suggestions about Safety and Usability Problems

Appendix M

General Comments and Suggestions about Safety and Usability Problems

Comment and Suggestion	N
<u>Older adult practices and behaviors</u>	
The older adults should stay on the first floor of the houses or stay in one story houses	30
Be careful in order that one will not fall down	11
Be careful while walking, going up and down the stairs, and walking on the floors that have different levels, should always hold on the handrails	10
Should not move too fast and should change position slowly to prevent dizziness	8
Be careful about accidents from electricity	8
Dry the floor immediately if it is wet	6
Exercise very often	5
Should not go up and down stair too often	5
Clean the bathroom floor very often to prevent slipping	5
Should wear slippers in the bathroom to prevent tripping	4
Children should take care and understand the older adults	4
Turn off the gas stove, be sure that gas wire is not bitten by mice	3
Should not allow pets come inside the house (might trip on pets)	3
Place necessary items within reach	3
Place needed medicine with in reach in the bedroom and the bathroom	3
Use a cane when walking	2
The older adults should stay in the houses which were designed for the older adults	2
Call for help from family members when does not feel well	2
Should not carry heavy things	2
Be careful about fire	2
Should live with family members and should not live alone	2

(table continued)

Comment and Suggestion (continued)	N
<u>Older adult practices and behaviors (continued)</u>	1
Dry hands before turning on the light	1
Do not keep valuable belongings in the house to prevent robbery	1
Put things in the right place after use	1
Use slippers that will not slip easily when they are wet	1
Do not stop doing the chores except that they are hazardous to your health	1
<u>Entrance and stair</u>	
Should not place belongings on walkway, circulation, or stairs	6
Have a handrail at the step	4
Handrails were attached firmly at stairs	3
The stairs should not be steep	2
The stairs should be wide enough	2
The stair should not be winding	2
Use a ramp in stead of steps	2
The stair floor has non-slip material	1
Should have different textures between floor and stairs	1
<u>Bedroom</u>	
Should have a telephone in the bedroom	2
The bed should have appropriate height	2
There should be a water bottle or a small fridge in the bedroom or upstairs	2
Sleep on not too high mattress	1
Beds should have grab bars for getting up easily	1
The bedroom is close to the bedroom of family members	1
<u>Buddha Room</u>	
Should have a buddha room or a buddha shelf	3
There should not be a shelf for joss sticks and candles to prevent fire	1

(table continued)

Comment and Suggestion (continued)	N
<u>Bathroom</u>	
Put non-slippery floor tiles on the bathroom floor	15
Install grab bars in the bathroom	11
The bathroom should be located in or next to the bedroom	8
Install a western type toilet	6
The bathroom should be small	3
There should not be anything on the bathroom floor that may cause tripping	3
Separate the shower area from the toilet area and the basin area	3
Should not install a bathtub in the bathroom	2
Place a rubber mat on bathroom floor to prevent falls	2
Big bathroom	1
Do not lock bedroom and bathroom door	1
The bathroom door should be unlocked from outside	1
Install a shower closet	1
There should be a shower seat	1
Should have both a shower area and a bath tub in the bathroom	1
The shower area should be at the back of the bathroom and there should be a threshold around the shower area so that the bathroom will not be wet	1
<u>Kitchen</u>	
Have good air ventilation in the kitchen	1
Place non-slip floor in the kitchen	1
The hanging cabinet should be placed higher than head level to prevent bumping	1
Should have an electric boiler	1
<u>Porch</u>	
Build a porch	3
Use non-slip floor materials at porches and balcony	2

(table continued)

Comment and Suggestion (continued)	N
<u>Materials</u>	
The floor material should not be slippery when wet	15
The floor material should not be marble or granite	3
The floor material should be parquet	3
Should use durable and safe materials	1
Should have a carpet to prevent tripping	1
Non-slip rug	1
<u>Furniture</u>	
Should not place furniture that restricts movement, have enough space to move around	19
There should not be too many pieces of furniture	5
The furniture should be round-edged	2
Furniture is designed for convenience	1
There should not be any sharp edged items around	1
<u>Lighting and Light Switches</u>	
The house should have enough lighting and natural light. Should install light bulbs that save energy	20
Enough lighting on the stairs	4
Enough lighting in the bathroom	4
Have enough lighting at the entrance	2
Use glowing switches which can be seen in the dark	2
Have enough lighting at a medicine cabinet	1
Electric switches are within reach	1
Light switch should be easily operate	1
Switches and outlet should be placed at high level to prevent flood	1

(table continued)

Comment and Suggestion (continued)	N
<u>Electricity</u>	
Install an automatic safety cutout in the house to prevent accidents from electric power	9
Use a safe electric system, change the old wire	6
Have a fire extinguisher in the house	1
<u>Security</u>	
Install a detector to prevent robbery	3
Install iron screens at doors and window for security	1
Emergency call to guards	1
Put a sign at the gate for the police to come very often	1
<u>Emergency</u>	
There should be an alarm bell within easy reach in the bedroom and the bath room	5
Have emergency telephone numbers	1
<u>Other interior features</u>	
The house should have only one floor level or fewer floor level	13
The house should be airy and have good ventilation. The house should be located in wind directions	10
Have a medicine cabinet in the house	1
TV, radios, and fans should have a remote control	1
<u>Surroundings</u>	
Have lawns or gardens	9
The house should be located in a quiet neighborhood	3
Want a house close to a lake or a canal	1
<u>Services</u>	
There should be a service for chores and cooking	1
Have an expert who can help about exercising	1
Sell the house and move to an assisted living facility	1

VITA
Benjamas Kutintara

Benjamas Kutintara, daughter of Dr. Utis Kutintara and Mrs. Pusadee Kutintara was born on October 23, 1971 in Bangkok, Thailand. She graduated from Kasetsart University Laboratory School in 1988. In 1993, she graduated from King Mongkut's Institute of Technology Ladkrabang with a Bachelor of Architecture degree in Interior Architecture. During the summer of 1990 and 1992, she interned with major architecture and interior design firms in Thailand. Upon completion of her undergraduate degree, she was employed as an interior designer for Waranz Design Company, a major interior design firm in Thailand. In January 1994, she moved to the Department of Fine and Applied Arts, Bangkok University, to accept employment as an instructor to teach sophomore level interior design classes. In October, 1994, she received a scholarship from the Royal Thai government to obtain M.S. and Ph.D. degrees in Interior Design. She also serves as a faculty member in the Department of Interior Architecture at King Mongkut's Institute and Technology Ladkrabang, Thailand.

Kutintara was accepted into the masters program in Housing, Interior Design, and Resource Management at Virginia Polytechnic Institute and State University in 1995. She is a member of Thailand Interior Designers' Association and was selected for membership in Kappa Omicron Nu. In December, 1997, all requirements of the Master of Science Degree in Housing, Interior Design, and Resource Management were completed. She plans to pursue a Ph.D. Degree in Housing, Interior Design and Resource Management.