

Housing Conditions and Improvement Guidelines for the Elderly Living in Urban Areas: Case Studies of Four Bangkok's Districts

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ABSTRACT

The demographic structure of the Thai population has shifted to an ageing society with an increasing number of elderly people living in urban areas. This research, therefore, is aimed to study and analyze the housing conditions of the elderly as well as relevant behaviors and issues, and provide recommendations for improvement. This research employs interviews and onsite-surveys for data collection. Findings showed that the current conditions are inappropriate; bedroom furniture should be less high; handrails should be installed in bathrooms; stair risers should be shortened, and a common area e.g. a gazebo, should be provided for the elderly to spend time outside together.

Keywords: *housing condition, living inside a dwelling, elderly people, urban area*

INTRODUCTION

According to the United Nations' (2017) estimate of the world's older population, year 2001 to 2100 has been designated the century of the elderly; when the population aged 60 or over exceeds 10% of the world population. In 2017, the number of the older population reached 12.7%, which was the first time in world history that the number surpassed that of the children. The number of those of extreme old age is likely to surpass that of the past century. These growing numbers means that there will be a smaller proportion of the working-age population which will lead to the reduction of labor production, as well as savings. The implication also includes a greater government budget must be allocated to social welfare and medical expense to support the ageing population. Therefore, resource management studies and preparation are crucial for economic and social stability.

Thailand shares the trend of an ageing population with the world. From the estimate of the Thai population projection from 2010 – 2040 (Office of the National Economics and Social Development Council, 2013), Thailand will have an increased number of elderly dependents. This is in line with the data from the National Statistical Office (2014) showing that Thailand has become an aged society since 2005, having an old-age population of 10.4%. It is also expected that numbers will be increase to 20% which makes Thailand become a complete aged society in 2021, and turn to be a super-aged society in 2035 when an old-age population reach to 28% of country population.

From studies about older people living in Bangkok by the College of Population Studies, Chulalongkorn University, and Department of Older Persons, the post-implementation report of the National Plan for Older Persons No. 2 during 2002 – 2021 and Phase 3 during 2012 – 2016, it was found that in Bangkok, only 7.3% of the houses were in suitable condition for the living of older persons. As urbanization is driving higher prices of land and houses, it also shifts housing design from horizontal to vertical development. All of which have created barriers for the older persons' living. It is pertinent to study and find the proper housing conditions for older people living in the urban environment.

Therefore, this research set out to investigate the housing conditions of older persons living in Bangkok areas; including the 4 districts of Phasi Charoen (Khlomg Lat Phachi, Sirin & Friends, and Rasi Tham Communities) (Rattanapaisal, 2018), Pra Nakorn (Praeng Puthorn and Praeng Nara Communities) (Laksameewattana, 2018), Wang Thonglang (Sub Sin Mai Community) (Thupoltab, 2017), and Din Daeng (Din Daeng Community Restoration Project) (Buapradit, 2018). It includes the analysis of conditions, relevant behaviors and housing issues. Consequently, the research arrives at housing improvement recommendations and guideline, which could lead to future design prototypes suitable for the living of the elderly.

HISTORY AND BACKGROUND

This research was conducted in the 4 urban districts of Phasi Charoen, Pra Nakorn, Wang Thonglang, and Din Daeng. Each has its own history and background given different context of location, environment, and key events in history. Details are as follows:

Phasi Charoen District (Khlomg Lat Phachi, Sirin & Friends, and Rasi Tham Communities)

Phasi Charoen District's Ban Man Kong Community is a housing project accommodating those inflicted by gentrification in the past. As consequence of aggressive land development in Bangkok, those without the land ownership were forced to leave as the owner wished to realize its financial potential. Ban Man Kong Housing Development Project was initiated to solve the issues by providing affordable accommodation to those affected.

Pra Nakorn (Praeng Puthorn and Praeng Nara Communities)

Pra Nakorn District is located on the Rattanakosin Island. From the city plan¹, the area is in reserved for promotion of Thai cultural identity. Buildings in the

¹ Principle City Plan of Bangkok by Department of City Planning

conservation zone typically have limited space and with steeper stairways, which are not friendly to older people. The area, under the ownership of Bureau of the Crown Property, went through the Restoration Project which consisted of 6 sub-projects; including the 114 and 123-year-old commercial buildings of Praeng Puthon and Praeng Nara. Currently, the two buildings are registered as historical sites and, though not yet improved by the owner, were included in the plan. Key highlights of this study area were 1) its buildings' long history dating back to the reign of King Rama I, registered to the Fine Arts Department as historical sites 2) its reputable, long-established local restaurants 3) its current local occupants who who adopted and would pass on the lifestyle to the next generation.

Wang Thonglang (Sub Sin Mai Community)

The community in Wang Thonglang district, also under the Bureau of the Crown Property's patronage, was developed as the model for Older People's Living Quality Improvement Program. It has the distinction of being the urban community with over-30-year family relations as its foundation. Older people lived in the area including locals and migrants; some of which moved in for jobs from other parts of the country. This group also includes the elderlies who moved into the city to look after their grandchildren; as the parents worked away from home. The migration directly impacted the living of these older persons.

Din Daeng (Din Daeng Community Restoration Project)

Previously, the area of National Housing Authority's Din Daeng Housing Project² was allotted for the City's dump site. Later, it was occupied by the poor and became a slum. The government, therefore, assigned the Public Welfare Department to build a flat for the low-income tenants. It was named Din Daeng Flat. Currently, the 50-year-old flat is in a deteriorated state, and might not be considered as healthy for living. The National Housing Authority,

accordingly, resolved to pass the Din Daeng Community Restoration Master Plan (2016 - 2024), of which included the 28-story Residential Building G. The G Building was completed, and ready for move-in on July 2018. The majority of its occupants were from the old Din Daeng Flat. The Building G was designed by considering its older residents. The 8th and 9th floors were specifically dedicated to the senior tenants. The building was, therefore, an interesting case studying as it offers a look into 1) the housing conditions of the building designed to meet the needs of the elderly and 2) limitations to the older people living in a high-rise building.

RELEVANT CONCEPTS AND THEORIES

This research concerns housing conditions of older people. Important ideas and theories pertinent to this research are Age-friendly City, Ageing In Place and Accessible City.

Age-friendly City

An age-friendly city refers to a city responsive to living of older people. The United Nations has laid out 8 key areas for a framework for development including "1) Outdoor spaces and buildings 2) Transportation 3) Housing 4) Social participation 5) Respect and social inclusion 6) Civic participation and employment 7) Communication and information and 8) Community support and health services," which need support from each and all units. Among these, the areas pertinent to physical environments are 1), 2), and 3), which directly determine people's living quality in terms of convenience and efficiency of their daily routine.

Most of all those keys would be used from the beginning of this research. The key number 3 (Housing) would be concerned in the analyzing part to summarize the housing improvement guideline with the key number 4 (Social participation) and 5 (Respect and social inclusion) which describes the participation of the community and the elderly participants who live in all 4 districts area. All sample

² Phaen Maebot Khrong Kan Fuenfu Mueang Chumchon Dindaeng 2559-2567 BE [Din Daeng Community Restoration Master Plan (2016 - 2024)].

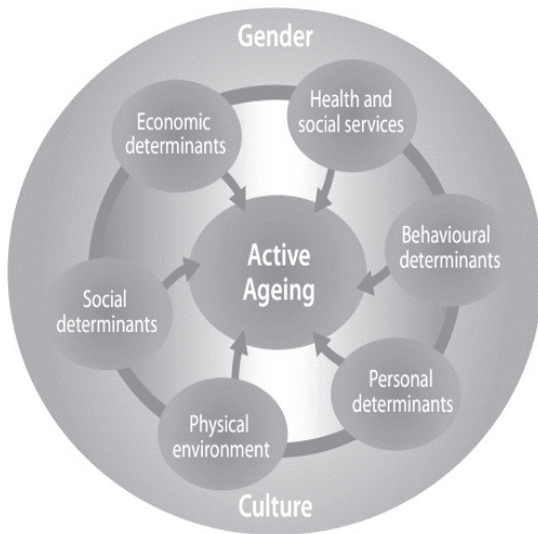


Figure 1:
Determinants of Active Ageing
(Source: *Global Age-friendly Cities: A Guide 2007*)

respondents and also other people living in those communities would receive all data and information they should understand before and while the research continuing as refer to the key number 7 (Communication and information).

Ageing in Place

In Thai culture, the most common family structure is the large family consisting of all family members living together as an extended family. The Thai Population Situation Report 2015 by UNFPA Thailand shows that a three-generation family has the largest number as 33.6% of the total number of families in country. The number is increasing due to the fact that the elderly is living longer, and the family need to save costs related to economic matters. Ageing people are increasingly staying in their place living with their family.

The concept of ageing in place pertains to providing health services. It entertains the idea of encouraging retirees to continue to live in their homes, where health services and supports will be made readily available, when needed. In general, older persons will need to move into other place such as health centers or hospitals to obtain health and medical

services. However, in fact, more than 90% of the older people wish to stay at their own houses in their community, as it feels at home and comfortable, which could help them to experience a faster physical health recovery.

The concept of ageing in place is for integrated development aiming to optimize happiness and satisfaction for the elderly, which ultimately refers to the ability to continue to live in their community. The society and people in the community should support and enable older persons to live with others normally. This could be obtained by providing facilities and housing improvement to meet the older people's needs. Key principles of this concept are to create awareness and shift the mind-set regarding the design of housing, as well as social and community environment, to that of Design for All.

This research supports the idea of ageing in place by searching for the better living guideline to maintain desirable environment which the most suitable for the elderly's happiness.

Accessible City

In the city scale, key concepts of environmental design for older persons consists of 1) environmental management for the elderly 2) environmental model for the elderly's healthy living and 3) usage of public spaces, which covers quality living development for older people in all aspects of physical environment, including public spaces, as well as social areas, with an aim for the wellbeing of residents. (Bureau of Environmental Health, 2015)

In addition to issues concerning housing condition, this research also cover the area of social contexts in four districts. The idea of Accessible City would be used as the supportive theory to find the solution for more suitable living condition of the elderly in case of the connection of housing area and public area.

Although set forth by different organizations, the three theories commonly focus on the importance of well-being of the elderly, whether at the city level, district level, community level or home level. All of those are used to determine the direction of this research to conduct the guideline for the better path forward.

RESEARCH OBJECTIVES

This research aims to study housing conditions of the elderly in environmental, economic, and social contexts of four Bangkok districts; Phasi Charoen, Pra Nakorn, Wang Thonglang, and Din Daeng district, and analyze the housing conditions, behaviors, and relevant issues found at the houses of the older people living in that area and continue to make a recommendation for housing improvement guideline related to those issues and relevant theories to encourage the elderly to stay living in their homes or their areas in accordance with the Ageing in Place theory. Besides, this research would support the old people to live in more suitable environment including private and public areas according to the theory of Accessible City.

SCOPE OF THIS RESEARCH

This research is focused on the living conditions of the elderly under the social and economic context, activities, and behaviors in four districts; Phasi Charoen district (Klong Lat Phachi, Sirin & Friends, and Rasi Tham Communities), Pra Nakorn district (Praeng Puthorn Community and Praeng Nara Community), Wang Thonglang district (Sub Sin Mai

Community), and Din Daeng district (Din Daeng Community Restoration Project). The study does not cover any other areas in Bangkok.

The population samples in this research are limited to older people aged 60 and over, living in the studies areas. From the secondary source of information and site surveys, the sampled population can be categorized as shown in Table 1 below. The first group is those allowing for interviews. The second is the rest who allow for volunteered visit and survey with the recommendation of being good samples, specifically selected by distinction. (Table 1)

LIMITATIONS

This research has the timeframe to limit period of selecting samples, about 8 - 12 months per each district for all research processes. As it took time to get familiarized by the elderly before they allowed the interviews or house surveys, some sites were not yet allowed for visits and information obtaining.

Some of the populations were older people with sight impairment or illiterate that they could not read; making them unqualified as samples.

Table 1: Population and samples in the 4 studied areas

Studied areas	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
Population	108 people (Those with names in Civil Registration of Phasi Charoen District Office)	65 people (All of the older people living in the Community)	358 people (Those living with families or in the area no less than 2 years)	156 people (Those moved from the old Din Daeng Flat to G Building)
Sample Group 1: Older persons allowing for interviews ³	16 people	22 people	38 people (Those live in Sub Sin Mai Community)	86 people (Those who actually live there and are willing to give information)
Sample Group 2: Older persons allowing for visit and survey.	16 people (same people as in Group 1)	22 people (same people as in Group 1)	3 people (Specifically selected)	9 people (3 live in the units designed for the elderly and 6 living in those of typical design)

³ For smaller sample group, should represent at least 30% of the population; with reference to Jamornman, U. (1993).

DATA COLLECTION

The research is based on 2 types of data including primary data and secondary data as followings:

Primary data are collected from site surveys, interviews with community leaders or the locals who knew the targeted older persons well (to help introduce the team, and make appointment with the older persons), and the targeted older persons.

Secondary data are collected from printed documents and statistics relevant to the target group of older people and the studied areas e.g. the elderly information, basic information of each district, ownership, pattern of buildings, etc. books and materials of the relevant concepts, theories, and researches and also an information of the elderly in the Chula ARI⁴ Project to be selected as samples for this research.

METHODOLOGIES

As mentioned earlier, the population samples of this research are the elderly who are 60 years old and over, most of whom have vision problems that might affect reading ability. Some seniors are low-income people who did not have enough access to good education so that they were unable to read, and therefore, they were unqualified as samples. The rest who were selected to be samples also had less issues with senility, so they were viable candidates. To avoid errors and misunderstanding from respondents, this research uses the direct unstructured interview method. Researchers and assistants collected information at the sites by reading and explaining each question to those elderly in the first sample groups, then noted the response. The interview would cover the 4 areas of basic information: personal data, occupation and income, daily routine, and condition of the house.

In Addition to collecting information from the interviews, researchers and assistants did non-participant observation on site to observed activities and how the spaces are utilized by the elderly. Afterwards, we continued with using participant observation method by attending in community activities such as yoga and morning aerobics to

build familiarity with both the elder people and their routine.

After collecting all the data, we analyzed and identified the current living condition of the elderly in the area, then summarized the brief recommendations for the physical improvement which would be more suitable with their daily lives. Later, referring to the Age-friendly city theory with 8 key areas, research team ran a focus group with the respondents for better data by listening to their opinions, adjusting to find the pleasant options for all people. Those are in accordance of the key number 4 (Social participation), 5 (Respect and social inclusion) and 7 (Communication and information). Then, the sample group 2 would be selected from some of the sample group 1 to conduct volunteered detailed surveys of their houses and specific living conditions for final improvements guideline.

Onsite surveys, taking photos and in-depth interviews were subsequently used in the final part of this research, including measured the sites. All data were analyzed and consulted with the architect team to finalize the improvement guidelines for the elderly living in urban areas.

FINDINGS

From the 4 studied areas, findings are divided into 3 parts: 1) Social and economic context and housing conditions 2) Patterns and issues relevant to the housing conditions 3) Recommendations/ guidelines for improvement. Details are as follows:

1) Social and economic context and housing conditions

General information and social status: From the information gathered from the 4 districts, despite their different background as described earlier in "History and background", older residents shared many characteristics. It was found that the majority of the older people were female, an average of 71%, most of which were married. Lesser portions were of single or widowed status, which varied across the districts.

⁴ Chulalongkorn University Platform for Ageing Research Innovation (Chula ARI)

Table 2: Genders of the sampled older persons by district

Gender	District								Total (n=162)	
	Phasi Charoen (n=16)		Pra Nakorn (n=22)		Wang Thonglang (n=38)		Din Daeng (n=86)			
	No.	%	No.	%	No.	%	No.	%	No.	%
Female	11	68.75	15	68.00	31	81.60	58	67.40	115	71.00
Male	5	31.25	7	32.00	7	18.40	28	32.60	47	29.00
Total	16	100.00	22	100.00	38	100.00	86	100.00	162	100.00

Table 3: Marital status of the sampled older persons by district

Marital status	District								Total (n=162)	
	Phasi Charoen (n=16)		Pra Nakorn (n=22)		Wang Thonglang (n=38)		Din Daeng (n=86)			
	No.	%	No.	%	No.	%	No.	%	No.	%
Married	6	37.50	13	59.00	20	52.60	51	59.30	90	55.56
Widowed	3	18.75	3	14.00	12	31.60	18	20.90	36	22.22
Single	4	25.00	6	27.00	2	5.30	12	14.00	24	14.81
Divorced	1	6.25	-	-	1	2.60	3	3.50	5	3.09
Others	2	12.50	-	-	3	7.90	2	2.30	7	4.32
Total	16	100.00	22	100.00	38	100.00	86	100.00	162	100.00

Economic status: Most of the older people were unemployed, approximately 62%. As for the employed group, its majority worked as low-skill laborers and sellers. Primary source of income for most of the older people was from their children.

Table 4: Occupations of the sampled older persons by district

Occupation	District								Total (n=162)	
	Phasi Charoen (n=16)		Pra Nakorn (n=22)		Wang Thonglang (n=38)		Din Daeng (n=86)			
	No.	%	No.	%	No.	%	No.	%	No.	%
Unemployed	6	37.50	11	50.00	20	52.63	63	73.26	100	61.73
Laborer	7	43.75	2	9.09	7	18.42	12	13.95	28	17.28
Seller	1	6.25	2	9.09	10	26.32	7	8.14	20	12.35
Food seller	-	0.00	7	31.82	-	0.00	-	0.00	7	4.32
Officer worker	2	12.50	-	0.00	-	0.00	-	0.00	2	1.23
Others	-	0.00	-	0.00	1	2.63	4	4.65	5	3.09
Total	16	100.00	22	100.00	38	100.00	86	100.00	162	100.00




Health conditions: About 80% of the elderly had health issues. The most prevalent was hypertension. Others found were gastritis, diabetes, etc. However, from the observation, the older persons looked well and strong with minor complications e.g. aches, stammered speech, which were not preventing them from living normally with friends, families, and others in the community.

Table 5: Health conditions of the sampled older persons by district

Health condition	District								Total (n=162)	
	Phasi Charoen (n=16)		Pra Nakorn (n=22)		Wang Thonglang (n=38)		Din Daeng (n=86)			
	No.	%	No.	%	No.	%	No.	%	No.	%
With issues	11	68.75	20	90.90	28	73.70	71	82.60	130	80.25
Without issues	5	31.25	2	9.10	10	26.30	15	17.40	32	19.75
Total	16	100.00	22	100.00	38	100.00	86	100.00	162	100.00

Housing conditions: Buildings of each district had different characteristics as shown in Table 6 below. However, utilization of spaces was similar i.e. how the interior and surrounding spaces of the residence were used, as behaviors and lifestyle of groups of older persons were similar across the districts.

Table 6: Housing conditions in the 4 studied districts

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
Housing conditions	 <p>2-story houses with the design of Ban Man Kong Housing Development Project. The older persons only lived on the first floor of the houses.</p>	 <p>2-story commercial buildings located in the conservation zone. The older persons lived on the first and second floor.</p>	 <p>2-story houses, found old and new across each community due to different times of construction. The older persons lived on the first and second floor.</p>	 <p>28-story building with 2 dedicated floors for older residents (8th – 9th floor). However, older residents were found living on many other floors across the building.</p>

2) Patterns and issues relevant to the housing conditions

From in-depth interviews and site surveys in the 4 districts, it was found that living patterns were similar across the districts i.e. living spaces were divided into the common area (interior space), sleeping

area, bathroom, and kitchen/ washing area. In Phasi Charoen, Pra Nakorn, and Wang Thonglang, stairways were found in the houses. As for Din Daeng district, the building was that of a hi-rise condo without any stairway within the unit. The main access was through passenger elevators.

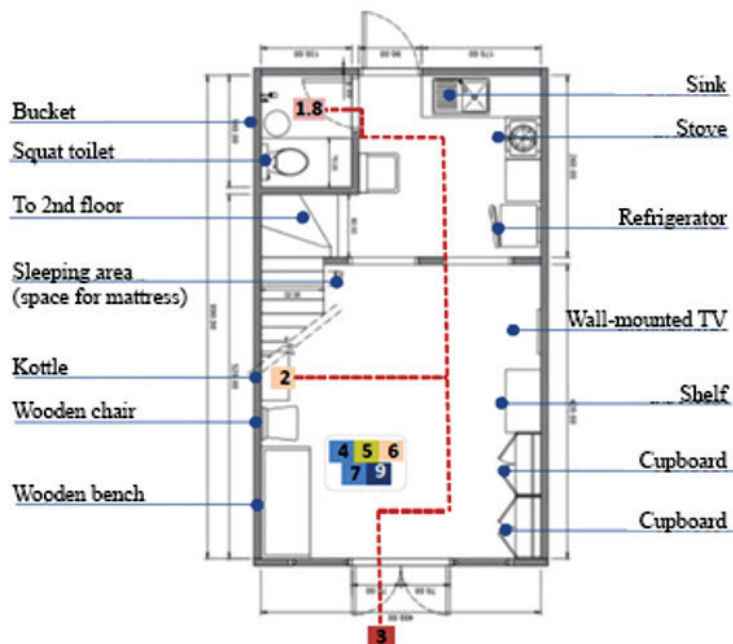


Figure 2.:
House plan of the residence in Phasi Charoen

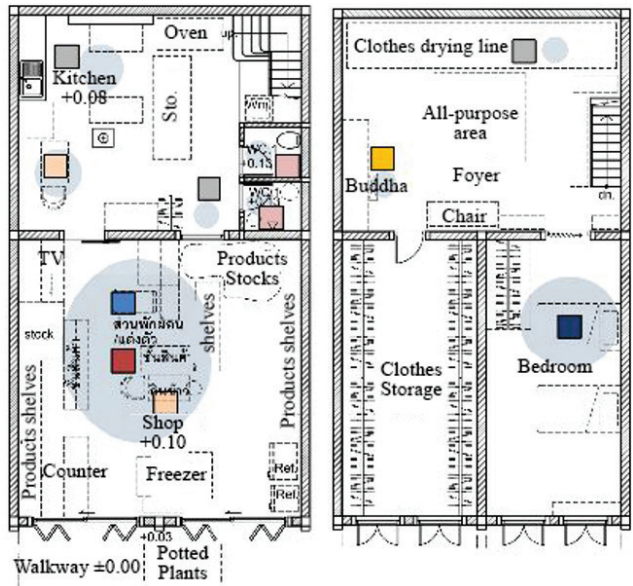


Figure 3:
House plan of the residence in Pra Nakorn

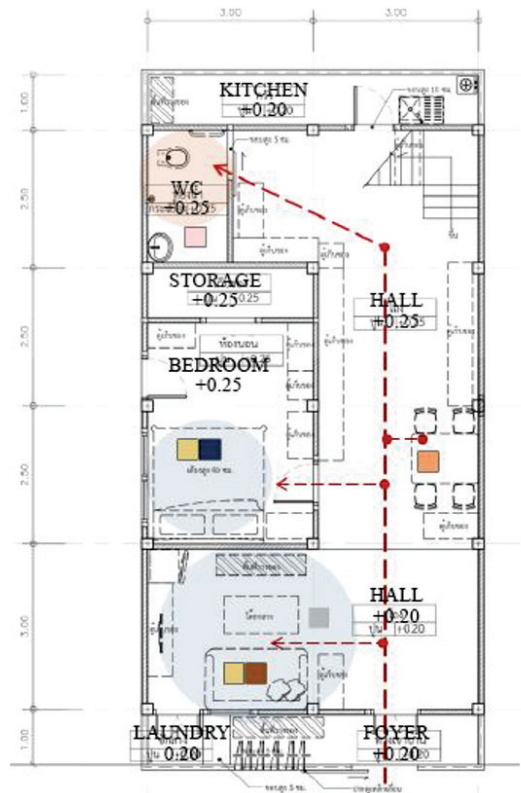


Figure 4:
House plan of the residence in Wang Thonglang

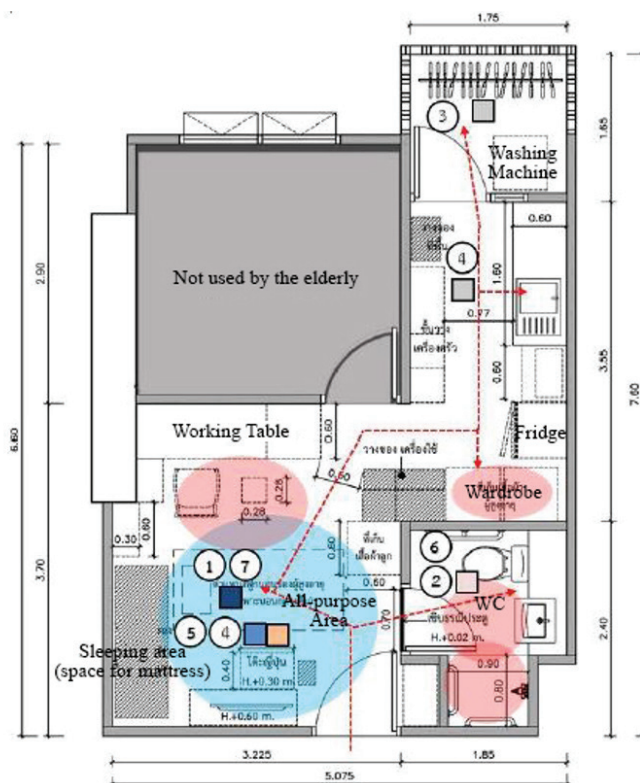


Figure 5:
House plan of the residence in Din Daeng

Across the 4 districts, the survey found issues both similar and different, which were categorized by space utilization i.e. all-purpose area (interior space), sleeping area, bathroom/ toilet, kitchen/ washing area, and stairway.

The condition of the all-purpose areas have deteriorated. The furniture was inappropriate for elderly people to use since tables and chairs are either too high or too short. Owing to the selection of wall color as a solid color, the atmosphere of the area was covered by a dark haze and gloom. In Phra Nakhon District, slip-prone floor material such as ceramic tiles were found mostly in use. In Wang Thonglang District, generally, there are stairs at the entrance of all-purpose area. Even if there are not many steps, most of them were steep stairs without handrails that caused difficulties to older persons. Besides, the all-purpose area and other areas floor levels were uneven or even had door curbs as borders in Phra Nakhon and Din Daeng causing increased risk to the elderly for tripping and falling.

For sleeping areas, it is found that the majority of elder people were using thin sheets or mattresses on the floor without a bed which made it inconvenient to get up in the morning. In the case of having beds, the elderly mostly placed their beds next to the wall with no space left which caused inaccessibilities. In Phasi Charoen District, sleeping area was usually arranged on the ground floor of the house, so it was suitable to use. However, in some districts, sleeping area was arranged on the second floor of the house which could possibly cause risk of falling from stairs.

Most bathrooms do not have handrails installed for the elderly that might lead to risk of slipping accidents except in Din Daeng district where rooms were intentionally designed for the elderly, so additional handrails have been installed. Despite that, the handrails installation was not proper. The position was too high and still not suitable for practical use. Moreover, in areas other than Din Daeng district, there were issues and problems with

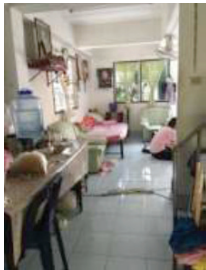
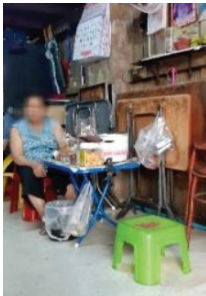
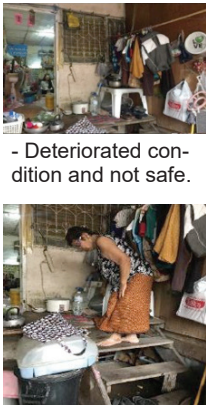
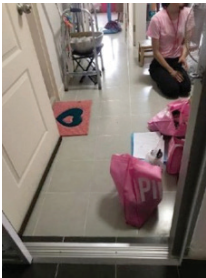
other inappropriate designs, such as the bathroom area being too small, and the installed position of sanitary wares make them difficult to use. The location of the bathroom was on a different floor with the bedroom. In the toilet or bathroom area, water on the floor drained slowly causing the wet and slip-prone floor, etc.

Kitchen or washing issues were encountered in all districts, mainly due to unsuitable furniture size and forms. Kitchen counters were found mostly without open space under the counters which was not convenient for participants who needed to sit in a wheelchair or had a walking stick to support walking. Also, the height of counters was too high and not consistent with the physiology of users. In Phasicharoen District, it was found that the gas tank and gas stove locations are not suitable for usage. In the area of Wang Thonglang, floor materials in the kitchen looks oily that increased risk of slipping. In Pra Nakorn district, most kitchen or washing areas were dilapidated.

The main physical problem found was that stair risers were higher than standard heights which was dangerous to use. Even though we found this similar physical problems in most areas, each area had different usage conditions. In Phasi Charoen district, most areas for the elderly are located on the ground floor of the house, so improper staircases were not problem. In Phra Nakhon district, the buildings were old and some located in conservation areas which were not possible to be improved. Stairs found in that areas were all dangerous with too high risers and too narrow treads yet elderly people still used them regularly. In Wang Thonglang District, the stairs were built based on standard width with handrails, but those handrails were not suitable for elderly use. In the Din Daeng area, since it was a tall building, the elderly accessed their units by using the passenger elevators. Therefore, there were no major challenges with the use of stairs. The studies found that form and size of the elevators were suitable for use.

All issues found could be summarized as shown in Table 7.









Table 7: Patterns and physical issues relevant to the housing conditions of the elderly in the 4 districts⁵

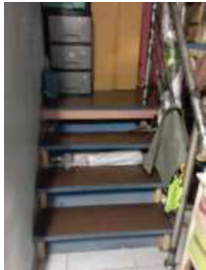


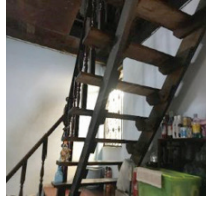
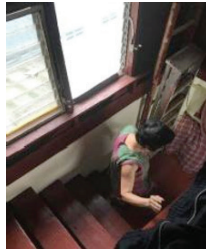

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
Interior all-purpose area	 <p>- Furniture was improperly high.</p>	 <p>- This table was too short.</p>	 <p>- Deteriorated condition and not safe.</p> <p>- Stair with high risers and without handrails</p>	 <p>- The added threshold to protect against dust and insects, which created uneven ground.</p>

⁵ Each picture was taken by the research team.

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
<p>Interior all-purpose area (continue)</p>		 <p>- The stool was too small and short. The couch was too soft making it difficult to get up.</p>  <p>- The deteriorated floor could cause accidents such as stumbling or slipping.</p>  <p>- Dark color of the walls gave a gloomy atmosphere.</p>  <p>- Uneven floor between rooms (also found thresholds)</p>		

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
<p>Sleeping area</p>	 <p>- Using mattress on the floor could be difficult getting up.</p>  <p>- It was proper for the elderly to live on the first floor.</p>	 <p>- Using mattress on the floor could be difficult getting up.</p>  <p>- The bed was usually pushed to one corner; no surrounding space.</p>  <p>- Some of the older persons slept on the second floor, exposed to risks of using the stairs.</p>	 <p>- Using mattress on the floor could be difficult getting up.</p>  <p>- The bed was usually pushed to one corner; no surrounding space.</p>	 <p>- The bed was usually pushed against one side of the walls.</p>
<p>Bathroom/ toilet</p>	 <p>- No handrails installed for the elderly.</p>	 <p>- No handrails installed for the elderly.</p> <p>- Far distance from the bed room</p> <p>- No toilet on the second floor, inconvenient for those sleeping on the second floor.</p>	 <p>- Slippery floor as water was not properly drained.</p>  <p>- Too small without any space for a care taker.</p>	 <p>- The handrail was too high.</p>

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
<p>Bathroom/ toilet (continue)</p>	 <p>- The toilet was away from the walls and too far to reach for when trying to stand up.</p>		 <p>- A toilet with a threshold.</p>	
<p>Kitchen/ washing area</p>	 <p>- LPG tank was further away from the stove that the LPG tube was made long and left hanging across the floor, which could cause an accident from tripping.</p>	 <p>- Space under the counter was not closed and too high.</p>  <p>- The seat was too short or the person had to squat sitting; difficult for older people.</p>  <p>- Kitchen floor was deteriorated and uneven.</p>	 <p>- Entrance to the kitchen was made with slippery material.</p>	 <p>- The counter was not transparent and too high.</p>

District	Phasi Charoen	Pra Nakorn	Wang Thonglang	Din Daeng
Stairs	 <p>- The house had 2 stories but was not the issue as the older persons lived on the first floor.</p>	 <p>- Too-high risers and too-narrow threads.</p>  <p>- Slippery stairs.</p>	 <p>- Too-high risers.</p>  <p>- Only one side of the handrail.</p>	 <p>- As a high rise building, elevators were normally used. The design and size were proper.</p>

3) Recommendations/ guidelines for improvement

The found physical conditions and issues led to some recommended guidelines for housing design and improvement for the residences in the 4 districts, which could be divided into interior all-purpose area, sleeping area, bathroom/ toilet, kitchen/ washing area, and stairs.

All-purpose area

The floor was of ceramic tiles or polished cement in bad condition that could cause slipping. This could be improved by using floor materials of rougher texture. In case of the conserved buildings, which did not allow renovation, vinyl floor tiles could be used on top after fixing the old floor as shown in figure 6.

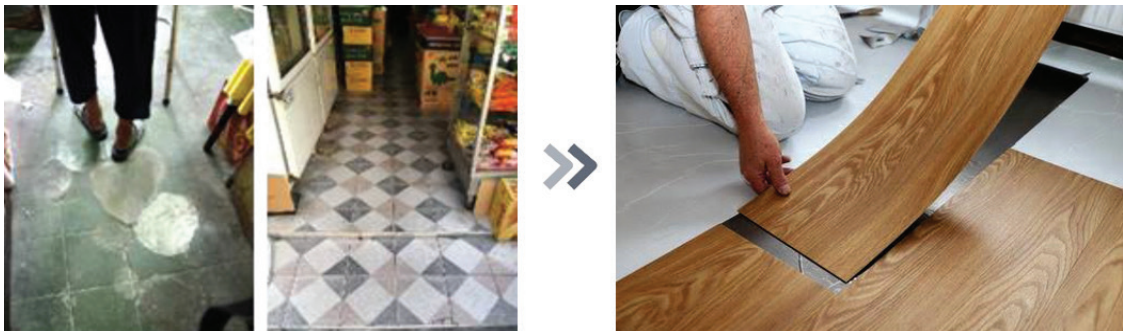


Figure 6:
Floor materials found at sites (left) and an example of using vinyl floor tiles (right)
(Sources: Photos taken by research team (Left), Tarkett Company (Right))



Figure 7:
Uneven floor (left) and an example of a ramp (right)
(Sources: Photos taken by research team (Left), Harmar Threshold Ramp - justwalkers.com (Right))

In addition, there was the issue of uneven floor and threshold, which caused difficulties or even accidents from tripping and falling to older persons. Therefore, it was recommended that each joint should be replaced with a ramp; a built, a ready-to-use, or a moveable one as shown in figure 7 for more convenience of the older residents

Sleeping area

Foldable sleeping mattresses were inappropriate for older people due to the difficulty of getting up. A replacement with a bed is recommended. In case of space constraint, a foldable bed could be put to use as shown in figure 8. Bedroom or sleeping areas for

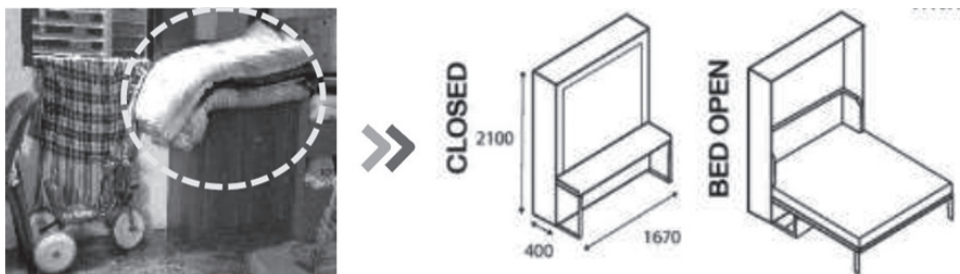


Figure 8:
A foldable mattress from the survey (left) and a foldable bed (right)
(Sources: Photos taken by research team (Left), domoreliving.com (Right))

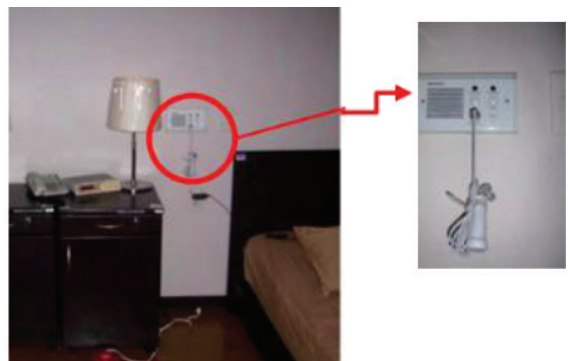


Figure 9:
Example of the bed with safety rail and emergency alarm
(Source: okwheelchair)

the elderly are on the second floor, which needed to be access via stairway and could cause accidents. It is recommended that the sleeping area for the older persons should be moved to the first floor. Safety rails should be installed at the side of the bed as well as an emergency alarm for the older persons to call for assistance conveniently.

Toilet

The toilet is the area the older people are most likely to have accidents and should be improved to meet the safety standard e.g. by installing a handrail on one side of the wall within a reaching range from the toilet bowl. In the case that the toilet bowl was not near either side of the walls, the toilet rail innovation⁶ could be used as shown in figure 10. The handrails available in the market could be costly. A cheaper alternative of PVC pipe could also be considered to save cost and still could reduce the risk of the older persons having accident in the toilet.

Kitchen/ washing area

Kitchen counters should be of the height for the use by the elderly, which is 0.75 meter by the standard. However, the number could be adjusted following the height and usage of the individual. Under the counter should be an open space, which was accessible for wheelchairs as shown in figure 11.

As for the case found in Phasi Charoen district, a long tube between the LPG tank and the stove was left on the floor and could cause accidents from tripping. A replacement with a set of stove tops with LPG tank housing is recommended as shown in figure 12, for more safety and convenience.



Figure 10: The toilet without a handrail of one of the samples (left) and an example use of the toilet rail innovation (right) (Sources: Photos taken by research team (Left), Faculty of Medicine Siriraj Hospital (Right))

⁶ The Toilet Rail innovation was awarded an outstanding innovation in 2015 by the Top Star Project, Faculty of Medicine Siriraj Hospital, Mahidol University.



Figure 11:
Example of a kitchen counter appropriate for the elderly
(Source: kitchenmagic.com)

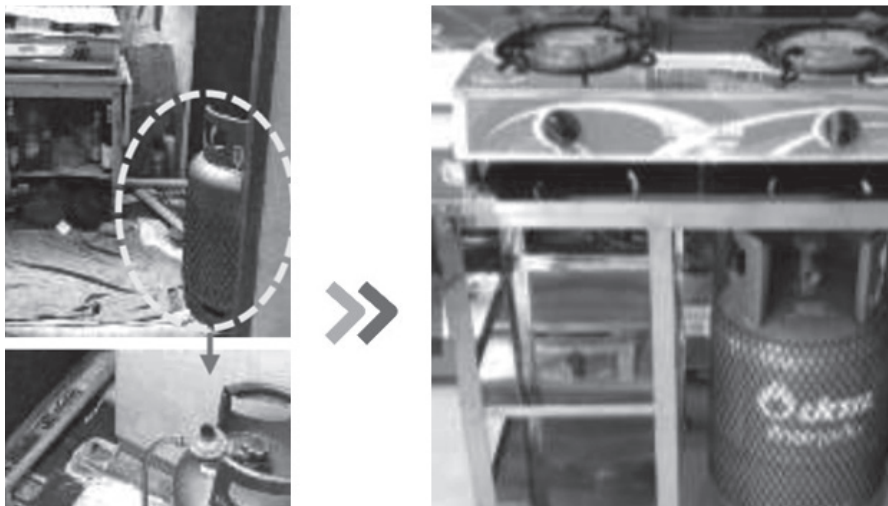


Figure 12:
The kitchen with safety issue (left) and an example of the improvement (right)
(Sources: Photos taken by research team (Left), muangnongas.com (Right))

Stairs

Stairways in some studied communities were found with higher risers and narrow treads as shown in figure 13. It was recommended to rebuild the stairs

to meet the minimum standard size for safer use by older persons. The risers and treads should also be distinguished with different colors. Anti-slippery tape should also be added on for more safety as shown in figure 14.



Figure 13. Inappropriate stairways found at the studied sites. (Sources: Photos taken by research team)

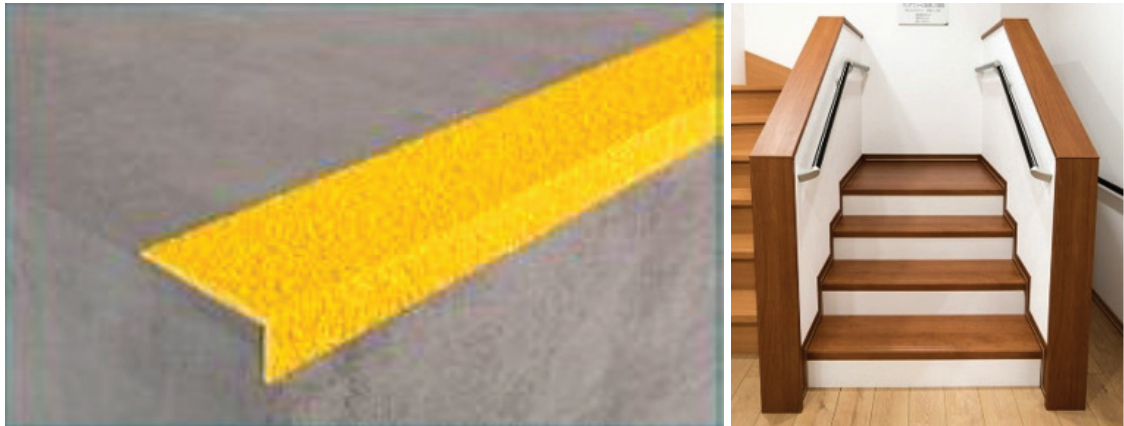


Figure 14. Example use of anti-slippery tape (left) and the stairs with distinguished colors of risers and threads (right) (Source: www.marketingoops.com/news/brand-move/aging-society)

CONCLUSION

The older people living in the 4 districts of Phasi Charoen, Pra Nakorn, Wang Thonglang, and Din Daeng are those who have lived in the area for a long time as well as new arrivals coming to live in the City with family or financial reasons. Development of the residences for the elderly living in Bangkok was limited by space constraints and the City Plan, in some cases. From the information gathered from the 4 districts, it was found that despite of the different housing conditions (e.g. low rise versus high rise building), older people shared quite a similar lifestyle and daily routine. The space usage and the relevant issues were also found to be similar. Considering their usage, the residential areas could be divided into an interior multi-purpose, a sleeping area, a toilet, a kitchen/ washing area, and a stairway. From the interviews and site surveys, it is appropriate to conclude and recommend as described above. Each of the recommendations aims to resolve physical issues and improve efficiency of space utilization. These recommendations could also be used as a guideline for future projects to help enable older people to live in their own homes and communities with good health, both physical and mental.

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