

## **The Study on the Usage of Interior Space in the Old Wooden Row Houses to Support The Elderly**

**Winai Mankhatitham<sup>1\*</sup> and Narong Butfang<sup>2</sup>**

<sup>1</sup>Program of Computer Technology Application in Architecture, Faculty of industrial Technology, Suan Sunandha Rajabhat University, Bangkok, Thailand

<sup>2</sup>T.C.M Management Co.,LTD. Nakhon Pathom, Thailand

\*Corresponding Author E mail :Winai.ma@ssru.ac.th

### **Abstract**

The study on the usage of interior space in the residence to accommodate the elderly was a study on the using interior space of the elderly in the row houses. As there was limited and narrow space it was important to modify space inside the house in order to make the living together within the family to be safe and comfortable for elderly in the community area. Data collection was divided into 2 methods, which were data collection from physical survey in the old wooden row houses and collecting data from behavior including interviewed residents. It was a Participatory research involving participation of villagers. Then the results were analyzed on the changing characteristics of the interior space. The research results found that among all the 15 houses. The living in the houses of the elderly each day, more than 80% were stayed in bedroom and about 70% were stayed in living area and all bedrooms were located on ground floor. There were relatively little ventilation and lighting inside the house and semi-glossy surface materials. There was still quite a few of other facilities, which will be conducive the usage for the elderly according to lack of knowledge and wasteful costs.

**Keyword:** Elderly, The Old Wooden Row House, Universal Design, Well Being, Participatory research

### **1. INTRODUCTION**

The 150 years old Bang Nok Khwaek old wooden row houses in Thailand were both commercial building and residence that made the old wooden row houses were different from other residential houses both physical and utility space characteristics where the utility space in the house will be vary according to the behaviors of residents in each house and from the past to the present.

This research project was to study the changing of interior living space in the Bang Nok Khwaek old wooden row houses that whether of the characteristics of the usage of utility space inside the old wooden row houses have changed from the past or not. And what the factors of that causes as well as whether it was suitable for the elderly in the house or not. By studying to conduct a physical survey and interview the residents in each house. Then the data was analyzed and summarized on the causes and characteristics of the changing of interior space inside the old wooden row houses how it can response to the needs of elderly who were staying in the houses.

### **2. OBJECTIVE**

- 2.1 To survey the utility space and behaviors of the residents in the old wooden row houses, Bang Nok Khwaek waterfront Market Community.
- 2.2 To analyze the characteristics of the interior space changing inside the old wooden row houses, Bang Nok Khwaek waterfront community.
- 2.3 To propose the guideline to improve interior space in the building to be safe for the elderly.

### **3. RESEARCH METHODOLOGY**

The study was started from the internal and external physical surveys and interviewed the residents in each house. After that, the data was analyzed and summarized.

From the survey of the physical characteristics and the number of dwellings, there were adjoining row houses that have front yard consecutive walkways with total of 56 units. For data collection, there was using of following methods: Participatory Research (PAR) and Open-Ended Question interviewing, which the question set up to enable respondents to think and respond fully without the setting format of the answers. The questions were allowed respondents to freely express their opinions and ideas by specifying the topics of inquiry as follows:

- 1) Community Background
- 2) Data of residents in the community
  - 2.1) Number of residents
  - 2.2) Period of time
  - 2.3) Occupation
- 3) Data on the utility space characteristics
  - 3.1) Renovation of interior space

#### 4. FINDINGS AND DISCUSSIONS

From the survey on physical data of the old wooden row houses, Bang Nok Khwaek Riverside can be summarized as follows:

The old wooden row houses in Bang Nok Khwaek waterfront community were houses built for trading activities and accommodation. Therefore, the utility space of the old wooden houses was different from other residential houses. (Boonnarapithak, Mankatitham, Sonthirat, & Siriponnoppakun, 2019) The old wooden row houses were mostly wooden overlaid walls, which have 1 floor and there were only 9 houses, which were houses number 13-14, 46-47, 54-58 where the 2nd floor was added to a total of 56 houses, 21 families. As the height of each house was 3.00 meters, the width was approximately 3.50 meters and the length were approximately 10.00 meters (excluding buildings with extensions).

There were 2 types of the roof characteristic, which the type 1 was Hip roof and type 2 was Gable roof, with eaves connected to prevent sunlight and rain.



**Figure 1:** Characteristics of the Old wooden row houses



**Figure 2:** The front of the house, next to the waterfront walkway

The fronts of the old wooden row houses, Bang Nok Khwaek waterfront faces Mae Klong River, stack a wooden pole into the river, lift the house floor away from water and built the consecutive walkway

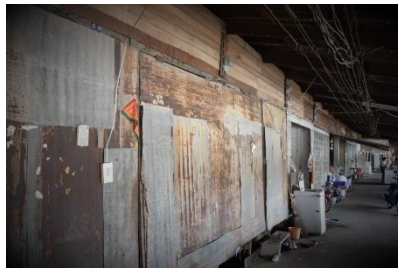
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bridges for walking in the community. Inside the old wooden row houses were divided into 2 parts, which were the front part that opened as a shop with space for trading and placing the goods and the back area was residential, which consists of a hall, bedroom, bathroom, kitchen and dining area. The walkway bridge was approximately 2.50 - 3.00 meters wide



**Figure 3:** The width of the walkway was approximately 2.50-3.00 m.

Next to the front walkway, there was a port for cargo handling and get on-get off. The side of the waterfront house was look like other residential except for the front door of the waterfront shop was made as an accordion door and the casement door that made from tin.



**Figure 4:** The casement door that made of tin

### 4.1 Data Collection from Surveys

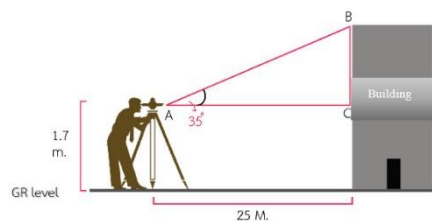
Procedures for surveying to measure the area proceed as follows:

4.1.1 Calculate the external building height

4.1.2 Calculated from the formula  $\tan A = BC / AC$  is the method of finding the height using the height altitude meter. Set far enough away from the building Capture the camera at eye level, A-B point.

4.1.3 Tilt the camera up and down to the highest level and record degrees (A)

4.1.4 Recording distance from the camera to the building. Suppose the figure is 25 m. The height from the camera level to the ground is 1.70 m.



**Figure 5:** Data Collection by the Survey

4.1.5 The process of substituting values in a formula will get a variable value,  $\tan 35^\circ$ ,  $AC = 25$ , when we get the variable We will replace it in the formula  $\tan 35 = 0.7$ ,  $AC = 25$ . The new formula is  $0.7 = BC$ .

$$\begin{aligned} \tan 35^\circ, AC &= 25 \\ &= 17.5 + 1.7 \\ 0.7 = BC/25 &= 19.2 \\ BC = 0.7 \times 2.5 &= 17.5 \end{aligned}$$

## 4.2 Data Collection from Interview Forms

For the interview results of 15 houses from 56 houses in total that can be summarized as follows: (G & Aminuddin, 2019)

### 4.2.1 Community Background

Khlong Bang Nok Khwaek was a canal connected to the Damnoen Saduak Canal and has been dug up together with Phasi Charoen Canal. In the reign of His Majesty King Rama IV, in order to expand the transportation routes from Bangkok to the Western cities. In the past, there used to be a floating market called "Nut Bang Nok Khwaek" on the day of the waxing- waning crescent moon - 1, 6 and 11 lunars were the center of trade and exchange of goods especially, agricultural products. In the past, there were always vendors and merchants mooring early in the morning even the sky wasn't clear. And people began to gradually come out to buy goods including food, desserts, fresh food and dried products that were available for selecting and buying. Until when the roads began to build through then the bustling of the market began to fade away.

Bang Nok Khwaek floating market used to be a bustling trade center in the past. Along the Mae Klong River, there were the Old wooden row houses with more than 100 years old. The row houses were consecutive built and could be considered to be the longest waterfront market of Samut Songkhram Province. Traces of the past were still can be found at Dong shua heung Chinese pharmacy, the old gas station by waterfront. And Mr Kangwan's House or generally known as "Bang Nok Khwaek Godfather", Aphidet Sithirun's house, a Thai boxer who has been given the nickname "The Great Kicker of Bang Nok Khwaek". There was also the relationship that linked to the period of the World War II, where it was a stopover place for Japanese troops that used as the route to transport supplies and military supplies between Bangkok and Kanchanaburi province. And the bombs were bombed by the Allies. As there were boats waiting to enter the Damnoen Saduak Canal and drift to the Tha Chin River at Bang Yang water gate. And in that bombing it was intended to cut off the withdrawal routes of the Japanese Imperial Army. The incident occurred on April 18, 1945 by a B-24 bomber from Air Squadron 356.

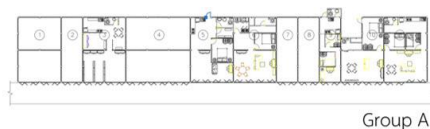
4.2.2 The Elderly data was used the structured interview principles as the in-depth interview (Chaloeichanya & Jarutach, 2016)

- Number of residents
- Period of stay
- Occupation

4.2.3 Information on the Utility space characteristics

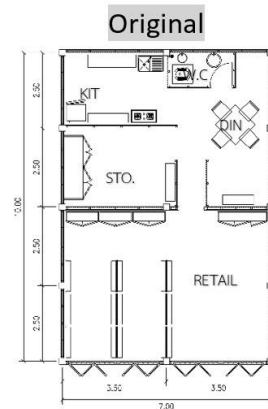
- Improvement and repairing of interior space

Group A.



**Figure 6 :** Layout Group A. House

Group A data, House no. 16 – 17



**Figure 7:** Shows the utility space, house number 16 – 17

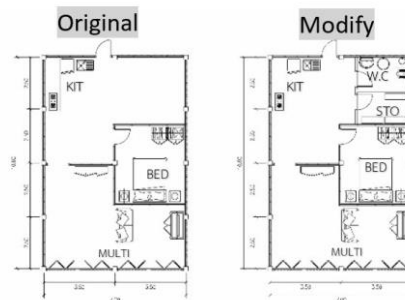
### Resident Information

**Owner :** Mrs. Suwana, aged 75 years old, has living together with his younger brother, Mr. Somchai who has residing for more than 70 years by opening a general consumer goods shop

### Information on the Utility space characteristics

- The backyard area has an open kitchen and bathroom.
- Inside the house there was room partition that has been built to store the goods for trading.
- The area in the front was for trading during the day and used to sleep at night.
- The utility space in the house was not has any extension and there was only the attached of a steel door for safety in year 1992. Later in the year 2013, the roof has been damaged so there was the changing of a new tin roof.

Group A data, House no. 21 – 22



**Figure 8:** Shows the utility space, house number 21 – 22

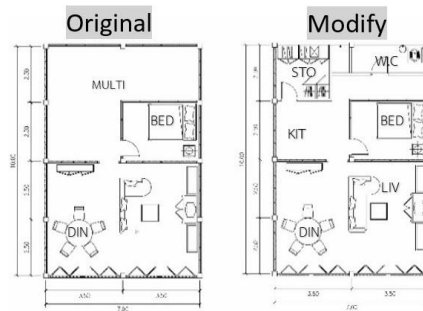
### Resident Information

**Owner:** Mr. Poonsak, aged 58 years old, residing before year 1977, live together with his children, daughter-in-law and grandchildren. He has opened the ice and refreshment business and has delivery to restaurants and general stores. Sometimes also has been hired for repairing the house.

### Information on the Utility space characteristics

- There were extensions of a bathroom and storage room according to the original area did not have a toilet inside the house, which caused the inconveniences

Group A data, House no. 23 – 24



**Figure 9:** Shows the utility space, house number 23 – 24

**Resident Information**

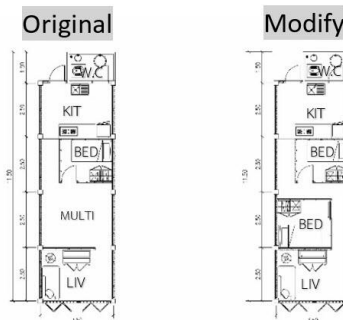
**Owner:** Mr. Daeng, aged 70 years old, residing for more than 40 years and living alone. In the past, Mr. Daeng's house was opened for business such as Boat gas station and general sales and currently the business has been stopped and closed.

**Information on the Utility space characteristics**

- In year 2007, there was the extension of the interior space by partitioning the room as a dressing room and bathroom.

- In year 2013, there was the changing of a new tin roof according to the original was damaged and not be able to use again. There was an additional bathroom and storage room at the back of the house.

Group A data, House no. 27



**Figure 10:** Shows the utility space, house number 27

**Resident Information**

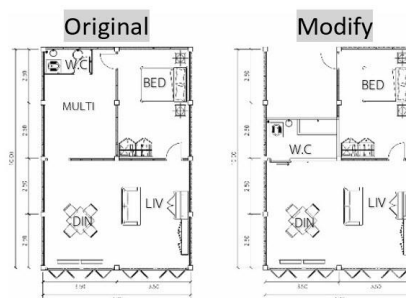
**Owner:** Mrs. Mali aged 66 years old, living together with 3 persons, residing for about 30 years and do not operate any business.

**Information on the Utility space characteristics**

- In year 2013, there was the changing of new tin roof due to the original tin roof was damaged.

- In year 2018, there was an extension of the room partition, which was bedroom 1 and for bedroom 2 was the original bedroom since she has been moved in.

Group A data, House no. 28 – 29



**Figure 11:** Shows the utility space, house number 28-29

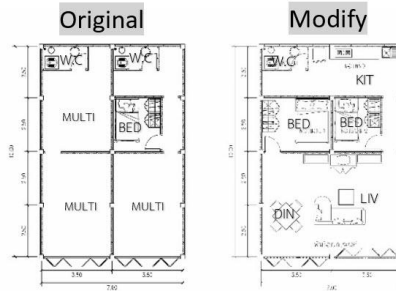
**Resident Information**

Resident: Mr. Pongsak, aged 63 years old, residing for more than 70 years and currently lives alone. In the past, he used to work for boat towing and boat transportation. At present, he is selling balm.

**Information on the Utility space characteristics**

- In year 2018, there was the extensions to make a new bathroom with concrete materials and repaired some parts of the floor that was damaged including the roof as well. There was a rear exit door in the bedroom.

Group A data, House no. 30 – 31



**Figure 12:** Shows the utility space, house number 30-31

**Resident Information**

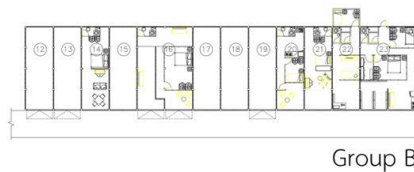
Resident : Mrs. Pimpa, aged 55 years old, residing for more than 60 years, currently living alone and has a shop selling steamed dumplings and steamed bun only on Saturday and Sunday.

**Information on the Utility space characteristics**

At the beginning, She had rented only one room, which was room number 31. Later, in year 1997, room number 30 was resold to her.

- In year 2014, there was the changing of tin roof according to the original tin roof was damaged and could not be able to use again.

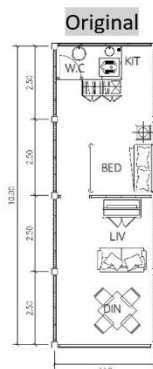
Group B



Group B

**Figure 13:** Layout Group B. House

Group B data, House no. 34



**Figure 14:** Shows the utility space, house number 34

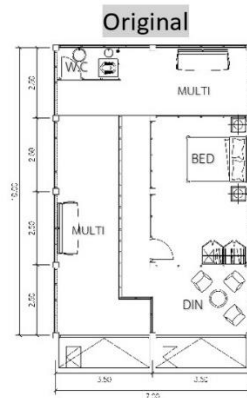
**Resident Information**

Anonymous resident: aged 60 years old, live together with 3 person and residing for about 10 years and opening a shop to sell consumer goods.

**Information on the Utility space characteristics**

-The interior space at the front of the house was used as resting area and was separated by a wooden wall as a living room. The bathroom was located at the back of the house. The house owner did not make any changes or additions.

Group B data, House no. 36-37



**Figure 15:** Shows the utility space, house number 36-37

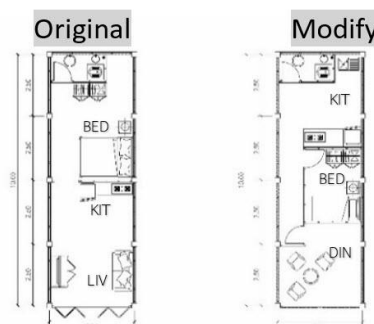
**Resident Information**

Resident: Mr. Chusri, aged 40 years old, 2 persons living together more than 20 years and opening the shop to sell Pad Thai with fresh shrimp, which open every day.

**Information on the Utility space characteristics**

- There was a partition to create a bedroom and bathroom at the back of the house. There was no exit door at the back of the house. The house owner did not change or add any space. There was only a small repaired at some places that were damaged.

Group B data, House no. 41



**Figure 16:** Shows the utility space, house number 41

**Resident Information**

Anonymous resident: aged 62 years old, live alone and residing for about 60 years, currently does not open any business.

**Information on the Utility space characteristics**

In the past, house number 42 had the same characteristics as other houses, with walls between the front and the back. Until about the year 1997, the walls has been removed and replaced with a smart board wall and a new room partition. The front area was for relaxing and chatting with neighbors and the bedroom was in the middle of the house. The bathroom was at the back of the house. The kitchen was an open kitchen in front of the bathroom and also changing to a new ceiling and new door from accordion door that can be removed to a steel door.

Group B data, House no. 42





**Figure 17:** Shows the utility space, house number 42

**Resident Information**

Resident: Mr.Somkiat, aged 50 years old, living alone, residing for more than 60 years. He opened a shop selling dried rice on Saturday - Sunday, while on weekdays he did the trading in Bangkok for over 10 years.

**Information on the Utility space characteristics**

- In Year 2007, there was the changing of all the wooden walls in the house as a smart board wall including changing to a new ceiling and removing the room wall partition and took a showcase as partition instead to prevent from seeing private area.

Group B data, House no. 43



**Figure 18:** Shows the utility space, house number 43

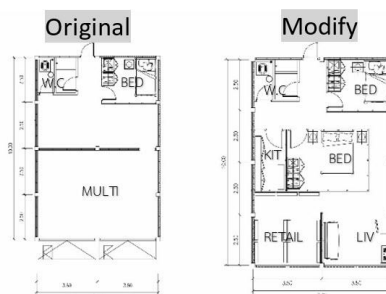
**Resident Information**

Anonymous resident: aged 71 years old, only provided information that he lives alone more than 10 years and now is opening the old style coffee shop.

**Information on the Utility space characteristics**

-The front door was a steel door that extends the interior space. The front area of the house was used for trading and used as a kitchen. Next to the trading area was separated by a wooden wall as a resting area and there was a bedroom at the back of the house There were two bathrooms in the front of the second bedroom.

Group B data, House no. 44-45



**Figure 19:** Shows the utility space, house number 44-45

**Resident Information**

Anonymous resident: aged 68 years old, only provided information that there were 3 persons living together over 50 years and currently, opening a dessert shop, Khanom Look Choup (Deletable Imitation Fruit).

**Information on the Utility space characteristics**

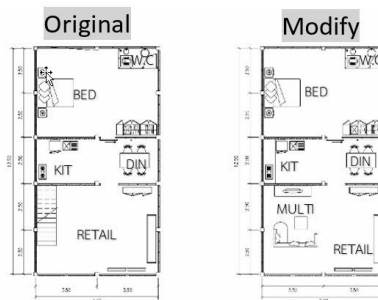
-The front door was a steel door that stretches the interior space. The front area was divided into half by a smart-wall board with the left half used for trading and the right half was for a multipurpose area where the kitchen was in this area. Next to the bedroom was the storage room. At the back area were two adjoining bathrooms and another bedroom. There was a back door of the house.

Group C



**Figure 20:** Layout Group C. House

Group C data, House no. 46-47



**Figure 21:** Shows the utility space, house number 46-47

**Resident Information**

Resident: Mr. Nan, aged 60 years old, former village headman, living together with his wife, residing for over 63 years and has a shop selling palm sugar.

**Information on the Utility space characteristics**

-The interior space at the front of the house was used as a resting area. There was a partition with smart boards to make a kitchen and bedroom with wc. In the past, this house has been extended to the second floor and removed in year 1997.

Group C data, House no. 62



**Figure 22:** Shows the utility space, house number 62

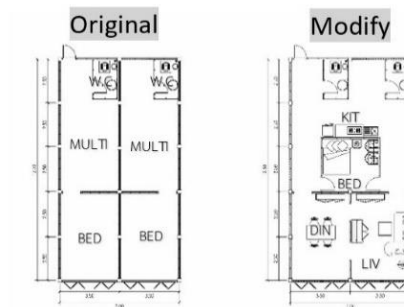
**Resident Information**

Anonymous resident: aged 69 years old, provided only information that there were 2 persons living together and residing since year 2017 and at present, doing loincloth business.

**Information on the Utility space characteristics**

-The front door was casement door or tank front door. The front area of the house was used for loincloths trading and using curtains to prevent the outsiders from seeing the private areas that used as living area. Next to the living area, the partition of room was made for using as a kitchen. The bathroom was located outside the house where the owner has not made any changes or additions since residing.

Group C data, House no. 66-67



**Figure 23:** Shows the utility space, house number 66-67

**Resident Information**

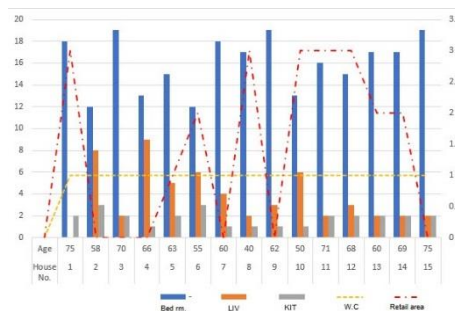
Resident: Mrs.Aumporn, 75 years old, 3 persons living together, residing since year 1972 and did not run any businesses currently.

**Information on the Utility space characteristics**

- Year 2007, the interior space where the front area of the house was used as a resting area, made partition on half of the space with a smart board wall, adding new bedroom walls with smart boards. And installed additional steel doors for increased more safety. The kitchen area was an open kitchen. There were two bathrooms at the back of the house. There was an exit door at the back of the house.

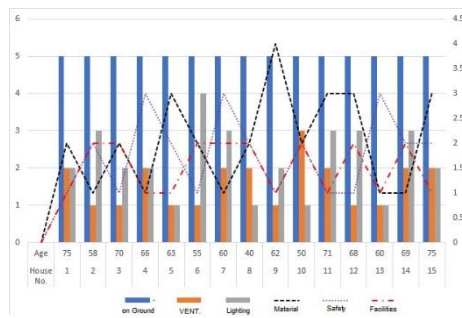
**5. CONCLUSION AND RECOMMENDATIONS**

From the physical surveys and interviewed with residents from 15 houses, the usage of the interior space in the house by number of usage hours per day can be summarized as follows:



**Figure 24:** Shows the usage of interior space in the house in each day of the elderly

It was found that more than 80 percent most of the elderly spent time in the bedroom in each day because most elderly wanted to have a rest and sleeping during the day and went to bed early and woke up early. Elderly who were very old have used the bedroom area more than younger elderly. The second most used area was the parlor that was used in various activities with approximately 70 percent. Sometimes the elderly has used the sitting area and eating together. For the trading area, it was depending on the activities and occupation of each person, which most elderly used about 3-4 hours a day.



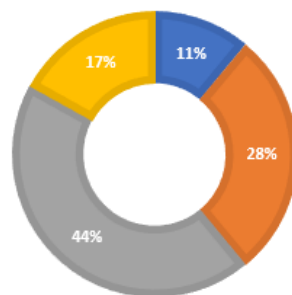
**Figure 25:** Shows the characteristics and conditions of various areas inside the house

The interior characteristic for all 15 elderly houses have a bedroom at downstairs, which was good for the elderly. Many row houses did not level the floors that resulted to the safety in using that reduced the chance of slipping for elderly (Hooi & Yaacob, 2019) There were poor ventilation and lighting because it was a row building that built continuously and there was opening in the front area only. The surface materials in the house were the most common materials, most of which are semi-glossy, semi-coarse materials such as bathroom tiles, wood flooring and so on, which enough to help ensure a moderate level of safety. As for other facilities that help to facilitate the use of elderly inside the house were still quite a few because most elderly were lack of the understanding in using of those facilities. So it made them him thought that it was not necessary and wasting costs such as handrails in the bathroom. Changing the toilet from squatting to flushing as the bathroom area was the area that needs to be improved for the most suitable using because it was the highest risk area to cause accident in the house.

The causes for changing the interior space in the house were from the survey on the condition inside the house since the past residents until the present residents. It was found that there were many causes for changing the interior space in all 15 row houses, which can be divided into issues as follows:

1. 11% from nothing added
2. 28% from repairing damaged parts
3. 44% from modifying living space
4. 17% from removing and rebuilding

■ Nothing ■ Repair damaged parts ■ Modify living space ■ Removing and rebuilding



**Figure 26:** Shows the proportion of causes of the changing on living space inside the house

The guideline to improve the area to support the elderly could be summarized as follows:

1. The general area inside the house did not have problems and obstacles to the living of elderly.
2. Should increase ventilation by Should increase ventilation by using mechanical systems to help such as installing ventilation fans on the roof to help to draw more air from the front into the house by using passive design principles (Aflaki, Mahyuddin, Al-Cheikh Mahmoud, & Baharum, 2015)
3. Should increase the light in the area that the elderly use regularly, for example the stairway area or areas with obstructions and should use light-colored walls such as white, light blue and cream to help brighten the room more (Piriyasurawong & Buasri, 2017)

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4. The toilet should be improved as following:

- 4.1 Change the doorknob to be able to open from the outside (to prevent the unconscious elderly in the bathroom).
- 4.2 Change the bathroom tile flooring material to rough type and slip sheets at the shower area.
- 4.3 Add handrails for the toilet and shower areas to enable the elderly to balance the body.



**Figure 27:** Shower handrails

4.4 Replacing a squatting toilet to flush toilet or arranged accessories to cover original toilet to allow the elderly be able to sit and take a piss, because the squatting toilets will easily cause Osteoarthritis (ERBAŞ, 2006)



**Figure 28:** The defecated sitting chair for the elderly

Source: <https://www.amazon.es/inoxidable-plegableport C3 A1til-embarazada discapacitada / dp / B074C7W7N7>

4.5 Leveling the bathroom floor to have an appropriate slope to prevent waterlogging and should not have a door sill.

4.6 The help signal should be installed in the bathroom in case of an emergency

The data that has been researched was the data that obtained from the physical survey of the interior space inside the residence and interviewed with the stakeholders who stayed in the houses in order to show the modifying of interior space in the houses when there were elderly living together. The proposed concept was to create safety in the house to reduce various accidents that might be occurred. But in reality, the house owners may not be able to modify immediately. Because it was also depend on the need for the budget to proceed. However, it was the beginning for house owners to be aware of the safety in the houses. For further research, interested people can conduct more in-depth research on each of the sub-issues, including additional study of elderly behavior, which will help the elderly to live more comfortably.

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