Risk Factors Fall in the Elderly at Panti Werdha Sejahtera Banjarbaru

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Abstract: Spatial design influences human behaviour conducting activities within. These influence includes attitude, action, psychological condition, safety feeling, and lenience in doing activities. Anthropometry is essential in spatial design. The objective of this study is to define the impact of incorrect anthropometric spatial design on elderly fall risk, to know identify accident level occurring as result of incorrect anthropometric spatial design, and to provide spatial design solution appropriate for elderly safety. This study is designed as a qualitative descriptive study with whole 110 habitants of Panti Sosial Tresna Werdha "Budi Sejahtera" population. Purposive sampling method is used with consideration on the elderly's ability to respond in communication. Data are analysed using descriptive statistic method. The spatial design of Panti Sosial Tresna Werdha "Budi Sejahtera" does not fully accommodate safety factors for elderly. This is supported by the frequence fall accidents happened there, espesially female elderly. The spatial design should pay more consideration on safety factors for the elderly by taking inhabitants' anthropometric characteristics into consideration.

1 INTRODUCTION

One indicator of the success of Health Development in Indonesia is the increasing Life Expectancy Age. In National Medium Term Development Plan, Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2014 Life Expectancy Age was expected to increase from 70.6 years in 2010 to become 72 years in 2014. As a result of the increasing age of life expectancy, the age structure of the population will change.

Nowadays, Indonesia is included in top five of countries with highest number of elderly, which reaches 18.1 millions in 2010 or 9.6% of the total population. National Development Agency, Badan Pembangunan Nasional (Bappenas) predicted that the number of elderly will be doubled in 2025 reaching 36 millions (BPS, 2009). International data by the U.S Census Bureau indicates that the number of elderly in Indonesia shows significant growth. In 2007, the number of elderly was 18.96 millions and became 20.54 millions in 2009. it is predicted that in 2025 the number will reach 27 millions. This increasing Life Expectancy Age is indicated by the increasing number of he population who reached age 60 years or above (Balitbang Kemenkes RI, 2013).

The increasing number of elderly rises several problems. When a person reaches the age of elderly, he or she will experience degradation of biological, physiological, psychological, and spiritual conditions. These degradation create some health problems for elderly. One of the problems is the increasing fall risk. It has been reported that more than one third of elderly who reached age 65 or more experienced fall every year. One of every three cases was recurrence (Gai et al, 2010).

Health effort for elderly is complete basic health effort. This includes enhancement, preventive, curative, and rehabilitative health (Darmojo, 2009). In Indonesia, approximately 30-50% elderly who reached age 65 years or more ecperienced fall every year (Probosuseno, in Widuri, 2010). Tuti's study (2013) shows that in Panti Sosial Tresna Wredha Unit Abiyoso, Pakem, Sleman, Yogyakarta, from 46 elderly being observed 52,2% had experienced fall. Tuti (2013) indicates that risk factor of falls are age

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and gender, mainly happened in the age group of 75-90 years (55%), and happened to male (58,8%) more than female.

Based on interview with polyclinic officers of Panti Werdha "Budi Sejahtera" Banjarbaru, it can be indicated that fall accident in elderly is quite high. Hartono and Indah (2012) states that the result of anthropometric study on the inhabitants of Panti Sosial Tresna Werdha "Budi Sejahtera" shows that there are some significant gaps between the result of the study on body proportion of the elderly from the standard stated in Minister of Public Works Regulation Peraturan Menteri Pekerjaan Umum Number: 30/PRT/M/2006. Minister of Public Works Regulation Number: 30/PRT/M/2006 contains the standard of accessibility for environment and building. Accessibility factors include safety, easiness, function, and independence for building users to be able to do activities within. The problem in this study is derived from this condition: is fall experienced by the elderly resulted from spatial design that does not considere the anthropometric characteristics of the inhabitants.

2 RESEARCH METHOD

The study is conducted in Panti Sosial Tresna Werdha "Budi Sejahtera" located in Jl. A. Yani Km. 21.700 Kelurahan Landasan Ulin Tengah Banjarbaru. This study is conducted in several stages: preparation, data collection, analysis, and data synthesis. The population is all 110 inhabitants of Panti Werdha "Budi Sejahtera". Purposive sampling methode is used to choose 83 samples that have good abilities to respond in communication.

The variables in the study are respondents characteristics: anthropometric characteristics, age, gender, and physical conditions, respondents fall risk characteristics: fall history and fall location and spatial design of the facilities.Data collection technique is applied as follows: Primary Data, These data includes anthropometric characteristics, fall risk, and spatial design. Anthropometric characteristics and spatial design data are collected through direct observation and direct measure. Fall risk data is collected from health record and interview with both inhabitants and polyclinic officers. Secondary Data, These data include age and health condition of the inhabitants. They are collected from polyclinic record. The analysis is conducted by tabulation and percentage calculation then being analyzed using qualitative descriptive method.

3 RESULT

From 83 samples of 110 inhabitants of Panti Werdha "Budi Sejahtera, there are 46 males and 37 females. Age distribution can be seen in the following table:

Table 1. Respondents's age group

Age Group	Total	Percentage
60 - 65 year	23	28%
66 - 70 year	15	18%
71 - 75 year	21	25%
76 - 80 year	13	16%
More than 80 year	11	13%

The result of anthropometric measure shows that the average height of respondents is different to the average height of Indonesian which is 170 cm as indicated in Minister of Public Works Regulation Number : 30/Prt/M/2006 on Facility Technical Guidelines and Accessibility in Building and Environment page 13 as followed:

Figure 1. Average height according to standard

The result of anthropometric measure show that the average height of male respondents is 149.6 cm and 138.9 cm for female residents. The result of the measure is shown in following table:

Table 2. Result of respondents' anthropometric measure

Gender	Body Position	Part being Measured	Average Result (cm)
Male	Standing Up	Height	149,6
		Hand fist height	65
		Chest	32,5
		Ability to lift up foot	11,7
	Sitting	Height	94,8

	Squatting	Knee Height	39,3
Female	Standing Up	Height	138,9
		Hand fist height	59,2
		Chest	35,3
		Ability to lift up foot	11,6
	Sitting	Height	66,6
	Squatting	Knee Height	35,1

Based on interview and confirmed by polyclinic record, between 2015 – 2016 there were 31 cases of fall. This means 15-16 accidents every year or 1.3 accidents per month. From the accidents, 11 cases (35%) involved male respondents, and 20 cases (65%)involved female respondents. There 9 respondents who experienced recurrence, the following table shows fall accidents related to age group.

Table 3. Fall accidents based on age group

Age Group	Total Case	Percentage compared to total Respondents	Percentage compared to number of elderly in age group
60 - 65 year	14	45%	61%
66 - 70 year	2	6%	13%
71 - 75 year	6	19%	29%
76 - 80 year	3	10%	23%
More than 80 year	6	19%	55%

Table 3 shows that fall accidents occur mostly in the age group of 60-65 year (61%) and the age group of more than 80 year (55%). It is interesting that fall accidents mostly occur in the youngest age group. One factor that influences it is the fact that most respondents within the youngest age group have lived in the facility for not a long time. Thus, they are still in the process of adapting to the environment of the facility.

Fall can happen anywhere. Fall accidents mostly occurred in toilet (65%), followed by dish washing room (26%). The following table shows the location of fall accidents in Panti Werdha Budi Sejahtera.

Table 4. Location of fall accidents

Location	Number of Accident	Percentage
Toilet	20	65%
Dish washing room	8	26%
Bedroom	2	6%
Terrace	1	3%

The result of direct observation on spatial design of the facility shows, the height of steps from outside to the terrace is 25 cm, floor is covered with smooth-textured ceramics. It is slippery not only when it is wet, hand-railing inside building is 80 cm high, while railing outside building along pedestrian way is 90 cm high, the floor in the toilet is very slippery and not well-maintained. The difference between the floor peil and closet peil is 30 cm. The height of water tank is 80 cm, the floor of dish washing room is made of smooth-textured wood. Some parts are covered with mould. Thus it is very slippery, especially when it is wet. The height of the water tap is 70 cm.

4 DISCUSSIONS

This study indicates that most fall accidents occurred in area related to water, namely toilet and dish washing room. The slippery condition of the floor is the main cause of fall accidents.

Toilets are covered with ceramics that are not abrasive enough. Thus, the slipperiness increases when it is wet. The difference of main room floor peil with toilet floor peil is about 5 cm. There is no different floor texture and color. This increases the fall risk since there is no texture and color difference for clue of different peil height. With the sippery condition of toilet floor, toilet users will have to experience the slipperiness without warning of different texture and color of the floor. It is suggested that toilet floor uses more abrasive tiles with contrast color different form those of the main room. The different of floor peil of the toilet and main room is suggested to be 2 cm. This to avoid tripping.

The difference between toilet floor peil and the closet peil is 30 cm. It is different from the standard that states 15 – 19 cm. Anthropometric study of the respondents shows that the ability for respondents to lift up their feet is 11,64 cm for female and 11,71 cm for male. The peil difference of 30 cm makes it difficult for respondents to use closet and unsupportive to their physiological condition. Even the standard height of 15 – 19 cm is not supportive. The ideal height should be 10 cm. This poor condition is worsen by the unavailability of hand-railing. Hand-railing should be installed with the height of 35 cm around the closet and 55 cm and 70 cm around the toilets. These heights are in accordance with the anthropometric measure.

Water tank's height is 80 cm. It is not supportive to the respondents' physiological ability. Based on thi

study, the height of hand fist in standing up position is 59,23 cm for females and 64,95 cm for males. It is suggested that the height of water tank is maximum 70 cm. For lavation, the height of water tank should be 35 cm in accordance with the height of squatting position. Thus, the water tank is divided into two parts, the one with the height of 70 cm for bathing needs and the other one for lavation with the height of 35 cm.

The floor of dish washing area is made of soft-textured wood planks. Some parts are covered with mould. Thus, it is slippery. This poor condition is worsen by the unavailability of hand-railing for users to hold. It is suggested that the floor covering should be made of concrete block which has more abrasive surface. The floor color should be made contrast to the color of back terrace floor as a clue for different floor peils. The different of floor peil of the terrace and dish washing area is suggested to be 2 cm. The height of water tap is already in accordance to the anthropometric study which is 70 cm. Hand-railing should be installed with the height 55 cm and 70 cm around the dish washing area.

Hand-railing inside building is 80 cm high, while railing outside building along pedestrian way is 90 cm high. According to standard, hand railing should be installed doubled with the height of 65 cm and 80 cm. The result of anthropometric study requires the hand railing installed with the height of 55 cm and 70 cm supportive to the height of hand fist in standing position 64.95 cm for male and 59.23 for female.

The height of steps from outside to the terrace is 25 cm. it is not in accordance with the standard that requires the height of 15-19 cm. The standard itself is not supportive to the physiological condition of the respondents who have the ability to lift up their feet only for 11,64 cm female and 11,71 cm for male. Thus, it is suggested that the height of the steps are not more than 10 cm.

Fall accidents mostly occurred inthe age group of 60-65 year and more than 80 year. It cannot be concluded that fall risk increase by the increasing of age as stated by Tuti (2009). Tuti (2009) finds that fall accidents occur mostly in the age group of 75-90 years (55%). Tuti also indicated that fall accidents more likely happen to male (58.8%) rather than female. This study shows different result. Fall accidents are more likely to occur among female (65%). rathen than male.

5 CONCLUSIONS

It can be concluded that anthropometric study shows that the average height of respondents is under the average of Indonesian according to standard. Human anthropometry plays an essential role in spasial design. In this case of study, government standard cannot be applied to the spatial design of fasilities in Panti Werdha Budi Sejahtera.

This study also shows that most fall accidents in Panti Werdha Budi Sejahtera are related to slippery floor, the existence of water, and hand railing factors, both unavailability and its installment that is not in accordance with the anthropometric condition of respondents. The correct decision of flooring materials can help the safety of the inhabitnts in a building. Abrasive surface can prevent falling. Applying different floor color on surfaces with different peils can halp users to be more aware of the difference of floor peil. Hand railing is essential factor in spatial design to support accessibility and safety for elderly. It is shown that anthropometric consideration in spatial design is influential to elderly's fall risk.

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