

Research Paper

The Study on Age-Friendly Environments for an Improvement of Quality of Life for Elderly, Asian Mega City, Thailand

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ABSTRACT

With the global trends of urbanization and aging population, more focus about the design of age-friendly environments to improve quality of life for our residents aged of 60 years and more is increasing. The pursuit of healthy, productive, and purposeful aging must become a priority for all communities, especially in Asian megacity, Thailand. In order to enable living environment for older people as a resource for their families, communities and economies, the complex infrastructure and social context must be unfolded. Thus, this study attempted to understand the health-related problem of age groups among difference life styles and neighborhood characteristics toward the appropriate recommendation of an age-friendly city by conducting the site investigation together with questionnaire survey. The total 1,000 sets of older people were interviewed by working closely with authorities from Banpaew district of Samutsakorn Province, Thailand. The technique of focus groups among caregivers and service providers in the public, voluntary and private sectors, the in-depth interview was executed and comprehended. The results from the focus groups led to a recommendation for longevity urban environment which could be promoted to encourage active ageing by optimizing opportunities for health, participation and security in order to enhance quality of life.

1. Introduction

In the context of the increasing percentage of older adults in many countries (Beard et al., 2012). The problems arising from the development of the city causing the world to experience problems in aging society. In 2015, there were 12.3 percent of the population aged 60 years and over and has a tendency to increase continuously. According to the global population forecast in 2050, the proportion will increase

to 21.5% of the total population (United Nations, 2017). Thailand with a lower birth rate that contributes to the increase in the elderly population, which is continuing to increase due to the aging population aged over 60 years, more than 9,125,970 people, or 17.19 percent (Ministry of Public Health, 2018). According to the Cohort-Component population forecast from 2005 – 2035, it was found that Thailand will be going to the situation of an aging population of more than 20 percent, to age index of 103.2, and will enter the aging society completely in 2021 and increase continuously. The

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increasing life expectancy combined with declining birth rates have caused much concerns about the impact of an ageing population. The consideration must be paid to the future generations that will struggle to meet that brings effect in many dimensions (UN population report, 2008), especially health care costs increase with age. More attention should be shaped to focusing particularly on older adults who are inactive experience significantly greater health problems (CDC and the Merck Company Foundation, 2007). Including the quality of access to basic social services and the living environment, the performance of urban service has become an obstacle to living an older life. Especially, in suburban or rural areas that have limited access to basic services compared to those living in urban areas. Thus, many challenges to be prepared for aging society is essential to ensure that the population ages healthily and that increased longevity is accompanied by better quality of life (Vagetti et al., 2015).

This research focuses on the study on the relationship between activities and health to recommendation the creative environment that is suitable for the lifelong living of an aging society. By emphasizing the role of place and the built environment in contributing to health and well-being (Barton and Grant, 2006). By design of the built environment in order to promote physical activity, it would help to improve activity levels of aged group which physically tend to decline progressively with increasing age (Franke et al., 2013). With this consideration on human space interaction and bring about the appropriate planning and design, it can enhance the long-term health and well-being of those who use them regularly, reduce the risk of falls, promote physical activity and reduce social isolation (WHO, 2002).

2. Literature review

2.1. Situation of age population in Samutsakorn, Thailand

Due to the increasing situation of the elderly population that will enter the elderly society completely in a short time, there must be a plan to prepare to cope with such changes, especially planning in suburban or rural areas with limited access to social services. The study attempted to assess the case of Samutsakorn province, Thailand which could be a representative of afore mentioned situation. When considering the trend of study area with its demographic change, it was found that the elderly population in Samutsakorn province during 2015 - 2030, has aging index of 129.92 percent. Sooner, it will become completely elderly society in 2025 and will increase by another 53.25 percentage in the year 2030 as shown in Fig.1. Furthermore, the situation is in the decline stage due to lacking elderly plans to support the aged group both public services and infrastructures together with unemployment situation, high cost of living and the environmental quality problem that are deteriorating from industry sectors in the study area (Four-Year Development Plan, Samutsakorn Province, 2017). When considering its spatial context and urban environment which is another important factor for demonstrating the quality of life of elderly group, it was obviously seen relative unplanned situation while most cities in developed countries have neighborhood environment to supports the elderly group by living nearby or with green spaces and recreation areas.

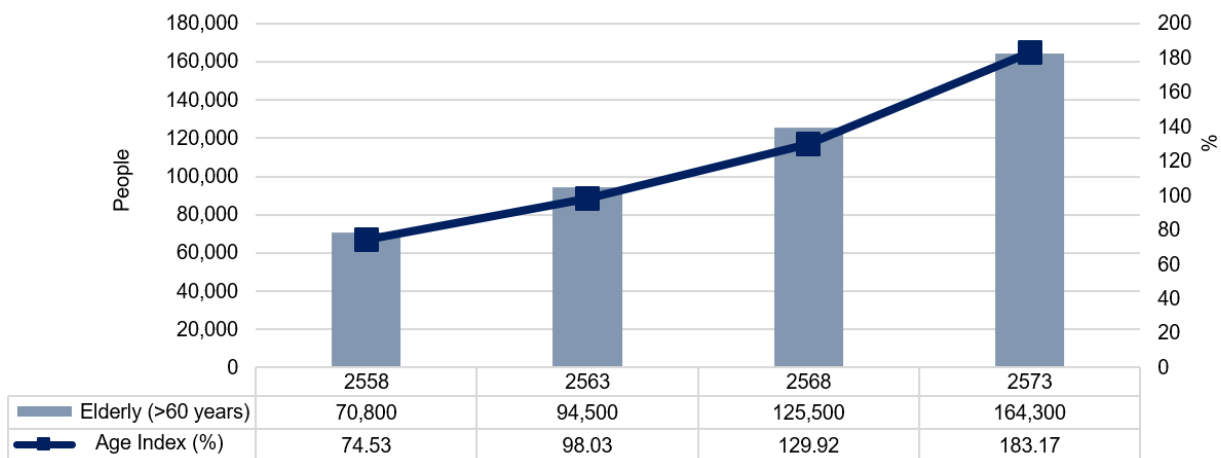


Fig. 1. Elderly population trends and elderly index in Samutsakorn province (Source: Ministry of Social Development and Human Security, 2015.)

This is an important aspect of urban characteristics for the elderly which should be designed and planned in suitable manner for both usage and accessibility. The daily space and facility allocation was not planned to support safety and secure pattern of utilization which could be seen from the random placed of exercise location along roadside of the secondary street with a distance of less than 1 meter resulted on unwalkable environment. Including, deteriorating of walking conditions lead to unpleasant environment for nonmotorization and less diversified activities provided for public spaces. The only green area that helps the elderly is their existing orchards. The design and planning of urban facilities and infrastructure must be the potential and appropriate to town and the elderly population.

2.2. *The relationship of the built environment and the elderly*

Changing the environment both in terms of landscape and usage affecting the quality of life and satisfaction of living in their own community for difference age group. Especially, those who need to live in that community every day, like the elderly. Which is quite sensitive to that changes due to limitation on physical movement and daily activities of the elderly, usually in the residential area and its surrounding (Musil, 1982). A good urban environment affects the vitality of the city in which the elderly live daily. Since the community environment is considered as a major factor affecting the stress of living in the elderly long-term care, it could not be overlooked to improve the urban environment to facilitate such care and daily life (Phillips, Siu, Yeh, & Cheng, 2005). Due to limitations in physical fitness and financial resources of the elderly, as a result, the daily activities of the elderly are in the neighborhood of the community and travel on foot.

Therefore, the design of the community should consider such conditions as well to provide comfortably access to basic social services such as shops, service centers or community interaction areas. Most of the communities in the urban area, surrounded by the infrastructure allocation and pedestrian facility better than the rural area. However, there is a risk of crime and travel accidents more easily than the countryside coupled with the relatively small relationship between people in the communities. Consequently, living in the community is not always good for the elderly. Improving the built environment to support the elderly living is a necessity to

be developed in both urban and rural areas and it should encourage the generation of the elderly as well.

2.2.1. *Active aging*

The active ageing concept was defined by the World Health Organization (WHO) as the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age (WHO, 2002). There is a strong case for promoting active ageing through the design of the built environment in order to promote physical activity. The concept of active ageing encompasses both physical activity and wider social and community participation. Much of the available evidences and innovations is focused on the role of the built environment in removing barriers to, or supporting, physical activity (Housing, 2016).

2.2.2. *Physical activity and Built environments*

The environment is an integral part to encouraging physical activity that the built environment which is defined as the part of the physical environment (Goldstein, 2002). It can be constructed or modified by human activity, including buildings, grounds around buildings, layout of communities, transportation infrastructure, and parks and trails. (Transportation Research Board and Institute of Medicine, 2005; Saelens and Handy, 2008). Built environment features that are hypothesized to be associated with recreational and transport activity have been divided into four categories which are recreational, community, land use characteristics, neighborhoods form characteristics. Specific features of the built environment that has been found to correlate with physical activity levels include mixed land use, residential density and street connectivity (Gebel et al., 2007; Sallis et al., 2012). Characteristics of built environments from neighborhoods to cities was found to have relationship with rates of chronic disease and mental health, including risk factors such as obesity (Frank et al., 2003; Ewing et al., 2003). For physical activity, it can be classified into four domains of life that describes how people spend their time which are recreational, occupational, transport and household activities. Physical activity are relevant to and driven by the built environment features and is believed to be a critical mechanism by which built environments can affect chronic disease (Pratt et al., 2004; Frumkin et al., 2004; Frank et al., 2003).

2.3. Health and Physical activity

As health declines and relevant risk increases with age, it effects on functional limitations and progressively lose the ability to live that effect on physical and mental health. Each decade after age thirty, maximum oxygen uptake declines by about 8 percent to 16 percent, muscle strength declines by about 10 percent to 15 percent, and the risk from falls increases (Paterson, Jones and Rice, 2007). For older adults who have functional limitations, engaging in physical activities helps to recover and delay the onset of disability (Carr et al., 2013). More active individuals are less depressed and anxious and have higher ratings of quality of life (Nelson et al., 2007). The appropriate physical activities can slow functional decline in later life and related to reduced morbidity and mortality (Talbot et al., 2003; Paterson, Jones, and Rice, 2007; Carr et al., 2013; Hrobonova et al., 2011). Furthermore, outdoor physical activities benefit mental health by increasing the opportunities to access nature and reducing the risk of depression (Hartig et al., 2014; Mitchell, 2013).

3. Methodology

3.1. Sampling strategy

This study is focusing on the relationship between activities and health in order to predict the creative

environment that is suitable for the life of an aging society. By applying survey research, the method of descriptive research and analytical statistics was employed to explain the pain point of aging group in suburban area. This research selected a specific study area in Samutsakorn province by emphasis on Ban Phaeo district. This is to achieve practical integration and participation of government agencies, the private sector, the education sector and local people. In addition, the study area has the context of rural communities and the proportion of the elderly is counted more than another two districts within the province as illustrated in Table 1. The distribution of aged group in this districted was found make life and activities including access to basic social services with limited living conditions.

The sample group focuses on elderly people aged about 60 years and older, particularly all are living in Ban Phaeo district, Samutsakorn province. The size of the sample group was calculated from number of populations in Ban Phaeo district with a total population of 97,005 persons which was determined the sample size by using the formula of Taro Yamane (Yamane, 1986). By defining the sample error of 0.01% and finally the minimum number of sample group was received of 400 samples. Therefore, in order to cover the number of sample group within this research, the data collection was designed to gather a total of 1,000 samples by using purposive sampling technique.

Table 1. Number of elderly people in Samutsakorn Province, 2018

District	Total population	Number of elderly		Registered elderly	Social bound		Home bound		Bed bound	
		N	%		N	%	N	%	N	%
Samutsakorn	246,080	38,152	(15.50)	24,072	23,357	(97.03)	512	(2.13)	203	(0.84)
Krathum Baen	133,158	20,736	(15.57)	13,513	13,254	(98.08)	200	(1.48)	59	(0.45)
Ban Phaew	81,025	16,614	(20.51)	12,683	12,264	(96.70)	302	(2.38)	117	(0.92)
Total	460,263	75,502	(16.40)	50,268	48,875	(97.23)	1,014	(2.02)	379	(0.75)

Source: HDC, 2018

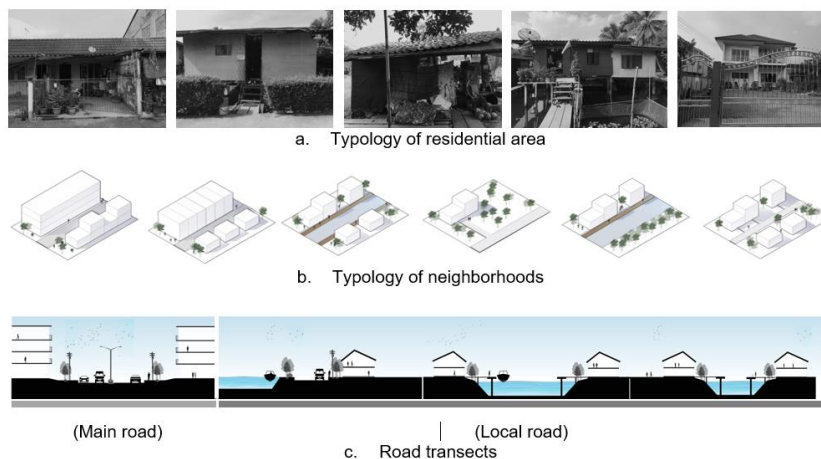


Fig. 2. Site characteristics of Ban Phaeo district, Samutsakorn province

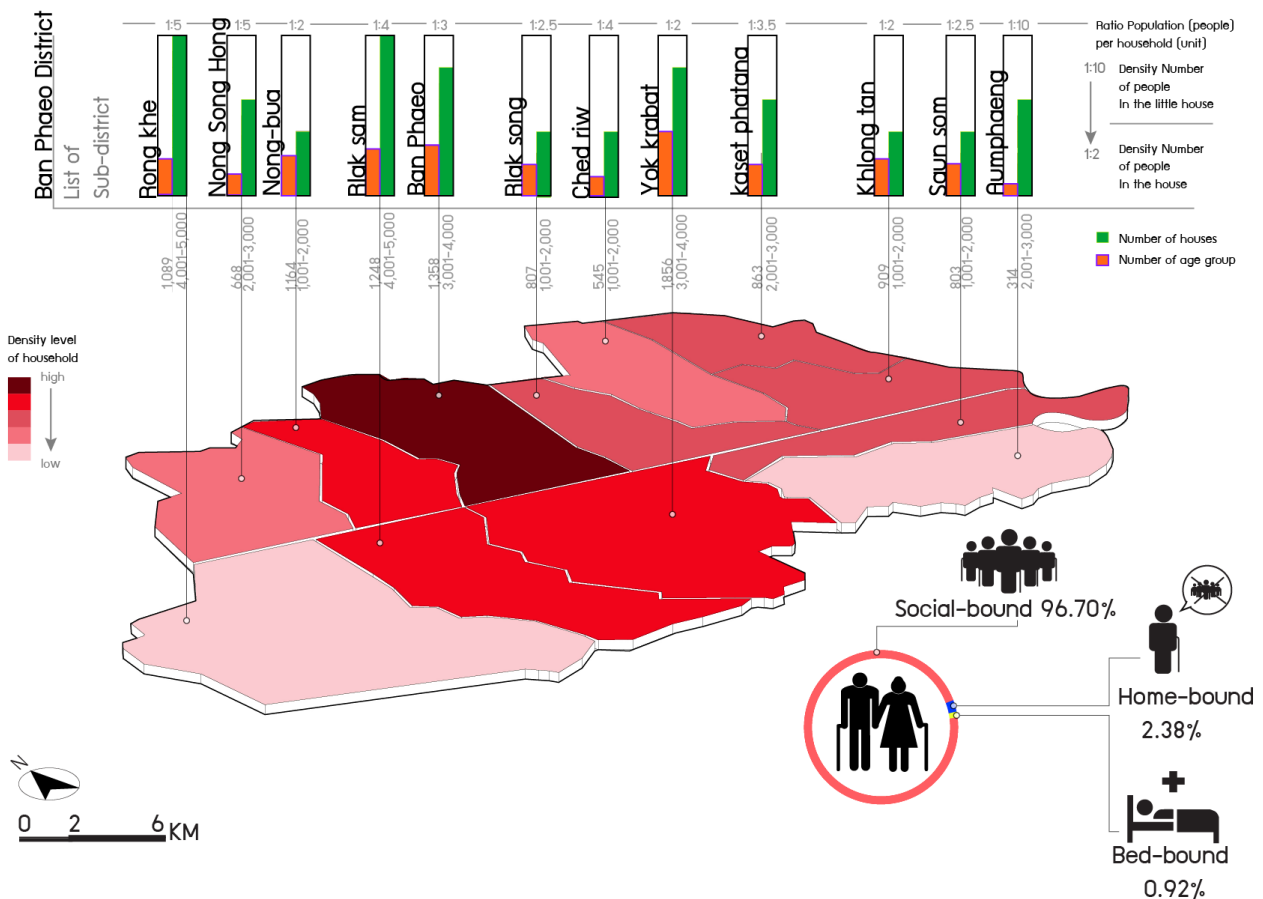


Fig. 3. Sample size at Ban Phaeo district, Samutsakorn, Thailand

3.2. Data collection

The collected data by 1,000 sets of questionnaires which was surveyed for this research. It was focused on physical activity and built environment factor including socio-economic of samples in different dwelling units with age more than 60 years.

The process of collection was face to face interview survey and requested collaboration from public health volunteers of local for help research team collect data each household (one person per home) (Fig. 2) and then the data were analyzed by using descriptive statistic. The period of questionnaire survey was 4 months during August to December, 2018. The set of questionnaires were classified into 3 parts which consist of (a) socio-economic (b) physical and mental health (c) pattern of physical activity. The distribution of questionnaires are designed according to population density in each district for coverage and distribution of data gathering (Fig. 3).

3.3. Measurement and Data analysis

The data collection was conducted into 3 parts which the detail of distribution can be explained as follows (Fig. 4):

- *Socio-economic* were assessed by using explainable indicators such as age, gender, income and family which were collected by interview and questionnaire. The research was designed the attribute of analysis to measure aging group for general information which represent individual data among elderly. It demonstrates difference social and economic characteristics led to providing appropriate health services.
- *Health status* are explained variable of health status both ADL (Activities of daily living) and the number of chronic diseases. The ADL were measured with self-rated health by using likert scale range from 1 [very poor] to 4 [very good] that consist of 10 factor which were (1), transfer (2), mobility (3), toilets use (4), grooming (5), bladder (6), bowels (7), bathing (8), feeding (9), dressing (10), stairs. Other health indicators were the number of chronic medical conditions (a total of 10 sets) (Fernandez-Mayoralas, Giraldez-Garcia, Forjaz, Rojo-Perez, Martinez-Martin, & PrietoFlores, 2012) that were measured using with scores ranging from 0-3; (0=No chronic diseases, 1=1-2 chronic diseases, 2=3-4 chronic diseases, 3=more than 4 chronic diseases up).

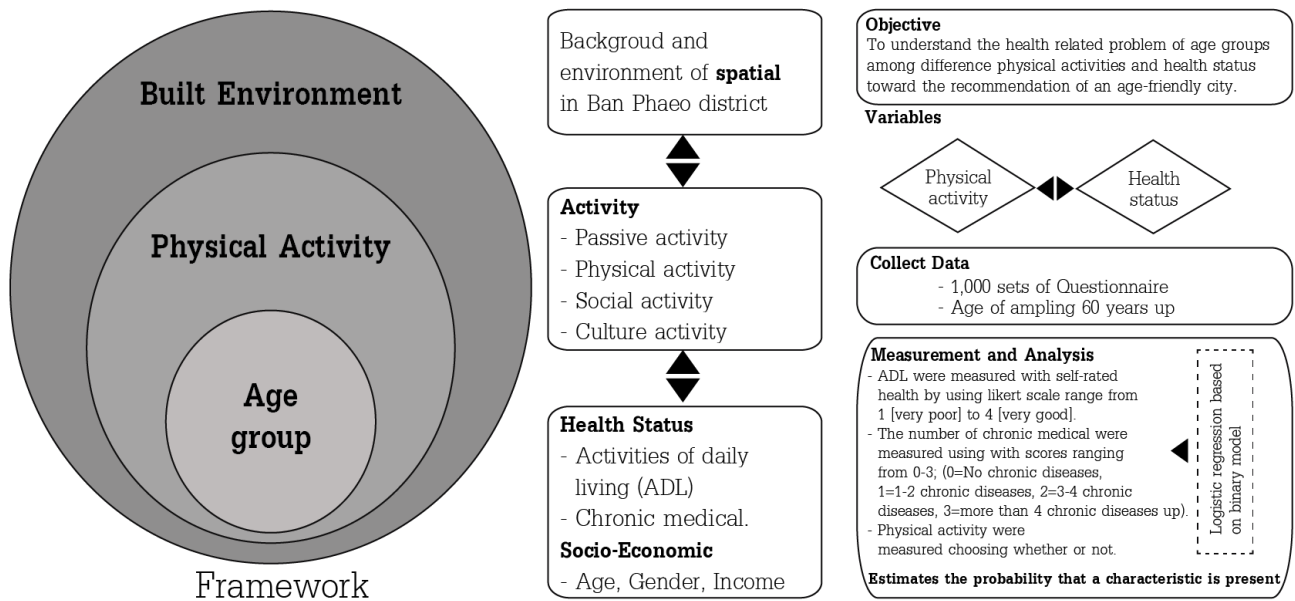


Fig. 4. Framework of study

- *Physical activity* can be classified into four domains of life that describes how people spend their time: recreational, occupational, transport and household activities (Pratt et al., 2004). It could be measured the dependent variable from questions about whether or not they engaged in physical activities: (1) physical, (2) passive, (3) cultural or occupational and (4) social (Fernández-Mayoralas et al., 2015).

Data analysis were executed together, comparatively assessing the distributions of the variables by applying logistic regression based on binary model. The independent variable were socio-economic and health status and dependent variable was represented by their characteristic of physical activity. Binary logistic regression estimates the probability that a characteristic is present (e.g. estimate probability of "success") (Pennstate Eberly college of science, 2018). It was utilized to estimate the probability to understand the health related problem of age groups among difference physical activities and health status toward the appropriate recommendation of an age-friendly city.

4. Result of analysis

Considering the built environment as an intervention for improving physical activity, it can demonstrate advantages and perspective through relative both activity and health of aged group in Ban Phaeo district. To allocate appropriate plan of built environment to promote quality of elderly life, the in-depth information from aged

group is an imperative input. From 1,000 samplings, the detail of their socio economic can be shown in Table 2.

- **Socio-economic aspect:**

When considering socio-economic factor by cross tabulation, it was shown that most of the information is female which is in the early age group with the age range between 60-69 years. Most of the income of the elderly group is over 68.8 percent with income less than 2,000 baths which is considered in the group of low income. The majority source of income is from elderly fund and low income fund that were supported by the government. The characteristics of residential areas were located in the suburb area with the average household members are relatively higher than in the urban area. It presents the average number of household members of 3-5 person per household.

- **Health aspect:**

Health status were about 1-2 diseases and most have a chronic disease due to physical condition of the elderly. General diseases were blood pressure, diabetes, heart disease, kidney disease, memory loss, arthritis bone and skin, respectively. For the nature of the disease, the elderly has the most symptoms 2-10 years, especially with the diabetes disease, pressure disease, kidney disease. Most of elderly receives regular treatment by follow a doctor appointment every 3-6 months according to the symptoms of the disease. In terms of physical activities, it was found that the nature of activities as this is research classified into 4 types of activities and described as follows:

- (1) Passive activity: watching TV, listening to the radio, listening to music, board games, handicrafts, etc.;
- (2) Physical activity: swimming, going to the gym, dancing, walking, playing petanque, bowling, etc.;
- (3) Social activity: participate mass or to church, meeting relatives and friends, etc.);
- (4) Culture or occupation activity: go to the movies or theatre, museums and exhibitions, reading, studying, playing a musical instrument, painting, drawing, etc.).

Most of the elderly chose to do activities from their convenience of traveling and activities that are conducted regularly. Including the readiness of the physical health of the elderly group, most of the activities are in the neighborhood area, not too far away that most of them are able to travel on their own, such as walking. This is due to the reason that they do not have to rely on others during the daytime. However, with the physical characteristics of Ban Phaeo district both urban and agricultural communities, the urban context represents densely populated and concentrated habitats. On the other hand, in the agricultural community, there is a habitat in a distributed area of agricultural land. The housing location is far. In addition, it is also located far from the government service facility. Therefore, it is necessary to have an appropriate environmental planning and design to cover the facility allocation and their living conditions. This is due to the designing of the environment is favorable to the elderly will help the elderly to become more self-reliant. The social interaction is important in life of the elderly which will help make the

elderly have a healthy body and mind, including a better idea system. The key consideration should be focused on social interaction, including maintaining relationships which is an important part of the health of the elderly. Additionally, the introduction of new technology would help the elderly to have more social interaction.

5. Discussions

The purpose of this article was to shed further light on the link between physical activities and health to recommendation the appropriate creative built environment. By considering health and social aspects, the current economy of the sample that could link to the activities in each category to consider the possibility of doing activities. This useful information will lead to the design and planning for the urban environment of different characteristics of the elderly group. To promoting and increasing the opportunities to access physical activity among aged group, physical activities will help creating benefit mental and physical health and reducing the risk of depression for aged groups. There result of analysis could be explained as shown in Table 3.

From the result of Table 3, it was found that factors there are relationship of pattern of activity and socio-economic variables which are age, number of diseases and ability to live. When considering the details of sub-variables, it was found that some sub-variables was not correlated with the pattern of activity.

Table 2. The characteristics of socio-economic among different aged groups

Variable	Early aged (60-69 years)	Middle aged (70-79 years)	Old aged (>80 years up)	p-value
	N (%)	N (%)	N (%)	
Gender				0.093
Female	256 (61.98%)	220 (62.32%)	154 (65.81%)	
Male	157 (38.02%)	133 (37.68%)	80 (34.19%)	
Income (baht)				0.000
Less than 2,000	231 (55.93%)	249 (70.54%)	208 (88.88%)	
2,000-5,000	85 (20.58%)	65 (18.41%)	16 (6.84%)	
5,001-10,000	56 (13.56%)	25 (7.08%)	10 (4.27%)	
10,001-15,000	21 (5.08%)	6 (1.70%)	0 (0%)	
15,001-20,000	10 (2.42%)	5 (1.42%)	0 (0%)	
More than 20,000	10 (2.42%)	3 (0.85%)	0 (0%)	
Member in family				0.138
1-3 persons	171 (41.40%)	176 (49.86%)	120 (51.28%)	
4-6 persons	192 (46.49%)	146 (41.36%)	92 (39.32%)	
7-9 persons	44 (10.65%)	27 (7.65%)	17 (7.26%)	
More than 9 persons	6 (1.45%)	4 (1.13%)	4 (1.71%)	
Number of chronic disease				0.006
No chronic disease	135 (32.69%)	83 (23.51%)	55 (23.50%)	
1-2 chronic disease	245 (59.32%)	220 (62.32%)	153 (65.38%)	
More 3 chronic disease	33 (7.99%)	49 (13.88%)	26 (11.11%)	
Pattern of activity				
Passive activity	277 (48.5%)	205 (35.9%)	89 (15.6%)	0.001
Physical activity	166 (46.2%)	119 (33.1%)	74 (20.6%)	0.049
Social activity	48 (39.3%)	44 (36.1%)	30 (24.6%)	0.022
Culture or occupation activity	11 (73.3%)	4 (26.7%)	0 (0.0%)	0.889

Table 3. The relationship between physical activities and health to recommendation the creative environment

Variable	Passive Activity		Physical Activity		Social Activity		Cultural Activity	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Age								
Age (60-69 years)	2.140*	[1.469, 3.117]	1.148	[0.782, 1.689]	0.875	[0.506, 1.513]	-	-
Age (70-79 years)	1,823*	[1.270,2.618]	0.956	[0.657, 1.389]	0.954	[0.564, 1.614]	-	-
Chronic disease								
No Chronic disease	1.233	[0.761,1.997]	1.953*	[1.167, 3.268]	1.162	[0.576, 2.344]	1.308	[0.15, 1.20]
1-2 Chronic disease	1.510*	[0.974, 2.340]	1.545	[0.957, 2.492]	0.969	[0.509, 1.844]	1.022	[0.12, 8.40]
ADL								
Transfer	2.105*	[1.129, 3.923]	1.976*	[1.047, 33.732]	1.368	[0.628, 2.976]	-	-
Mobility	0.897	[0.492, 1.634]	0.595	[0.324, 1.093]	0.702	[0.331, 1.490]	-	-
Toilets use	1.695	[0.705, 4.077]	1.982	[0.797, 4.929]	2.092	[0.717, 3.102]	-	-
Grooming	0.420	[0.152, 1.165]	0.339	[0.124, 0.929]	3.350	[0.780, 1.395]	-	-
Bladder	1.175	[0.751, 3.258]	2.929	[0.371, 3.097]	0.179	[0.007, 4.475]	-	-
Bowels	0.53	[0.003, 1.134]	0.301	[0.043, 2.113]	6.419	[0.296, 3.983]	-	-
Bathing	0.744	[0.361, 1.533]	1.330	[0.631, 2.807]	0.597	[0.236, 1.510]	-	-
Feeding	0.736	[0.277, 1.957]	1.771	[0.745, 4.212]	0.802	[0.239, 2.692]	-	-
Dressing	2.786	[0.937, 4.282]	0.923	[0.366, 2.329]	0.512	[0.152, 1.728]	-	-
Stairs	1.144	[0.757, 1.728]	0.926	[0.617, 1.390]	0.612	[0.384, 0.976]	-	-
Constant	0.047		0.097		0.079			

- *The socio-economic factor* which was age variable reflected the different age characteristics on different pattern of activities. The early aged (60-69 years) (OR=2.140*, 95% CI=1.469, 3.117) would perform variety of activities more than 2.14 times of the middle aged (70-79 years) (OR=1,823*, 95% CI=1.270, 2.618). Increasing of age would demonstrate its effect to decreasing tendency of participation on variety of activity. The pattern activities that significant on different aged group was passive activity groups that related to general activities such as making merit, listening to radio, watching television etc. It is obviously seen that most of these activities were in-house activities. For outdoor activities, there are difference types could be executed which include physical activity, social activity, and occupational activity without statistical significance.
- *Term of health factor*, it was considered for both ADL and chronic disease, which the number of chronic diseases of the elderly is significant relate to difference activities. The physical activity which was considered in this category are related to exercise, sports, etc. The elderly group without disease has the possibility of participating about 1.95 times of activity (OR=1.953*, 95% CI=1.167, 3.268) which is more than the elderly group with chronic diseases (OR=1.545*, 95% CI=0.957, 2.492). For ADL factor, it showed that sub-factors that are significant to activities are transfer factor which has relationships with 2 groups of activities It demonstrated the probability to join activity for passive activity about 2.105 time (OR=1.545*, 95% CI=1.129, 3.923) and physical activity about 1.976 time (OR=1.545*, 95% CI=1.047, 33.732).

between health factors and activity factors in order to predict the possibility to join different activities in each elderly group with health restrictions and different age. This information could lead to the recommendation of creating a suitable and consistent built environment for the daily life of the elderly. From the analysis, it was found that due to the limitation of the physical condition that tends to increase their limitation as the age increases. The elderly has ability to perform fewer activities. With the group having the most opportunity and possibility to enjoy variety of activity is the early aged group (60-69 years) due to physical fitness that is ready to do activities such as no disease, normal transfer and have the ability to take care themselves and society. However, the activities that the elderly do mostly are home based activities or travel not in longer distance which is due to the urban environmental characteristic that does not facilitate accessibility among diverse activities. The allocation of facility are relatively far away, lack of public transit and mode choice include non-standard facilities, etc. Therefore, the appropriate recommendation of an age-friendly city is proposed as follows;

- 1) Endeavor to create a built environment that is conducive to appropriate activities and can be applied at all ages, not particularly for the elderly. To create a good interaction and create a system to improve social capital among each other in society.
- 2) Pulling the potential of the locational background from the context of urban, rural and agricultural areas by creating economic mechanisms to generate local economy for the unemployed elderly to create sustainability of community planning.

For discussion of the results, the analysis according to the purpose of this research demonstrated relationship

- 3) Built environment planning need to build collaborations across multiple disciplines such as transportation, urban planning, public health laws, as well as local people that will help promote a healthy community design for all age group.
- 4) In the planning and design of the built environment, planners or policy makers should pay attention to the different social, economic and health characteristics to balance their social dimension.
- 5) Develop facilities for the elderly to meet international standards and accessible such as safe pedestrian crossings, walkways and cycle paths, public transit for ageing, adequate public toilets, etc.

6. Conclusions

Currently, the feeling of being cut off from outside society becomes the biggest problem among the elderly, especially the elderly who live in the countryside as Ban Phaeo district, Samutsakorn province, Thailand. The creation of an environment can help create opportunities for the elderly to participate in society and do more activities if appropriate planning by understanding the characteristics of the elderly groups that differ in terms of health, age and activity types. The useful result of analysis reflects that older people are increasing weakness body and less capacity to participant in activities that are not attracting including the limitation of space conditions such as long-distance travel, lack of public transit and mode choice, facilities are not standard. Both directly and indirectly effect to the health-related problem of age groups among difference life styles and neighborhood characteristics. Thus, to sustain the situation of aging population in developing world, it is a must for all stakeholders to search for an integrated approach to allocate suitable urban plan and management by considering all age groups for local level through urban scale.

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