FACTORS THAT INFLUENCE ELDERY
TO AGE IN PLACE IN SABAH

BY

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DECLARATION

We hereby declare that:

(1) This undergraduate research project is the end result of our own work and that due acknowledgement has been given in the references to ALL sources of information be they printed, electronic, or personal.

(2) No portion of this research project has been submitted in support of any application for any other degree or qualification of this or any other university, or other institutes of learning.

(3) The word count of this research report is <u>20358</u>.

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ACKNOWLEDGEMENT

DEDICATION

I would like to begin by dedicating this research to Universiti Tunku Abdul Rahman for granting me the opportunity to conduct this study. It has provided me with invaluable insights into the factors influencing elderly individuals to age in place in Sabah. Additionally, I extend my dedication to my final-year project supervisor, Sr Dr Amalina Binti Azmi, whose continuous guidance, patience, and support were crucial throughout the two semesters of this study.

Last but not least, I extend my heartfelt gratitude to the 100 participants who generously contributed to this research. Their cooperation, guidance, and assistance were instrumental in the completion of this study.

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AIP	Adjusted goodness-of-fix index
ADL	Bank Negara Malaysia
UN	United Nations
SPSS	Statistical Package for Social Science

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PREFACE

In our contemporary world, the ageing population is a pressing global issue, and Malaysia, including Sabah, is no exception. As more individuals enter their golden years, it is crucial to understand their preferences and needs when comes to suitable housing arrangements.

One significant challenge faced by Malaysia's elderly population is the shortage of affordable elderly housing. Initiatives for elderly-friendly housing exist in Malaysia (Retirement Village), but affordability remains a challenge (Begum, 2017). Moreover, inadequate elderly care facilities. Both public and private elderly care facilities are insufficient to meet growing demand (Fisal, 2023). High costs of private care facilities lead to accessibility issues, especially for low-income households (Harun, 2023).

Additionally, there is a neglect in elderly housing programs. Housing programs in Malaysia lack focus on the needs of the elderly. Unlike country like Singapore, Malaysia lacks specific policies mandating elderly-friendly housing (Ismail et al., 2019; Jye, 2022). Malaysia is not prepared to support its growing population of elderly, lacking adequate infrastructure, services, and facilities, including facilities for AIP (Tobi et al., 2017).

While previous research in Korea by Cho & Kwon (2023) explored similar topic, it is not directly relevant to Malaysia. Likewise, a study by Dye et al. (2010) in South Carolina titled "Advice from Rural Elders: What it Takes to Age in Place" shares insights, but no research specifically addresses factors that influence elderly to age in place in Sabah. Thus, this study fills a critical gap in understanding the unique circumstances of ageing in place among Sabah's elderly population. By examining various factors, I hope to provide insights that can guide the government, urban planners, investors, and communities in creating environments that support ageing in place in Sabah.

ABSTRACT

This research was carried out to study the factors that influence elderly to age in place in Sabah. Four factors had been tested which are social support, environmental factors, housing features and physical and mental health. This study applied a quantitative research method. The target population of this research is those who aged above 60, residing in Sabah state. Primary data of this research was obtained through the distribution of 100 copies of questionnaires and was analyzed using the SPSS software.

The constructs of the questionnaire were reliable as Cronbach's Alpha value of all the factors was above 0.8. The data analysis applied for this research is the relative importance index, the four factors were ranked from most important to least important and the ranking is as follows housing features, social support, environmental factors, physical and mental health.

CHAPTER 1: RESEARCH OVERVIEW

1.0 Introduction

Chapter 1 provides an overview of the overall research project and its fundamental background. The purpose of this research is to study factors that influence elderly to age in place in Sabah. This section will discuss the research background, problem statements, research questions and objectives, and significance of the study. Furthermore, the chapter layout of this research will be explained, and a conclusion for Chapter 1 will be included.

1.1 Research Background

Ageing populations are on the rise in many countries, making it a global issue that must be addressed (Julaihi et al., 2022). Japan's population is ageing quickly; in 2017, those over 65 made up nearly 30% of the country's overall population. This is the highest percentage in the globe, and it is expected to keep rising until it reaches around 38.5% in 2065 (Cabinet Office, Government of Japan., 2017). As of January 1, 2022 (ISTAT, 2021), the proportion of Italians aged 65 and older was around 24% of the overall population; by 2040, that figure is predicted to increase to 30% (Ricciardi & Tarricone, 2021). In addition, the UN Population Division projects that the number of people 65 and up will more than double in the next 30 years, reaching 1.6 billion in 2050. This trend is most pronounced in Asia, where the forecast indicates that 40% of the populations in Japan, South Korea, and Hong Kong will be 65 and up (Richter, 2023).

Malaysia is anticipated to become an old nation by 2030, with 15 percent of the population aged 60 and over (Md Nor & Ghazali, 2021). It is anticipated that the current population of Malaysians aged 60 and more would reach approximately 3.2 million in 2020, up from an expected 1.4 million in 2019. By 2040, the proportion of Malaysians 65 and over will have increased to around 14.4 percent of the overall population (Ismail et al., 2020). According to another research, Malaysia will be in the same boat as other ageing nations such as Japan, the United States, and China until 2030 (Phua et al., 2019). An ageing population is a result of

increasing life expectancy, better health care, more advanced technology, and a general improvement in economic conditions (Worldometer, n.d.), as well as a decline in the fertility rate (Tang & Tey, 2017). The ageing population of Malaysia has resulted in a significant increase in the demand for healthcare services and facilities (Md Isa et al., 2022). Despite several programmes to help elderly, such as Dasar Warga Emas Negara, Elderly Activity Centre (PAWE), and Dasar Kesihatan Warga Emas Negara, Malaysia does not have adequate healthcare facilities to meet the expanding old population (Md Nor & Ghazali, 2021).

Remaining in one's own home, retaining one's independence for as long as possible, and being able to rely on loved ones for assistance when necessary are common desires among elderly. Ageing in place refers to the practice of remaining in one's own house as one ages (National Institute on Ageing, 2023). In 2021, 77% of persons over 50 would choose to age in place if they had the opportunity, according to AARP International (2021). Statistics back up this preference: during the last two decades, there has been a rise in the number of adults living in conventional housing, while the number of people residing in nursing facilities has fallen (Toth et al., 2022). Research in the journal Economics and Sociology found that among Peninsular Malaysians approaching old age, 83.8% would rather remain in their own houses as they become older (Samsudin et al., 2019). Further, when looking at the housing choices of Malaysian generations in their senior (retirement) years, research showed that the majority of Baby Boomers (52.3 percent) chose "ageing in place" (Ismail et al., 2020).

The statistics from 2023 showed that Sabah's median age was 27.2 years old, the highest it has been across the ten-year survey period (Statista, 2023a). Sabah's median age has been on the rise, mirroring the state's demographic shifts and an ageing population. As of this year, the number of public aged care centres available in Sabah is limited to just 7 within its 25 districts (Jabatan Kebajikan Masyarakat, 2023). Operators face many difficulties in the management of these centres, including the absence of governmental assistance, limited initial financing, budgetary constraints, inadequate technological resources, and insufficient staff training (Md Isa et al., 2022). The presence of these deficiencies exacerbates the difficulties experienced by elderly in Sabah, hence making ageing in place a more feasible alternative given the insufficiency of authorized care facilities.

With Malaysia's elderly rapidly increasing, improvements in terms of providing enough housing for a gradually ageing population and building community settings that are friendly and livable for everyone are urgently required (Tobi et al., 2017). As a result, it is both timely and critical to conduct research on Malaysian elderly housing requirements and preferences (Ismail et al., 2020). The research is needed to bring the attention of government and policy makers to understand elderly needs and preferences for suitable elderly housing arrangments in Malaysia, particularly in Sabah, putting a focus on the concept of "ageing in place". This research aims to inform policies and interventions to enhance the quality of life of elderly ageing in place, for example, by providing adequate and appropriate facilities, infrastructure, services for ageing in place.

1.2 Problem Statement

The first problem is a shortage of reasonably priced homes for elderly in Malaysia, which also include Sabah. As shown by initiatives like The Green Leaf, Green Acres, and AraGreens Residence (Begum, 2017), some developers are seeing the need for elderly-friendly housing; nevertheless, the scope of implementation is still relatively small. As shown by one project that demands an amount of RM300k deposit for a lifetime lease, these efforts often only make financial sense for richer families (Begum, 2017). A lack of thought and motivation exists to apply this idea to low-income homes, which might result in elderly who are economically disadvantaged being without sufficient housing security (Fisal, 2023).

Secondly, inadequate elderly care facilities in Malaysia, including Sabah. Public and private facilities are insufficient to meet the growing demand, with only a small percentage of potential residents being accommodated. Bureaucratic red tape has led to the proliferation of unlicensed elderly care homes, posing safety hazards due to unmet standards (Fisal, 2023). Access to elderly care is problematic for less affluent households due to the high costs of private facilities. In Kedah, prices range from RM1,000 to RM2,000 per month for a twin room, and in Putrajaya, the range is RM2,000 to RM3,000 per month for a triple shared room, as reported by the Association of Residential Aged Care Operators of Malaysia (AgeCope) (World Bank, 2020). These costs are too expensive for the majority, exceeding the affordability of typical households, given the median income of RM6,338 as of 2022 (Harun,

2023). Public care facilities in Malaysia face insufficient funding, with World Bank (2020) data indicating that public spending on aged care was less than RM60 million from 2015 to 2019. accounting for 0.01% of the country's GDP. This falls significantly below the average cost of long-term care in Organization for Economic Cooperation and Development (OECD) countries, which is 1.5% of GDP (OECD, 2020).

Thirdly, the lack of attention to the housing needs of Malaysia's elderly in housing programs, including Sabah. In particular, the demand for housing in Malaysia will be affected by the growing number of people aged 65 and over, which would have a profound impact on the housing market. However, there is a noticeable lack of focus on providing housing that is specifically designed for the needs and preferences of elderly in Malaysia. In comparison to other industrialized nations, notably Singapore, elderly housing arrangements were well-maintained, particularly by the government. Each housing building in Singapore is expected to contain basic elderly features in accordance with the demands, as mandated by the governing body or Housing building Board (HDB). Malaysia is currently not prepared to support its growing ageing populations, due to lacking of adequate and appropriate facilities, infrastructure and services for people to age, including facilities for ageing in place (Tobi et al., 2017).

With the first and second issues spotted, again ageing in place becomes a more feasible alternative in the current situation and requires more attention and consideration from the government, so that this concept can quickly take place and widely practice in Malaysia, reducing the consequences that brought from these shortages. For example, safety concerns. Inadequate elderly housing may endanger elderly, especially if they live in conditions that are not built to fulfil their individual requirements. This might lead to accident and injury (PRB, 2017). Besides, financial burdens on families. Without affordable elderly housing options, families could have to shoulder the cost of caring for ageing family members, such as sending them to highly priced retirement villages, which might have an impact on their own financial well-being and possibly lower the nation's total economic output. For instance, depending on the degree of care and services needed, a studio apartment at ReU Living Retirement Village might cost anywhere between RM6,800 and RM15,000 (ReU Living, n.d.).

1.3 Research Questions

1. What are the factors that influence elderly to age in place in Sabah?
2. Which are the most factors that influence elderly to age in place in Sabah?

1.4 Research Objectives

1.4.1 General Objective

To investigate the needs and preferences of elderly when it comes to ageing in place.

1.4.2 Research Objectives

1. To identify the factors that influence elderly to age in place in Sabah.
2. To rank the most factors that influence elderly to age in place in Sabah.

1.5 Significance of the Study:

This study will examine the importance of understanding the needs and preferences of elderly in Sabah when it comes to ageing in place. There are a few parties that will be benefited by this study which include the government, urban planners, investors, elderly, middle-aged population, younger generations staying in Sabah.

With the government's understanding of elderly needs leads to a targeted approach for ageing in place. Recognizing the preference for independent living, the government could provide assistance, including financial aid to support housing features that suit elderly needs, introducing overseas technological innovations for housing modifications, and staffing for public healthcare system. This effort may raise awareness within society about the viability of ageing in one's own home. As society becomes more informed and supportive, ageing in place gains recognition as a respected choice for future housing arrangement. By diversifying

options and promoting ageing in place, the government reduces the burden of rapidly solving insufficient elderly housing and the shortage of reasonably priced homes for elderly.

Other than benefiting the government, opportunities for developers may arise in the real estate market as a result of the growing number of people opt for ageing in place in their golden years. Developing housing that suit the needs of elderly (e.g.: housing features that suit elderly needs) has the potential to be a very profitable industry. Additionally, by concentrating on developing age-friendly communities, urban planners can make sure that upcoming projects take the requirements of the aged into account. The livability of urban environments can be improved by this inclusion. Urban planners could advocate and allocate areas for cost-effective housing solutions that cater to the unique requirements of elderly (e.g.: environmental factors). These alternatives can include facilities such as pedestrian crossings and street lightings.

In addition, improved standards of living for elderly are guaranteed by easy access to suitable housing. The promotion of independence and safety enhances their entire well-being. Furthermore, middle-aged individuals (those approaching retirement) may improve their financial preparation in order to have a more seamless transition into retirement if they are aware that there are another suitable future housing arrangement.

1.6 Chapter Layout:

Chapter 1: Research Introduction

This chapter serves as a brief description to the thesis titled factors that influence elderly in Sabah to age in place, outlining the research background, problem statements, research objectives, and questions. It further emphasizes the significance of the study and presents the chapter arrangement.

Chapter 2: Literature Review

This chapter delves into secondary data sources to conduct a literature review and elaborate on the definition of elderly, definition of ageing in place and chosen key factors which consist of social support, environmental factors, housing features as well as physical and mental health. It includes a summary and analysis of previous studies related to the research objectives, exploring elderly housing needs and preferences when it comes to ageing in place.

Chapter 3: Research Methodology

In this chapter, the study's research methodology is explained through a structured explanation of data-gathering methods. The process of obtaining high-quality data involves the design of a survey questionnaire, data collection, and analysis on a specific group of participants. This study utilizes Google Forms for distributing survey questionnaires, which will be administered to 100 participants aged 60 years and above staying in Sabah for the actual survey, and another different 30 participants aged 60 years and above staying in Sabah for the pilot test.

Chapter 4: Results Discussion

This chapter involves the presentation of data acquired from participants, utilizing data analysis techniques to generate various tabulations. The results obtained from the data analysis are thoroughly discussed, shedding light on the most factors that influence elderly to age in place in Sabah.

Chapter 5: Conclusion & Recommendations

The final chapter concludes the research by summarizing key findings from the preceding chapters. It addresses the limitations of the study and provides recommendations for future research endeavors in the field of elderly housing preferences that focus on ageing in place.

1.7 Conclusion

Chapter 1 sets the stage for the research by presenting a comprehensive overview of the study's aim, beginning with the research background and problem statement. Research questions, and objectives are thoroughly examined, significance of the study are highlighted. The chapter also outlines the structure, guiding readers through the analysis of the factors that influence elderly to age in place in Sabah, emphasizing the study's value. In Chapter 2, the research progresses to gather information through online resources, such as articles and journals, aiming to gain a more profound insight into the factors that influence elderly to age in place.

CHAPTER 2: LITERATURE REVIEW

2.0 Introduction

This chapter furnishes a literature review for the research study focused on the factors that influence elderly in Sabah to age in place. The section offers a concise overview of both elderly and ageing in place. Subsequently, the following portion delves into the influencing factors that impact elderly towards ageing in place, encompassing factors like social support, environmental factors, housing features as well as physical and mental health.

2.1 Factor and Influence

Factor is an element or circumstance that affects how something turns out (Merriam-webster, n.d.). In other words, factor can be defined as a component, constituent, or "actor" in the context of a particular situation or quantity (Cambridge Dictionary, n.d.-a). For example, the weather was a significant factor in the decision to cancel the outdoor occasion. Effective time management is a crucial factor for success in finishing the project on schedule. The word "influence" indicates to have an impact on the way something or someone progresses, performs or thinks (Cambridge Dictionary, n.d.-b).

2.2 Elderly

In Malaysia, elderly are classified as those aged 60 and up, in accordance with the World Assembly on Ageing's definition (MyGOV, n.d.). Besides, when the percentage of Perak residents aged 60 and more reaches 15.3% in 2020, the state will officially be considered "old," according to Department of Statistics. (MyMetro, 31 October 2019). Furthermore, Malaysia raised the obligatory retirement age from 55 to 60 in 2013 (Gimino, 2023). The United Nations also defines elderly population as those who are 60 years of age or older (Scherbov & Sanderson, 2019). While in the United States, elderly is typically defined as individuals aged 65 and over (Caplan, 2023). In Korea, people who are 65 years old and above are commonly referred to as elderly population (Cho & Kwon, 2023). In Japan, the demographic comprising individuals aged 65 and above is commonly denoted as elderly

population, as indicated by Nakagawa et al., in their 2022 study (Nakagawa et al., 2022). As indicated in (Melchiorre et al., 2022), elderly population in Italy is defined as persons aged 65 and above.

2.3 Malaysia

Southeast Asia is home to the nation of Malaysia. There are thirteen states and three federal territories that make up this federal constitutional monarchy. These include Kuala Lumpur, the administrative capital, Labuan, Johor, Kedah, Kelantan, Melaka, Negeri Sembilan, Pahang, Perak, Perlis, Penang, Sabah, Sarawak, Selangor, and Terengganu. Peninsular Malaysia and East Malaysia are geographically distinct parts of Malaysia. The South China Sea separates the two areas by a distance of around 400 kilometers (Sidder, 2021).

2.4 Population Improvement in Malaysia

It is projected that the population of Malaysia will keep on increasing. The Malaysian Department of Statistics projects that the country's overall population will reach 33.4 million in 2023, up from 32.7 million the year before (New Straits Times, 2023). The current population of Malaysia is reported to be 34,308,525 as of 2023, representing a 1.09% increase from the previous year (United Nations, 2020; Macrotrends, n.d.). With an estimated 33.4 million people in 2023, the population of the nation is expected to increase by 2.1% this year, greater than the 0.4% and 0.3% growth rates in 2022 and 2021, respectively, due to migration from the outside world (Pfordten, 2023). Malaysia has a population density of 104 persons per km2 square (270 persons per mi square) (Worldometer, n.d.).

2.5 Elderly Population Improvement in Malaysia

Indeed, there has been a rise in the proportion of Malaysians in their elder age. More than 15% of the population would be 65 and older by 2050, according to research from Malaysia's Ministry of Finance (International Trade Administration, 2023). A little over seven percent of Malaysians were 65 and older in 2022, up from seven percent the year before (Statista, 2023b). Further, from *Table 2.1 and 2.2* below, it is shown that Malaysia's elderly population

amounted to 3,618,000 as of 1st January 2023, spotting an increment of 149,800 compared to data collected as of 1st January 2022, showing a total of 3,767,800 elderly (Department of Statistics Malaysia, 2023). There is an increasing trend of elderly from 2022 to 2023.

1/1/2022	Malaysia	overall_sex	overall_ethnicity	60-64	1254.3
1/1/2022	Malaysia	overall_sex	overall_ethnicity	65-69	974.5
1/1/2022	Malaysia	overall_sex	overall_ethnicity	70-74	674.5
1/1/2022	Malaysia	overall_sex	overall_ethnicity	75-79	377.1
1/1/2022	Malaysia	overall_sex	overall_ethnicity	80-84	203.1
1/1/2022	Malaysia	overall_sex	overall_ethnicity	85+	134.5

Table 2.1: Malaysia's Number of Elderly Population (60-85+ years old) in '000 as of 1st January 2022. Credit to https://open.dosm.gov.my/data-catalogue/population_population_malaysia

1/1/2023	Malaysia	overall_sex	overall_ethnicity	60-64	1288.8
1/1/2023	Malaysia	overall_sex	overall_ethnicity	65-69	1011.9
1/1/2023	Malaysia	overall_sex	overall_ethnicity	70-74	710.9
1/1/2023	Malaysia	overall_sex	overall_ethnicity	75-79	412.6
1/1/2023	Malaysia	overall_sex	overall_ethnicity	80-84	204.2
1/1/2023	Malaysia	overall_sex	overall_ethnicity	85+	139.4

Table 2.2: Malaysia's Number of Elderly Population (60-85+ years old) in '000 as of 1st January 2023. Credit to https://open.dosm.gov.my/data-catalogue/population_population_malaysia

2.6 Sabah

Located in Malaysia, Sabah is a state that occupies the northern part of East Malaysia. It is renowned for having a wide variety of ethnic groups, beautiful jungles, and great wildlife. Kota Kinabalu, the state capital of Sabah, is a well-liked location for outdoor recreation and

ecotourism. The tallest mountain in Southeast Asia, Mount Kinabalu, and the Kinabalu National Park, a UNESCO World Heritage Site, are both located in Sabah. Having more than thirty distinct ethnic groups, each with its own language and customs, the state is renowned for its cultural richness. Sabah's economy is mostly reliant on agriculture and tourism, and it is also a significant producer of oil, lumber, and palm oil (The Editors of Encyclopedia Britannica, 2023). Selangor (21.6%), Johor (12.3%), and Sabah (10.4%) marked the largest population compositions in Malaysia in 2022 (Department of Statistics Malaysia, 2022). According to Department of Statistics Malaysia (2023), Sabah's Elderly Population aged 60-85+ for male is 104,139 and for female is 93,885, amounted to a total of 198,024. The population of Sabah is 3,418,785 (Department of Statistics Malaysia, 2023). Additionally, from *Table 2.3* below, it is shown that Sabah's elderly population aged 60-80+ amounted to 308,300 as of December 2023, spotting an increment of 110,276 compared to data provided by Department of Statistics in 2020 (Citypopulation, 2023). There is an increasing trend of elderly from 2020 to 2023.

Age Distribution (E 2023)	
0-9 years	580,800
10-19 years	668,800
20-29 years	761,600
30-39 years	619,400
40-49 years	402,300
50-59 years	251,800
60-69 years	185,500
70-79 years	90,500
80+ years	32,300
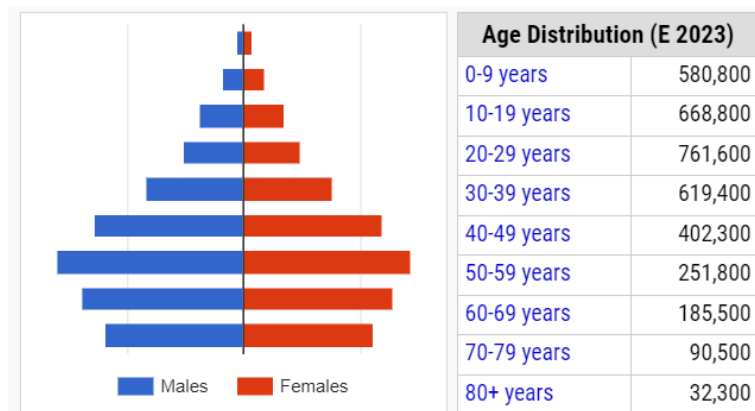
Table 2.3: Sabah's Number of Population According to Age Distribution as of December 2023. Credit to https://www.citypopulation.de/en/malaysia/admin/12__sabah/
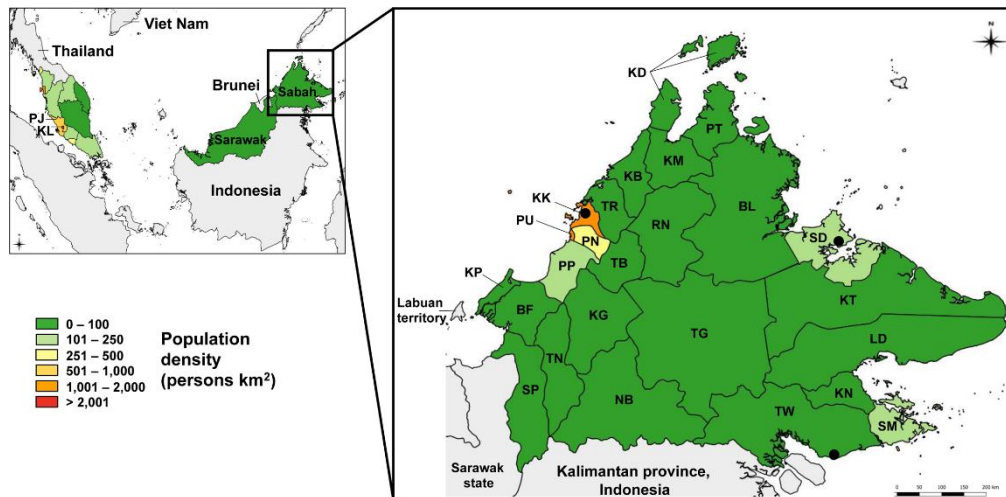
Figure 2.1: Map of Sabah state. Credit to: (Murphy et al., 2020).

Figure 2.1 shows twenty-five districts of Sabah state: "Beaufort (BF), Beluran (BL), Keningau (KG), Kinabatangan (KT), Kota Belud (KB), Kota Kinabalu (KK), Kota Marudu (KM), Kuala Penyu (KP), Kudat (KD), Kunak (KN), Lahad Datu (LD), Nabawan (NB), Papar (PP), Penampang (PN), Pitas (PT), Putatan (PU), Ranau (RN), Sandakan (SD), Semporna (SM), Sipitang (SP), Tambunan (TB), Tawau (TW), Tenom (TN), Tongod (TG), Tuaran (TR)." Three of the largest cities in Sabah state are marked by black points. These are Kota Kinabalu, Sandakan, and Tawau (Murphy et al., 2020).

2.7 Ageing in Place (AIP)

Growing old in one's own house as opposed to an institution like a nursing home or assisted living facility is known as "ageing in place" (Vitman Schorr & Khalaila, 2018). It highlights how important it is for people to keep their sense of self and ties to their own homes as they get older. The proposal is in line with the notion of giving elderly the assistance and resources they need to stay in their homes and preserve their feeling of independence and well-being. Ideally, this would also take place in a long-term family home, in respective neighbourhoods and larger communities (B. Kim et al., 2017). It emphasizes that ageing in place is about more than simply the physical dwelling; it is also about maintaining social links, community involvement, and the emotional attachments that come with a long-term family home. This larger viewpoint advocates for a holistic approach to elderly care that takes into account both the physical and social elements of people's life as they age.

Being able to live independently is also an important aspect of ageing in place (Vitman Schorr & Khalaila, 2018). The concept emphasizes the idea that as people age, they should be able to manage their daily activities, make personal decisions, and retain a certain amount of self-sufficiency in their own homes. Ageing in place is the capacity of elderly to live securely, autonomously, and comfortably in their own homes and communities, regardless of age, poverty, or functional limitations (World Health Organization, 2017). This concept is consistent with a person-centered and holistic approach to elderly care, emphasizing the overarching objective of ensuring a high quality of life for elderly in their homes and communities. The phrase "ageing in place" can indeed be summarized as "staying put" in one's home and community (Wiles et al., 2017). It signifies a dedication to preserving continuity, relationships, and a sense of belonging inside one's own home and neighbourhood, emphasizing the concept of ageing with autonomy and comfort in a familiar and cherished setting.

Even though these "generic" definitions are often used, a closer examination of the literature shows that there is not a great deal of consensus on what constitutes a "home" or a "community." AIP, on the one hand, describes remaining in an individual's private home or dwelling. However, as an alternative to entering a long-term care facility, AIP may entail remaining in supportive housing or a community (such as independent or assisted living, continuing care retirement community). AIP in the context of this study, refers to extending one's stay in their present private residence as far as feasible. The dwelling has been occupied for decades; additionally, one may be relocated to a smaller residence in the same neighbourhood (Bigonnesse & Chaudhury, 2020).

Definitions of AIP vary in different regions. In Belgium, the term "ageing in place" originally referred to the act of people growing old in their own houses. However, in recent times, the concept has expanded to encompass remaining in the existing community and residing in a home of one's choosing (Vanleerberghe et al., 2017). According to World Health Organization Centre for Health Development definition, ageing in place refers to the fulfilment of people's desire and ability to continue living relatively independently in their community and current

home, or in a suitable housing arrangement, with the provision of appropriate services and assistance (Rudnicka et al., 2020).

In Delaware, ageing in place refers to the act of staying in a community-based residence during one's later years. The home can either be a place where an individual has spent a significant portion of their adult life, possibly raising a family and forming deep connections, or it can be a smaller living space, such as an apartment, mobile home, or condo, that provides the advantages of independent living without the burden of maintaining, paying for, and potentially facing hazards in a larger home. For some people, ageing in place may include relocating to a family member's or friend's residence in order to preserve a certain level of autonomy while also benefiting from the advantages and assistance or supports provided by co-housing (Ratnayake et al., 2022).

In UK, the term 'ageing in place' is often used in social policy to describe a strategy that assists elderly in remaining in their own residences for as long as feasible (Lewis & Buffel, 2020). In Korea, ageing in place is a strategy that enables elderly to remain in their familiar homes and communities while getting the necessary assistance and services, even if they have impairments or limits (World Health Organization, 2020; Cho & Kwon, 2023).

In Canada, ageing in place (AIP) encompasses the concept of remaining in one's residence and community for as long as feasible, while postponing any prospective move to a long-term care facility (Bigonnesse & Chaudhury, 2020). In Japan, living in one's own house is referred to as "ageing-in-place" (Nakagawa et al., 2022). In Thailand, to age at home means "ageing in place" while to age in nursing homes means ageing relocation (Yonghencharoen & Pongpattrachai, 2021). In Norway, ageing in place pertains to the independent living of elderly in their private residences, either on their own or with family (Redzovic et al., 2023).

In Malaysia, "ageing in place refers to the ability of elderly to live in their own homes and communities independently, safely, and comfortably, regardless of age, income, or ability level" (Centers for Disease Control and Prevention, 2009; Tobi et al., 2017). Tobi et al. in

their 2017 research also indicates that an ageing in place approach entails developing services and facilities that will enable elderly to remain in their homes or chosen environments for as long as possible (Tobi et al., 2017). In general, individuals tend to age in place by remaining at home and in their neighbourhood without losing their autonomy. The decision is crucial for those who have lived their lives independently and value their autonomy highly (Yusof & Yasin, 2023). Same as in the Canada research of Bigonnesse and Chaudary, in the Malaysia research of (Ismail et al., 2023), they refer ageing in place as the concept of remaining at home and within one's community for as long as possible, while delaying any potential move into long-term care. While in the study of (Ismail et al., 2020) in Malaysia, they mentioned that the concept of ageing in place initially seeks to understand why elderly attached to or like certain locations, whether physical or emotional. While early definitions were broad, linking the concept to any place, the understanding has evolved to emphasize a stronger connection to one's home over time.

2.8 Factors that Influence Elderly to Age in Place

Bosch-Farré et al.'s qualitative study on enablers and barriers of healthy ageing in place, emphasizing social support, environmental factors and housing features. However, their focus on access to healthcare services overlooked another crucial dimension of health—health concerns, encompassing physical and mental health.

Building on their work, this research aims to comprehensively examine how physical and mental health influences elderly's decision to age in place, aiming to enrich existing insights and contribute to a more holistic understanding of needs and preferences of elderly when it comes to ageing in place.

2.8.1 Social Support

Social support is the perception and reality that one is cared for, having access to aid from others, and being a member of a supportive social network (Zainuddin et al., 2022). Marriage, parenthood, and other close relationships, friendships, coworker relationships, memberships in religious groups, social, cultural, political, and recreational groups, and

contacts with neighbours, shopkeepers, and service providers are all types of relationships that make up social support networks (Rausa, n.d.). Social support may be classified into three distinct categories: emotional support, instrumental support, and informational support. Emotional support entails possessing a social network of relatives and friends whom you can rely on during times of distress. Instrumental support include aid in activities of daily life and support in personal care. Informational assistance offers counsel and direction (Kelly et al., 2017). Under social support factor, there are four subfactors which include contact with family, contact with friends, contact with neighbours and contact with the community.

2.8.1.1 Contact with Family

According to Bosch-Farre et al.'s findings (2020), participants emphasized the importance of family bonds as a vital support system to age in place. This conception is further agreed by López Doblas (2018) and Pani-Harreman et al. (2021) which their research stated that many elderly acknowledged that adapting to living alone is difficult but elderly still willing to age in place for more freedom, privacy and autonomy because they know that whatever the circumstances, they still can have regular contact with their family. They further added that social actors (such as those who have strong emotional ties to their homes and environments) all report having daily family contact, with their children or other closest family members when they age in place. A face-to-face relationship is formed when they live nearby; if not, the relationship is handled by phone and through occasional visits (López Doblas, 2018; Pani-Harreman et al., 2021). Another research by Yonghencharoen & Pongpattrachai in 2021 as well coincided with the significance of family connections as a crucial support network for ageing in place. In their study, elderly participants were given three elderly housing related choices to choose over which include: ageing in place, considering relocation (consider moving to long term care facilities) or ageing relocation (move to long term care facilities), all participants that choose to age in place voiced that the positive side of such decision is that they are able to stay with their family (spouse, children).

Additionally, contact with siblings is also important for elderly to age in place. A study conducted online focusing on adults in their middle and later years discovered that

siblings continue to stay in touch through different means. This includes meeting in person, talking over the phone, exchanging emails, texting, and connecting through social media. These methods serve as paths for both instrumental and emotional support among siblings in later years (Gilligan et al., 2020; Jensen et al., 2020). According to Stocker et al. (2020), elderly participants maintained contact with their siblings through various means, including face-to-face interactions, phone calls, or social media, ranging from once a week to several times a week, on average. These interactions serve as sources of support and could help alleviate feelings of loneliness while enhancing overall well-being (Stocker et al., 2020).

Other than that, most participants of Bosch-Farré et al.'s research viewed a strong and positive relationship with grandkids to be critical and a top objective to healthily age in place. Participants perceived their relationship with grandkids to be bidirectional and mutually beneficial. Many participants had regular contact with their grandkids and frequently babysat, which was usually regarded positively. Some opposing views were stated, implying a sense of responsibility in taking on particular responsibilities (Bosch-Farré et al., 2020). A research done in Berlin revealed that grandparents who provided periodic assistance in caring for their grandkids had a mortality rate that was 37% lower compared to grandparents who did not engage in childcare activities. The study examined the lifestyles and health of 500 individuals aged 70 and above. It discovered that elderly who engage in childcare responsibilities, such as babysitting their grandkids, can have advantages in terms of maintaining physical activity and social interaction (Baltes et al., 2001). Another Chinese empirical data indicates that elderly who assist in raising their grandkids report higher levels of life happiness and mental health (Dong et al., 2023). To conclude, intimate relationship between elderly and their grandkids, or in other words, with elderly having responsibilities to take care of their grandkids, it is most likely to leading elderly incline to age in place instead of age in long term care settings.

2.8.1.2 Contact with Friends

Additionally, friends played an essential role in encouraging elderly to age in place. Consistent communication with friends among elderly plays a crucial role in maintaining self-esteem, strengthening their sense of identity, and effectively coping with the stresses

associated with ageing (Loa et al., 2023; Shin & Park, 2022). A participant of Loa et al's study maintains communication with friends via Facebook and meets them whenever possible, emphasizing the importance of these interactions for personal happiness (Loa et al., 2023; Shin & Park, 2022). Other than that, research of Badache highlighted that maintaining good social relations with friends by (e.g.: having dinner with friends regularly) as a crucial factor for successful ageing (Badache et al., 2023). Further, research of Stephens et al. and Tavares et al. emphasized the crucial role of physical needs in well-being of elderly for healthy ageing. This includes having enough friends and opportunities to engage with friends, such as attending club meetings, church services, and special occasions, like birthday parties or funerals that contribute to a sense of participation in everyday life (Stephens et al., 2015; Tavares et al., 2017).

2.8.1.3 Contact with Neighbours

Moreover, neighbours played a crucial role in supporting elderly to age in place. A participant of Lewis & Buffel's study, named Barbara experienced a strong sense of belonging because of her supportive neighbours who regularly reached out to inquire about her needs. Additionally, her recognition by the neighbours within the broader community contributed to her feeling at home. In describing her sense of belonging, Barbara highlighted a profound feeling of being socially integrated (Lewis & Buffel, 2020). Besides, Versey's study revealed that participants showed a preference for ageing in place independently within an urban neighbourhood rather than relocating south with family. They leaned heavily on the support of neighbours for everyday tasks like fetching items from the store, providing rides if physically capable for attending medical appointments or grocery shopping, and cooking for each other (Versey, 2018). Furthermore, neighbours play a crucial role in providing emergency support, emphasizing the close proximity that enables immediate assistance. One elderly shared a personal incident where a neighbour helped with a twisted ankle, the neighbour promptly assisted in wrapping the injured foot, and the elder expressed a sense of dependence on her, especially in the context of potential hospital visits (BRUGGENCATE et al., 2018; Greenfield, 2016; Kemperman et al., 2019; Lau et al., 2012).

2.8.1.4 Contact with the Community

In addition, connecting with peers, neighbours and participating in community activities were viewed as enhancers of elderly's sense of belonging, and help to reduce home isolation and loneliness (Bosch-Farré et al., 2020). Some community activities identified in previous research findings involve engaging in physical activities like walking, hiking, dancing, yoga, tai chi, and swimming; participating in intellectual pursuits such as memory sessions, and language courses; enjoying hobbies like singing, dancing, cooking, gardening, crocheting, fishing, and traveling; and finally, contributing to volunteer activities (Bosch-Farré et al., 2020; Karasawa et al., 2020). Another example will be elderly work with others to do something together and achieve a common goal, like playing team sports in recreational activities (Dehi Aroogh & Mohammadi Shahboulaghi, 2020). Participating in community recreational, social, cultural, and spiritual activities promotes elderly's continuous integration with society and keeps them engaged and informed (World Health Organization, n.d.-a). As elderly age in place, social inclusion and participation are critical mechanism for contributing to their life satisfaction and quality of life (Bigonnesse & Chaudhury, 2020; Nagargoje et al., 2022; Wiles & Jayasinha, 2013). Engaging in volunteer work and participating in intergenerational activities (e.g.: reading picture books to local neighbourhood children and actively listening to children as they read, to assist them in the development of oral language skills; teaching and playing musical instruments with local neighbourhood children) fosters a sense of connection and reciprocity among elderly who choose to age in place (Bigonnesse & Chaudhury, 2020; Park, 2014; Ten Bruggencate et al., 2019). A sense of purpose and fulfillment may be obtained by elderly who age in place through involvement in community programs and activities, which enhances their sense of overall belonging. Participating in the community and having social connections with others can help elderly feel better emotionally, manage stress, and avoid desperation (L. Chen & Zhang, 2022).

In Malaysia, the findings of Tobi et al. (2017) agreed with the need of social support for elderly to age in place, which stated contact with other community members and regular social engagement positively impact the health and well-being of elderly. This is because in comparison with elderly who are less socially active over time, those who are socially active and continually engaged with others have a slower decline in health (Tobi et al.,

2017). Another research conducted in Malaysia by Yusof & Yasin (2023) aligned with the importance of social support for elderly to successfully age in place, where they emphasized having access to an inclusive community makes it possible for elderly to age in place in comfort and in a supportive environment. Social inclusion is one of the three key principles of an inclusive community. The sense of belonging that elderly experience from being socially connected allows them to remain mentally healthy and valued as members of their communities. Active participation in neighbourhood activities that create a conducive environment mainly foster elderly sense of belongingness.

In a nutshell, social support which encompasses contact with family, friends, neighbours and the community was considered to be an important contributor to the health and well-being of elderly to age in place.

2.8.2 Environmental Factors

Under environmental factors, there are three subfactors which include housing location, pedestrian infrastructure and elevator.

2.8.2.1 Housing Location

Housing location appeared as a critical component in environmental factors, with accessibility to neighbourhood facilities and ease of access regarded vital for elderly to age in place (Bosch-Farré et al., 2020). Ensuring that neighbourhood facilities such as commercial spaces (convenient store, mall, supermarket) and recreational spaces (park, minor open space) are conveniently located within a reasonable walking distance supports the daily lives of elderly and enhances their overall well-being (Wang et al., 2022). Accessibility to green spaces, parks, and recreational facilities encourage elderly to age in place by contributing to physical activity promotion among elderly, particularly walking (Portegijs et al., 2023). Furthermore, prior research has demonstrated that elderly benefit significantly from access to public transportation (train station, bus station), as it affords them the chance to reach distant destinations of their choice, thereby encouraging increased physical activity levels and supporting them to age in place (Cerin et al., 2017; Mulliner et al., 2020; Wang et al., 2022; Yu et al., 2021). As

individuals age, there is a growing preference for having essential amenities like shops, care facilities, and public transport conveniently located within walking distance or in close proximity to their homes (Mulliner et al., 2020). Research of Somsopon et al. (2022) revealing that ensuring the provision of commercial spaces like restaurants, coffee shops, beauty salons, hair salons, fitness centres in urban residential areas is crucial for promoting healthy ageing, creating an environment where elderly can comfortably age in their homes or communities (Somsopon et al., 2022)

2.8.2.2 Pedestrian Infrastructure

The second subfactor of environmental factors will be pedestrian infrastructure. Outdoor obstacles that elderly research participants of Bosch-Farré et al. had to overcome included sliding on wet days and tripping on uneven pavements (Bosch-Farré et al., 2020). According to research, elderly's physical comfort and safety can be seriously hampered by badly maintained outdoor areas, such as uneven pavement, potholes, and curbs. This might impair elderly's physical abilities and deter them from participating in outdoor activities (Yu et al., 2021). Furthermore, the fear of falling and limitations in physical functioning may prevent elderly from being active outdoors, emphasizing the need for safe and accessible outdoor environments (including pedestrian infrastructure) to promote outdoor activity and the overall well-being of elderly (Curl et al., 2020; Kerr et al., 2012). According to Gaglione et al. (2021) and Pulvirenti et al. (2020), elderly's perception of critical issues concerning pedestrian infrastructure includes the lack of pedestrian crossings, faded pedestrian crossings, and the absence or inadequacy of street lighting. Absence or inadequate street lightings hinder elderly from identifying fall hazards during nighttime walks (Gaglione et al., 2021; Pulvirenti et al., 2020). Gaglione et al. further added that with these problems solved, the quality of life of elderly population can be elevated, and an active role in community life can be facilitated. Studies of Sarlo et al. (2019) and Zajczyk (2018) summed up and agreed that environment factor is a crucial factor that supports elderly to age in place, indicating the characteristics, conditions and safety of streets, the design and availability of nearby public spaces, along with the accessibility to shops, services, and public transportation - all of these factors affect elderly residents' health, their social relationships, and their sense of belonging to the community.

2.8.2.3 Elevator

The third subfactor of environmental factors will be elevator. Elevator is categorized under housing environment, supported by research of Azmi et al. (2021). According to Chu & Shen (2022), the installation of elevators in strata housing is essential to maintain the independent living of elderly (Chu & Shen, 2022). Mobility-related concerns were emphasized by elderly research participants of Bosch-Farre et al., with a focus on the absence of elevators in strata housings, especially in older or outlying neighbourhoods, hindering them to age in place healthily. According to findings of Azmi et al. (2021), elevator that is large in size (minimum width is 2400mm, minimum length is 2000mm) supports elderly to age in place (Azmi et al., 2021). Handrails function as a preventive measure against potential injuries by acting as an anti-falling device (Tam et al., 2018). Therefore, handrails should be mounted on all walls within the elevator car, excluding those with doors to offer physical support for elderly to stabilize themselves (Architectural Services Department, n.d.). Yuen (2019) and Azmi et al. (2021) also emphasizes the significance of having grab bars in elevators as a crucial element in supporting elderly to age in place (Yuen, 2019; Azmi et al., 2021). Additionally, incorporating mirrors on elevator walls facilitates individuals in wheelchairs to navigate in and out of the space seamlessly without the need to turn, thereby enhancing accessibility for those with physical disabilities in public spaces (TN Viral Desk, 2022; Azmi et al., 2021).

In Malaysia, research by Zaid et al. (2019) indicated their analysis examines how Malaysia practices accessibility in housing design, which promotes ageing in place. Moreover, research by Yusof & Yasin (2023) stated the distance to nearby facilities and services, and social engagement level, impact elderly capability to age in place (Yusof & Yasin, 2023).

All in all, environmental factors which encompasses housing location, pedestrian infrastructure, and elevator was viewed as a significant factor contributing to the health and well-being of elderly who choose to age in place.

2.8.3 Housing Features

Under housing features, there are three subfactors which include toilet, kitchen and technology.

2.8.3.1 Toilet

The toilet was identified by numerous elderly residents as the least secure area within their apartment's spaces (Bamzar, 2019). The use of slippery floor tiles in toilet has led to inevitable incidents of injury due to accidental slipping and falls (Nguluma & Kemwita, 2018). Therefore, anti-slippery floor is suggested to facilitate ageing in place (Zaid et al., 2019; Azmi et al., 2021; Bamzar, 2019; Mulliner et al., 2020). Moreover, previous research findings proved that the addition of grab bars/handrails in the toilet support them to walk around and avoid injuries among elderly residents (Nguluma & Kemwita, 2018; Zaid et al., 2019; Azmi et al., 2021; Bamzar, 2019; Choi, 2020). Other than that, the height of seating, especially the toilet seat, played a crucial role for elderly in facilitating easy sitting down, standing up, and maintaining balance. In cases where the standard toilet seat was too low, a raised toilet seat was utilized (Kuboshima et al., 2018). Choi and Nguluma & Kemwita as well highlighted the importance of having raised toilet seats as necessary housing features for an age-friendly housing (Choi, 2020; Nguluma & Kemwita, 2018).

2.8.3.2 Kitchen

Moving to the kitchen, elderly research participants of Ramsamy-Iranah et al. who lived independently expressed dissatisfaction with the high kitchen cabinets. They suggested lowering or removing the high cabinets due to safety concerns, as climbing on chairs or ladders to access utensils posed a risk, especially considering their age (Ramsamy-Iranah et al., 2021). Bamzar proposed an alternative to solve this problem by installing upper kitchen cabinets that can be raised or lowered (Bamzar, 2019). Kaczor et al. agreed with the notion of Bamzar by recommending features like adjustable heights for upper kitchen cabinets to improve accessibility and safety for elderly (Kaczor et al., 2023). Further, according to Gemito et al. and Pereira et al., one of the factors contributing to the prevalence of falls among elderly is slippery floors in the kitchen (Gemito et al., 2014;

Pereira et al., 2017). Based on research of Zaid et al., Bamzar and Gemito et al., flooring that is resistant to slipping (anti-slippery floor) in both dry and wet conditions prevent falls and accidents among elderly and encourages them to age in place (Zaid et al., 2019; Bamzar, 2019; Gemito et al., 2014). Additionally, for the purpose of ensuring personal safety for elderly who age in place, Azmi et al. proposed the installation of a gas leak sensor in the kitchen (Azmi et al., 2021). Research of Gu et al. aligned with the importance of installing alert system for gas leak in the kitchen as one of the housing features to improve quality of life of elderly (Gu et al., 2021).

2.8.3.3 Technology

In designing a house for elderly, technologies must also play a role in supporting their independence and providing a sense of confidence and security, enabling ageing in place (K. Kim et al., 2017; Portegijs et al., 2023). Smart home technology has increasingly been incorporated into the management of individuals with reduced capabilities due to ageing or disability over the past decade (Portegijs et al., 2023). Firstly, enhancing home security for elderly, security cameras enable them to monitor their residences conveniently through a smartphone or tablet from any location within their home (Maswadi et al., 2022; SEVEN & DİRİK, 2023). Other than that, by utilizing smart lighting, elderly can independently manage the lighting in their homes through the use of smartphones or voice commands, allowing them to turn lights on and off or adjust brightness levels without relying on family members for assistance (Maswadi et al., 2022; SEVEN & DİRİK, 2023; Tural et al., 2021). One in six elderly in Malaysia encounter at least one fall within a span of 12 months (Sahril et al., 2020). Previous research findings showed that wearable fall detection sensors (wearable accelerometers) support elderly to age in place and improve their safety, well-being and quality of life (Chabot et al., 2019; Jo et al., 2021; Ma et al., 2022). In the event of a fall, a wearable device (e.g.: watch, pendent, belt or clip-on device) with an embedded accelerometer sensor detects the speed of the person's descent and employs an algorithm to determine the occurrence of a fall. Upon confirmation, the device signals the manufacturer's monitoring team, and an agent communicates with the individual through the device's speaker. If the person acknowledges the fall, the agent notifies the person's emergency contact as listed in the system. In case of no response, the emergency contact is automatically informed.

Additionally, many devices include a manual button for individuals to self-report a fall when they are able to do so (Wigand, 2024; Pannurat et al., 2014; Tanwar et al., 2022).

In Malaysia, study of Tobi et al. (2017) highlighted the fact that researchers have found that designers and developers are still unaware of universal design concept, its implementation, and the unique housing needs of elderly and disabled. Therefore, some suggestions (e.g.: United Kingdom's Inclusive Home Design Act 2003) are provided in their investigation to counter such issue (Tobi et al., 2017). Moreover, research by Yusof & Yasin (2023) stated the local environment and society are accountable to make ensure optimal ageing in place, as the concept of ageing in place includes housing features that suit elderly needs.

2.8.4 Physical and Mental Health

This section will outline how physical health (chronic illnesses, decline in motor skills) and mental illnesses (depression, anxiety disorder) affect ability of an elderly to age in place, primarily focuses on how their health status affects their functional capacity. Physical health and mental health are classified under personal health (Teoli & Bhardwaj, 2024). Maintaining good physical, mental, and cognitive health is crucial for healthy ageing and ageing in place independently (National Institute on Ageing, 2020). According to Ahlqvist et al. (2016) and Loa et al. (2022), having a certain level of health and functional capacity is essential to age in place independently. An individual's functional capacity is measured by their ability to perform Activities of Daily Living (ADLs) (Ahlqvist et al., 2016; Loa et al., 2022).

2.8.4.1 Physical Health

The primary causes of disability are chronic illnesses, which also play a major role in severe cases that impact basic ADLs (Hou et al., 2018). Basic ADLs are the skills necessary for attending to one's basic physical requirements like personal hygiene, dressing, toileting, ambulating, and eating (Edemekong et al., 2023). Chronic diseases are highly prevalent among elderly population. According to National Council on Ageing (2023), nearly 95% of adults aged 60 and older have at least one chronic condition, while

nearly 80% have two or more. Disability defined by World Health Organization as any impairment of the body or mind that makes performing certain activities (activity limitations) and interacting with the world harder (participation restrictions) for the individual (World Health Organization, 2001). Until here, it can be concluded that disability which mainly cause by chronic illnesses affects one's functional capacity. Functional capacity affects elderly's ability to age in place independently.

Some examples of chronic illnesses that influence elderly persons' functional capacity are provided. Diagnoses of diabetes, stroke, heart disease, hypertension and arthritis in elderly need to be monitored more carefully because these conditions significantly contribute to impairment that make them dependent on ADLs (Maresova et al., 2019). Furthermore, study by Redzovic et al. (2023) found that in the U.S., cardiovascular diseases, cancers, chronic respiratory diseases, and diabetes are leading causes of mortality and disability (Redzovic et al., 2023). Among the prevalent chronic respiratory diseases are "chronic obstructive pulmonary disease (COPD)", "asthma", "occupational lung diseases", and "pulmonary hypertension" (World Health Organization, n.d.-b). According to World Health Organization (2021), some instances of cardiovascular diseases include "coronary heart disease", "cerebrovascular disease", "peripheral arterial disease", "rheumatic heart disease", "congenital heart disease", "deep vein thrombosis and pulmonary embolism". Both arthritis and stroke are age- and gender-neutral causes of impairment, whereas heart disease and hypertension significantly affect the prevalence of disability in women (Costa Filho et al., 2018; Farías-Antúnez et al., 2018). The incapacitating effects that result in ADL dependency are exacerbated by multimorbidity (Hou et al., 2018).

Following a stroke, impairments persist for a long time, making it difficult to carry out ADLs like eating and dressing. This causes emotions of powerlessness, melancholy, and emotional agony, impairing cognitive functioning and producing depression and anxiety (Charernboon & Lerthattasilp, 2016; Lee et al., 2021; Terrill et al., 2018). Long-term functional impairments following a stroke can reduce quality of life, affect social relationships, change roles, and result in financial troubles (Charernboon & Lerthattasilp, 2016; Tiwari et al., 2021). Moreover, elderly who suffer from chronic back or knee pain

are much more likely to become dependent on ADLs. Functional limitations are common in people who experience pain, and there is a feedback loop where pain exacerbates functional limitations, which in turn exacerbates pain (Iijima et al., 2018). Elderly who have long-term medical illnesses often have challenges when it comes to independent transportation and participating in social and community events, which make it difficult for them to age in place independently (Maresova et al., 2019). Maresova et al. further added that in the majority of cases, physical impairments make it difficult for elderly to perform everyday tasks on their own.

The second subfactor under physical health which influence elderly to age in place will be decline in motor skills. According to findings of Bosch-Farré et al. (2020), because of the correlation between reported falls and a decline in motor skills and balance of elderly due to ageing, preventing falls become a top priority at home (Bosch-Farré et al., 2020). As individuals age, there is a recognized decline in motor functions, making them more susceptible to falls (Barban et al., 2017). "Motor skills" refer to the physical capabilities related to movement and coordination. Motor skills encompass a range of functions, including balance, muscle strength, agility, and overall physical coordination (Sutapa et al., 2021). Elderly exhibiting signs of frailty in their balance and mobility are at a higher risk of experiencing recurrent falls (Jehu et al., 2021). Falls result in a lower intention to age in place and a greater disease burden (Cho & Kwon, 2023). Falls pose a significant risk for elderly who age in place independently (Lotfi et al., 2018). Their research paper introduced an innovative visual-based fall detection method to enhance independent living for elderly who reside alone at home. Falls among individuals aged 65 and above can have life-altering consequences, with the most severe outcomes resulting in disability or, in some cases, even death (D. Kim & Portillo, 2018). Falls threaten elderly's ability to age in place independently (Maresova et al., 2019). Hence, it can be concluded that decline in motor skills due to ageing lead to falls. Thereby, threaten elderly to age in place, especially those who age in place independently.

2.8.4.2 Mental Health

Moving to mental health aspect, over 25% of those 65 years of age and older suffer from a mental health condition (Cameron, 2023). These illnesses are responsible for around

10.5% of all disabilities among elderly (measured in disability adjusted life years), according to Global Health Estimates (GHE) 2019 (Institute of Health Metrics and Evaluation, 2024). Psychological distress that may impact the mental health of elderly can result from unfavourable occurrences such as retirement, income drop, bereavement deterioration in functional capacity, and limited access to quality support and services (World Health Organization, 2023). Other than the factors mentioned by World Health Organization in 2023, the major risk factors for mental health problems happening later in life are social isolation and loneliness. According to World Health Organization (n.d.-a), about 25% of elderly experience social isolation and loneliness.

Social isolation and loneliness can lead to depression, accelerates decline in functional capacity, increases death rate, reduce quality of life, increases the possibility of various physical and mental illnesses (Singer, 2018). It is also important to note that chronically ill people are more likely to suffer from anxiety and depression. Among patients with chronic diseases, stress, anxiety, and depression were prevalent (M. et al., 2023). Depression is an example of mental health concern that can lead to decreased mobility, chronic pain, frailty, dementia, or other physiological issues that need long-term care (World Health Organization, 2023). Research findings of Harigane et al. (2017) as well coincided with sayings of World Health Organization in 2023, stating depression in elderly limits their functional capacity, in other words, functional independence, which often leads to a deterioration in their ability to perform basic daily activities or maintain skills for independent living (Harigane et al., 2017).

Moving to anxiety disorder, according to Frost et al. (2020), anxiety disorder is linked to higher rates of functional and cognitive decline, as well as increased utilization of healthcare services. These factors pose challenges for elderly with anxiety disorder to maintain their independence and age in place (Frost et al., 2020). Psychological challenges such as anxiety disorder pose a threat to elderly's ability to age in place independently (Maresova et al., 2019).

In summary, physical health (chronic illnesses, decline in motor skills) and mental health (depression, anxiety disorder) were considered a pivotal factor to consider over by elderly when making decisions to age in place. This notion is supported by research of Ahlqvist et al. (2016), Loa et al. (2022), and Maresova et al. (2019), mentioning ageing in place independently is threatened by the following factors: deterioration of functional capacity and health, disability in Activities of Daily Living, chronic illnesses, loneliness, falls, isolation, insecurity, immobility, psychological problems and malnutrition. Additionally, a qualitative study conducted on Filipino elderly revealed that maintaining good physical health and self-care is an essential part of ageing in place independently (Loa et al., 2023).

In Malaysia, research by Tobi et al. (2017) agreed that the health status of elderly affect their ability to age in place independently, necessitating assistance with ADLs. They reported that while life expectancy has increased, the prevalence of chronic illnesses has risen significantly, emerging as the primary cause of disability and functional dependence among middle-aged and elderly populations. Disability and functional dependence pose challenges for elderly to age in place. Besides Tobi et al., research of Yusof & Yasin (2023) also concurred that the health condition of elderly influences their ability to age in place by their own, highlighting elderly ageing in place independently without adequate care are susceptible to risks related to safety and health. They encouraged elderly with limited physical capabilities and health issues to seek external help if they choose to age in place by their own. Moreover, Malaysia research conducted by Ismail et al. (2023) similarly supports the idea that the health of elderly plays a crucial role in their ability to age in place independently, noting that individuals in their sixties and seventies are generally in good health, so the majority of them express a preference for maintaining independent living, in other words, age in place independently. In contrast, individuals aged eighty and above commonly experience a rise in frailty and a heightened vulnerability to illness and disability, impacting their independence. So, they might need to consider moving to long term care facility (Ismail et al., 2023).

2.8 Conceptual Framework
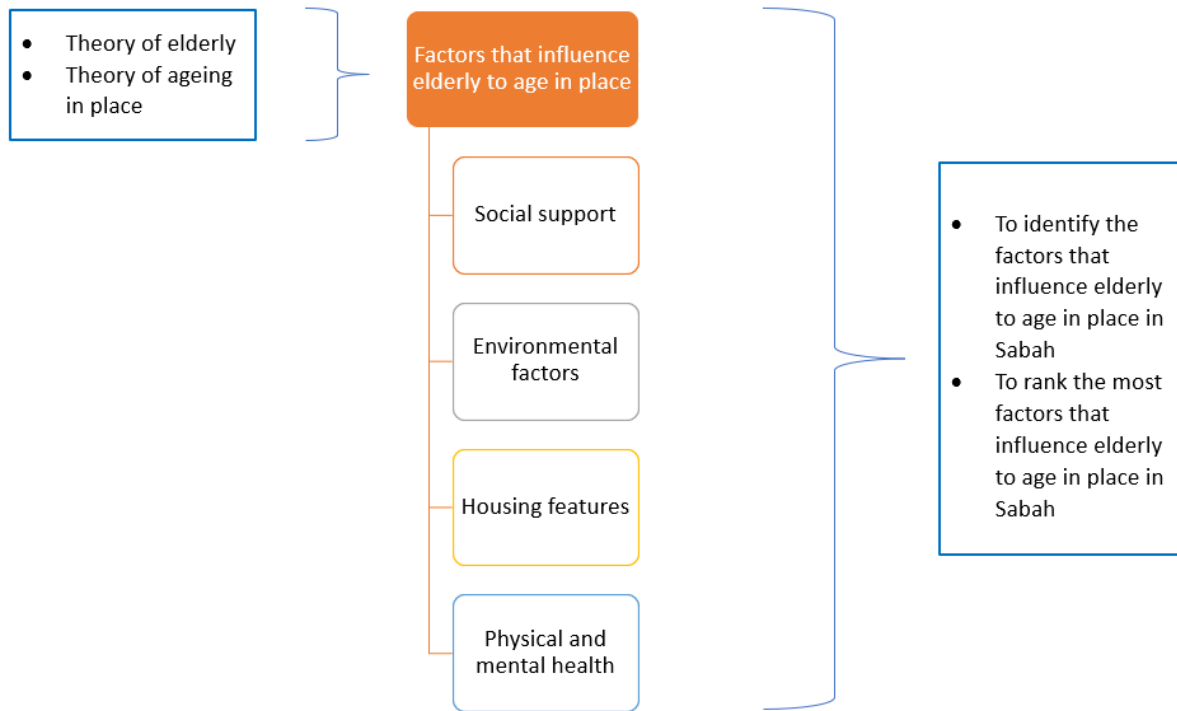
Figure 2.2: Proposed Conceptual Framework

The conceptual framework in Figure 2.2 outlines potential outcomes for this study. Previous Korea research by Cho & Kwon (2023) looked at the factors influencing ageing in place for elderly but is not relevant to Malaysia (Cho & Kwon, 2023). Similar study by Dye et al. (2010) titled: "Advice from Rural Elders: What it Takes to Age in Place" was done in South Carolina (Dye et al., 2010). To conclude, there is currently no research addressing the factors influencing elderly decision to age in place in Sabah.

2.9 Conclusion

In summary, Chapter 2 provided definitions for terms such as factor, influence, elderly, Malaysia, Sabah, elderly population in Malaysia as well as in Sabah, and ageing in place. It further expounded on theories related to factors influencing elderly decision to age in place, encompassing factors like social support, environmental factors, housing features as well as physical and mental health.

CHAPTER 3: METHODOLOGY

3.0 Introduction

Chapter 3 will cover the research technique used in this study. Detailed explanations of the techniques used for gathering data are provided. This chapter will cover many components of the research process, including research design, data collection methods, sampling design, research instrument, constructs measurement, data processing, and tools for data analysis. Chapter 4 will involve the analysis and interpretation of the data using SPSS.

3.1 Research Design

This study will identify the factors that influence elderly to age in place and later rank the most factors that influence elderly to age in place, such as social support, environmental factors, housing features as well as physical and mental health. A survey questionnaire will be employed to implement the proposed approach.

In this study, quantitative research method will be used. "Quantitative research involves collecting numerical data and conducting mathematical analyses to observe trends, make predictions, run experiments, and test hypotheses" (Chris, 2021). The findings of quantitative research are presented in numerical format tables, graphs, and figures to summarize certain information and improve comprehension. Data can be collected via mail/telephone/online survey questionnaires and Likert scales. Descriptive and inferential statistics are used to analyze data. Data is coded and input into statistical programs like Excel, SPSS, and SAS (Hameed, 2020; Addo & Eboh, 2014; Fajimi, 2022).

The chosen research design for this study is descriptive research. Describes a phenomenon and its characteristics is the purpose of descriptive research. A greater emphasis is placed on what has occurred than on how or why it has happened in this kind of research. For this

reason, observation and survey methods are frequently used to gather data, and the data is later analyzed quantitatively (Kamper, 2020; Nassaji, 2015). While qualitative methods may be used to gather the information in this type of research, the analysis is typically done quantitatively. This involves using statistics like frequencies, percentages, averages, or other numerical analyses to understand relationships in the data (Nassaji, 2015). Descriptive research differs from experimental research in that no variables are controlled or manipulated, but only observed and measured. In other words, it involves naturalistic data (Siedlecki, 2020).

In the context of this research which aims to identify the factors that influence elderly to age in place and rank the most factors that influence elderly to age in place, factors such as social support, environmental factors, housing features, as well as physical and mental health are examined. Instead of manipulating these factors, the study aims to comprehend and depict the existing conditions and influences on elderly's decision to age in place. Besides, a greater emphasis is placed on what has occurred than on how or why it has happened in this research, with the research questions of: "What are the factors that influence elderly to age in place in Sabah?" and "Which are the most factors that influence elderly to age in place in Sabah?". Moreover, survey methods will be employed to gather data about the social support, environmental factors, housing features as well as physical and mental health of elderly, and the data collected will be analyzed quantitatively.

Phase 1: Literature Review

Goal: Examine relevant literature to formulate a theoretical framework regarding the factors that influence elderly to age in place in Sabah.

Outcomes:

• Development of the theoretical framework.

• Identification of key factors.

Phase 2: Design of Survey Questionnaire

Goals:

• Establishing a sample and selecting sampling approaches.

• Conducting a preliminary test on the survey questionnaire through a pilot study.

Outcomes:

• Determined the suitable sample size and identified the targeted participants.   • Prior to distribution, the survey questionnaire underwent preparation and revision.
Phase 3: Data Collection   Goal: Distribution of survey questionnaires to the targeted participants.   Outcome: Raw data collected for subsequent analysis stages.
Phase 4: Data Analysis   Goals: • Conduct data screening.   • Utilize SPSS software for the process.   Outcomes: • Attained measurement validity and reliability for the structural model.
Phase 5: Findings and Conclusion   • Presentation and discussion of survey results.   • Conclusion of the research.   • Formulation of limitations and recommendations

Table 3.1: Research Methodology Flowchart

3.2 Data Collection Methods

Data collection refers to the systematic gathering, measurement, and analysis of accurate information by various appropriate methods. Its purpose is to obtain answers to research queries, evaluate outcomes, and forecast probability and trends (Simplilearn, 2023). There are two fundamental approaches employed in data collecting: primary data collection and secondary data collection (Ajayi, 2017). Primary and secondary data have commonalities in their utilisation for acquiring information and insights into various research areas, as well as their capacity to address research questions and test hypotheses (Allen, 2017; Unachukwu et al., 2018). This research aims to identify and rank the (most) factors that influence elderly to age in place in Sabah.

3.2.1 Primary Data

Primary data refers to information collected for the first time and directly by the researcher (Wagh, 2024). The primary data sources are derived from both qualitative and quantitative methodologies such as surveys, observations, survey questionnaires, focus groups, case study and interviews (Allen, 2017). This data is specifically meant to address and resolve the study problem at hand (Wagh, 2024). Primary data is real time data. Moreover, primary data is more accurate and reliable compared to secondary data. In the process of collecting primary data, the researcher will be very involved (Ajayi, 2023). Survey questionnaires will be employed to collect data and information for this research. Participants will be sent the survey questionnaires digitally over the internet. The advantages of this strategy include quick and easy to complete, cost effective and immediate analysis of results possible (Curtis & Allen, 2018).

In this research, survey questionnaire will be employed to collect information.

3.2.2 Secondary Data

Secondary data refers to information that has been previously acquired by another individual or organization (Ajayi, 2023). Secondary data refers to the use of pre-existing and past data for a purpose other than its initial collection (Unachukwu et al., 2018) Secondary data is relatively less accurate and reliable. The process of collecting secondary data is simpler and faster. Secondary data lacks specificity to the research objective and may not fulfill the specific requirements of the researcher for the present research (Ajayi, 2023).

Secondary sources analyze, interpret, or restate primary sources and aim to persuade. They usually involve summarizing, combining, interpreting, commenting, or evaluating to convince the reader of the creator's viewpoint. Most of the time, they try to describe or explain first-hand sources (UNSW Library, n.d.). Secondary sources encompass several types of scholarly materials such as journal articles that provide commentary or analysis of research, textbooks, dictionaries, encyclopedias, books that

offer interpretations and analyses of political commentary, biographies, dissertations, newspaper editorial or opinion pieces, and criticism of literature, art works, or music (UNSW Library, n.d.). The limitations of secondary data arise from the potential unreliability of data obtained by third parties, resulting in decreased dependability and precision. Unreliable data can hinder the overall quality of research findings and conclusions (Cheng & Phillips, 2014; OLABODE et al., 2018).

3.3 Sampling Design

3.3.1 Target Population

The target population refers to the specific group of individuals that the research intervention aims to study and derive conclusions from (Barnsbee et al., 2018). It refers to a narrower group of individuals who meet specific criteria or possess certain traits (Bhandari, 2020). Target populations are selected based on the research question or the initiative's objectives (Willie, 2023).

In this study, the targeted participants for both the pilot test and the actual survey are individuals aged 60 years and above, located in Sabah state. There are 30 participants in the pilot study and 100 in the actual survey, with distinct individuals taking part in each phase.

3.3.2 Sampling Frame and Sampling Location
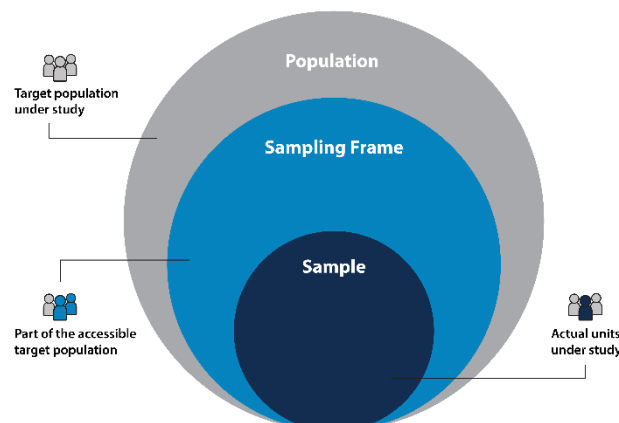
Figure 3.1: Sampling Frame. Credit to "https://www.nlm.nih.gov/oet/ed/stats/02-100.html"

It is common to refer to a sampling frame as a list of all sample units in a target population. It is important to keep in mind that a target population is more general than a sample frame, while the latter is more specific (Rahman et al., 2022). It would have to eliminate many more extra groups without a sampling frame. While maintaining the validity of the sample, this could reduce the intended sample size.

Participants aged 60 years and above and currently staying in Sabah state make up the study's representative sample and selection location. Based on *Figure 2.1*, twenty-five districts of Sabah state include "Beaufort, Beluran, Keningau, Kinabatangan, Kota Belud, Kota Kinabalu, Kota Marudu, Kuala Penyu, Kudat, Kunak, Lahad Datu, Nabawan, Papar, Penampang, Pitas, Putatan, Ranau, Sandakan, Semporna, Sipitang, Tambunan, Tawau, Tenom, Tongod, and Tuaran." Based on *Table 2.3,* Sabah's elderly population aged 60-80+ amounted to 308,300 as of December 2023. The targeted participants for this study are those aged 60 years and above in Sabah state, with distinct individuals for both the pilot test (30 participants) and the subsequent actual survey (100 participants).

3.3.3 Sampling Elements

The sampling elements for this study are elderly above 60 staying in Sabah state. Since they are about to or currently experiencing their later-life living arrangements, they know what factors will influence their decision to age in place, or in other words what are their needs when it comes to ageing in place.

3.3.4 Sampling Technique

Probability sampling and non-probability sampling are the two fundamental sampling techniques (Showkat & Parveen, 2017). In probability sampling, each element in the

population has an equal probability of being included in the sample. This means that every individual or unit has the same chance of being selected. The probability of selecting any particular element from the population is non-zero, meaning that no element is excluded from the possibility of being chosen. Every unit has a chance, even if that chance is small (Showkat & Parveen, 2017). Non-probability sampling is a method of selecting a sample from a population in which not every individual or element has a known, non-zero chance of being included. Non-probability sampling techniques rely on methods that do not involve random selection. The researcher uses subjective judgment, convenience, or some other non-random criterion to choose elements for the sample (Showkat & Parveen, 2017).

In this study, non-probability sampling is used, specifically purposive sampling and convenience sampling. Purposive sampling involves the deliberate selection of participants who are expected to provide relevant and valuable information. This method enables the identification and choice of samples that can optimize the utilization of limited research resources (Campbell et al., 2020). Convenience sampling, characterized by researchers using an easily accessible sample within their reach, can be employed in a wide range of research scenarios due to its flexibility (Golzar et al., 2022). So, individuals who meet the criteria of the target population are first identified, and then the Google form is distributed to those who are available and convenient.

3.3.5 Sampling Size

Sample size determination is the process of mathematically estimating the appropriate number of individuals or units to include in research. Inadequate sample size can impede the ability of a well-executed study to address its research questions. If the sample size is excessively big, the study will become difficult and expensive, and there is a risk of losing accuracy (Kaur, 2017). The prevailing agreement suggests that an appropriate sample size should be 100 (Memon et al., 2020). The study's sample size was determined utilizing Taro Yamane's formula with a 95% confidence level (Yamane, 1973). There are two group of researchers that focus on elderly research,

used Taro Yamane to calculate suitable sample size which include Thailand research titled "The Association between Health Beliefs and Drug Use among the Elderly in Wiang Chai District, Chiang Rai Province" (Winyangkul et al., 2022); and another research in Kenya, titled "Health Systems Responsiveness To Elderly Optimal Aging In Rachuonyo North Sub-County Of Homa Bay County, Kenya" (Odero et al., 2018).

$$n = \frac{N}{1 + N * (e)^2}$$

Figure 3.2: Taro Yamane Formula. Credit to: (Yamane, 1973).

Where: n = necessary sample size, N = the population's size, while e = the allowed error (percentage) which is usually 0.10, 0.05 or 0.01.

N= 308,300 (estimation elderly in Sabah state); e= 0.10

n= 308,300/1+308,300 * (0.10)^2

n= 100 (rounded)

This approach is commonly employed in research studies to ensure that the sample size is suitable and accurately reflects the population. The outcome yielded a sample size of 99.9999354 individuals. In order to obtain reliable data, the researcher must ensure a sample size of 100 participants.

3.4 Research Instrument

3.4.1 Design of Survey Questionnaire

The survey questionnaire consists of two sections:

i.   Section A: Demographic profile

ii.   Section B: The factors that influence elderly to age in place

Section A is to collect the basic information of each elderly participant (e.g.: gender, age, living arrangements, house ownership, length of residence, employment status, income status, etc.) Section B is to collect elderly participants' factors (e.g.: social support, environmental factors, housing features, physical and mental health) that influence them the most when deciding to age in place. There was a total of 45 questions in the survey questionnaire. It will take around 10 minutes to complete the survey questionnaire. *Table 3.2* shows the research instrument.

Subfactors	No.	Statements	Item in Questionnaire	Reference(s)
Factor 1: Social support				
Contact with family	1	Having regular contact with my children (face-to-face or phone interaction) influence me to age in place	Section B, Q1, 1.-12.	(López Doblas, 2018; Pani-Harreman et al., 2021)
	2	Having regular contact with my siblings (either in person, over the phone, via email, via text messaging or through social media) influence me to age in place		(Gilligan et al., 2020; Jensen et al., 2020; Stocker et al., 2020)
	3	Having the responsibility to frequently babysit my grandkids influence me to age in place		(Baltes et al., 1999; Bosch-Farré et al., 2020; Dong et al., 2023)

Contact with friends	4	Having consistent communication with friends (face-to-face or phone interaction) makes me happy. Thereby, influence me to age in place		(Loa et al., 2023; Shin & Park, 2022)
	5	Having dinner with friends regularly influence me to age in place		(Badache et al., 2023)
	6	Having enough friends and opportunities to engage with friends (e.g.: attending church services, birthday parties, funerals) that contribute to a sense of everyday life participation, influence me to age in place		(Stephens et al., 2015; Tavares et al., 2017)
Contact with neighbours	7	Having supportive neighbours who regularly reached out to inquire about my needs influence me to age in place		(Lewis & Buffel, 2020)
	8	Having support of neighbours for everyday tasks (e.g.: fetch items from the store, provide rides to attend medical appointments or grocery shopping, cook meals) influence me to age in place		(Versey, 2018)
	9	Having neighbours stayed in close proximity, able to provide immediate assistance during my emergency situation (e.g.: twisted ankle) influence me to age in place		(BRUGGENCATE et al., 2018; Greenfield, 2016; Kemperman et al., 2019; Lau et al., 2012)
Contact with the community	10	Being able to participate in physical activities in my community (e.g.: walking, hiking, yoga, tai chi, swimming) influence me to age in place		(Bosch-Farré et al., 2020)
	11	Being able to participate in intellectual activities in my community (e.g.: memory sessions, language courses) influence me to age in place		(Bosch-Farré et al., 2020)
	12	Being able to participate and volunteer myself in intergenerational activities (e.g.: reading picture books to local neighbourhood children; teaching and playing musical instruments with local neighbourhood children) influence me to age in place		(Bigonnesse & Chaudhury, 2020; Park, 2014; Ten Bruggencate et al., 2019)
Factor 2: Environmental factors				
Housing location	13	Housing close to public transportation (e.g.: train station, bus station) influence me to age in place	Section B, Q2, 1.-9.	(Cerin et al., 2017; Mulliner et al., 2020; Wang et al., 2022;

				Yu et al., 2021)
	14	Housing close to commercial spaces (e.g.: convenient store, mall, supermarket, restaurant, coffee shop, beauty salon, hair salon, fitness centre) influence me to age in place		(Somsopo n et al., 2022; Wang et al., 2022)
	15	Housing close to green spaces, parks, and recreational facilities influence me to age in place		(Portegijs et al., 2023)
Pedestrian infrastructure	16	Absence of uneven pavement, potholes, curbs influence me to age in place		(Yu et al., 2021)
	17	Presence of street lightings allow me to identify fall hazards during nighttime walks. Thereby, influence me to age in place		(Gaglione et al., 2021; Pulvirenti et al., 2020)
	18	Presence of pedestrian crossing influence me to age in place		(Gaglione et al., 2021; Pulvirenti et al., 2020)
Elevator	19	An elevator that is large in size influence me to age in place		(Azmi et al., 2021)
	20	An elevator that has handrail on the three sides influence me to age in place		(Azmi et al., 2021; Yuen, 2019; Architectu ral Services Departmen t, n.d.)
	21	Incorporation of mirrors on elevator walls influence me to age in place		(Azmi et al., 2021; TV Viral Desk, 2022)
Factor 3: Housing features				
Toilet	22	Having handrails/toilet grab bars in the toilet influence me to age in place	Section B, Q2, 1.-9.	(Azmi et al., 2021; Bamzar, 2019; Choi, 2020; Nguluma & Kemwita, 2018; Zaid et al., 2019)

	23	Anti-slippery floor in the toilet influence me to age in place		(Azmi et al., 2021; Bamzar, 2019; Mulliner et al., 2020; Zaid et al., 2019)
	24	Raised toilet seats influence me to age in place		(Choi, 2020; Kuboshima et al., 2018; Nguluma & Kemwita, 2018)
Kitchen	25	Upper kitchen cabinets that can be raised or lowered influence me to age in place		(Bamzar, 2019; Kaczor et al., 2023)
	26	Anti-slippery floor in the kitchen influence me to age in place		(Bamzar, 2019; Gemito et al., 2014; Zaid et al., 2019)
	27	Having alert system for gas leak in the kitchen influence me to age in place		(Azmi et al., 2021; Gu et al., 2021)
Technology	28	Application of security cameras in the house influence me to age in place		(Maswadi et al., 2022; SEVEN & DİRİK, 2023)
	29	Application of smart lightings in the house influence me to age in place		(Maswadi et al., 2022; SEVEN & DİRİK, 2023; Tural et al., 2021)
	30	Application of wearable fall detection sensors (e.g.: embedded in a watch, pendent, belt or clip-on device) influence me to age in place		(Chabot et al., 2019; Gu et al., 2021; Jo et al., 2021)
Factor 4: Physical and mental health				
Physical Health	31	My chronic illnesses (e.g.: diabetes; stroke; arthritis; cancers; cardiovascular diseases - coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein	Section B, Q4, 1.-4.	(Maresova et al., 2019; Redzovic et al.,

		thrombosis and pulmonary embolism; chronic respiratory diseases - chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, pulmonary hypertension) influence me to age in place		2023)
	32	Decline in motor skills (e.g.: decline in balance, muscle strength, agility, overall physical coordination) influence me to age in place		(Barban et al., 2017; Bosch-Farré et al., 2020; Cho & Kwon, 2023; Lotfi et al., 2018; Maresova et al., 2019)
Mental Health	33	My depression influence me to age in place		(Harigane et al., 2017; World Health Organizati on, 2023)
	34	My anxiety disorder influence me to age in place		(Frost et al., 2020; Maresova et al., 2019)

Table 3.2: Research Instrument

3.4.2 Pilot Test

Pilot studies are frequently referred to as feasibility studies. They guide the planning of large-scale investigations. A pilot project is a risk mitigation strategy meant to reduce the likelihood of a larger project failing (Fraser et al., 2018). The main objective of a pilot study is not to address specific research questions, but rather to safeguard researchers from initiating a large-scale study without sufficient understanding of the proposed methods. Essentially, a pilot study is conducted to avert the occurrence of a critical flaw in a study that would be both time-consuming and expensive (Polit & Beck, 2017).

Along with the goal of getting at least 100 responses, 30 pilot tests were sent to parents' elderly friends who reside in different districts of Sabah state and friends who

reside in different districts of Sabah state, having elderly family members or relatives living with them. The purpose of these tests was to identify any flaws in the survey questionnaire and enhance its effectiveness in gathering accurate, comprehensive, dependable, relevant, and timely data.

3.5 Construct Measurement (Scale and Operational Definitions)

3.5.1 Scale of Measurement

There are several types of measurement scales, and the type of data gathered decides which scale is utilised for statistical measurement. There are four measuring scales: nominal, ordinal, interval, and ratio (Allanson & Notar, 2020). The measuring scales are used to assess both qualitative and quantitative data. Quantitative data is measured using interval and ratio scales, and qualitative data is measured using nominal and ordinal scales. However, the ratio scale did not apply to this research (Allanson & Notar, 2020).

3.5.2 Nominal Scale
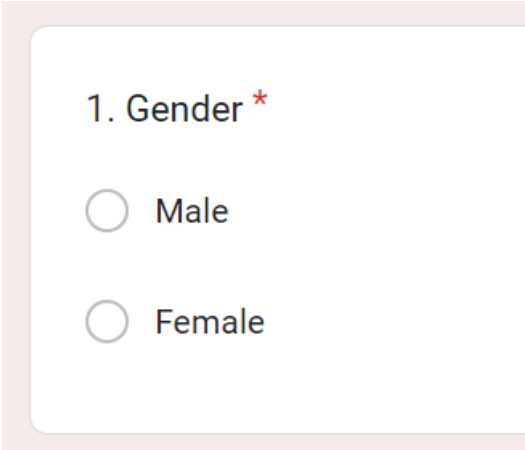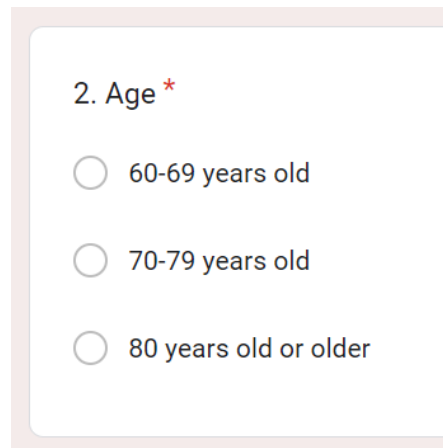
Figure 3.3: Example of Section A Question 1 for Nominal Scale

Since nominal scales are only used for labelling or arbitrary variable classification, they are seen to be the easiest to understand. Nominal scales cannot be used for any mathematical operations and have no quantitative value or order. Nominal scales,

which are based on attributes of a kind like gender, race, and place of birth, are basically a form of coding (Allanson & Notar, 2020). In the survey questionnaire of this study, the nominal scale only applied in Section A. The nominal scale only applied to Section A for question 1, 3, 4, 6, 8, and 9.

3.5.3 Ordinal Scale

Figure 3.4: Example of Section A Question 2 for Ordinal Scale

Although both nominal and ordinal scales are used to categorize data, the main distinction between the two is that ordinal data is ranked, or arranged from highest to lowest, and it summarizes the relationship between the data points (Allanson & Notar, 2020). An ordinal scale, which often employs non-numeric categories like low, medium, and high, is defined as "a variable measurement scale used to simply depict the order of variables and not the difference between each of the variables" (Market Research Guy, 2021). In the survey questionnaire of this study, the ordinal scale applied only in Section A. The nominal scale only applied to Section A for question 2, 5, and 7.

3.5.4 Likert Scale

4. What are the physical and mental health that may influence you to age in place? *

	Strongly Disagree	Disagree	Agree	Strongly agree
My chronic illness…	○	○	○	○
Decline in motor s…	○	○	○	○
My depression infl…	○	○	○	○
My anxiety disorde…	○	○	○	○

Figure 3.5: Example of Section B Question 4 for Likert Scale

In a more specific meaning, the Likert scale is employed to ascertain a participant's attitude towards a particular subject. Multiple statements in the form of phrases are included in a Likert test. Participants are asked to indicate whether or not they agree with these statements using a scale (León-Mantero et al., 2020; South et al., 2022). Typically, Likert scales have five, seven, or eleven attributes (Statista Encyclopedia, n.d.; León-Mantero et al., 2020; Tyumeneva et al., 2022). All of the remarks, when taken as a whole, are inherently interconnected and contribute to a unified understanding of a specific viewpoint or aspect related to the subject under discussion (Singh, 2006). The 4-point Likert scale is utilized in every question of Section B of the survey questionnaire, ranging from "Strongly Disagree" to "Strong Agree." Likert scale is used in two similar research. First, written by Ahn et al. (2020), titled "Supporting Aging-in-Place Well: Findings From a Cluster Analysis of the Reasons for Aging-in-Place and Perceptions of Well-Being" (Ahn et al., 2020). Secondly, "Factors Associated with Aging in Place among Community-Dwelling Older Adults in Korea: Findings from a National Survey" by (Cho & Kwon, 2023).

3.6 Data Processing

Preparing data for analysis involves checking, editing, coding, transcribing, and specifying any special or unusual conditions before analysis. The term "data processing" is used to describe the process of readying data for analysis. According to Shukla, T. (2018), a researcher's initial screening of a survey questionnaire depends on data processing.

3.6.1 Data Checking

A review of the collected data is conducted in order to determine whether there are errors, inconsistencies, or missing information. The purpose of data checking is to ensure that the collected information is accurate and reliable. Data entry validation, ensuring completeness, and identifying outliers are some of the common checks. High data quality is essential during the data collection phase. Participants failing to complete survey questionnaires in full or those deemed invalid based on question responses will be excluded. If the number of valid responses exceeds 100, only the initial 100 will undergo further data processing to mitigate potential bias.

3.6.2 Data Editing

After the data checking phase is concluded, the subsequent step involves data editing. It is essential to clarify that this does not involve intentionally altering the data to achieve specific outcomes for the study. Instead, it entails reorganizing the dataset as necessary to streamline the subsequent steps. Therefore, prior to inputting the data into the SPSS software, researchers may make adjustments to rectify inaccuracies and inconsistencies.

3.6.3 Data Coding

The process of coding qualitative data involves assigning numerical or categorical codes, making it possible for statistical analysis to be conducted. During a survey, an individual's responses may be coded as numbers in order to facilitate the analysis of

the data. Coding makes it easier to process and analyze data with statistical software. Additionally, using it helps standardize responses from participants.

3.6.4 Data Transcribing

All the collected data will undergo coding, before being input into a computer and entered into SPSS Statistics 28.0 for future data analysis requirements.

3.6.5 Data Cleaning

Data cleaning involves the process of recognizing errors and implementing adjustments to address missing data. SPSS Statistics 28.0 will be utilized to thoroughly review the survey questionnaire and detect any data that falls outside the expected range.

3.7 Data Analysis

Analysis of data is about examining, understanding, and making sense of information. It involves looking at data, identifying patterns, and making conclusions to support well-informed decisions. Hence, a proper understanding of the results of a study requires appropriate data analysis methods. In simpler terms, data analysis revolves around transforming raw data into useful and practical knowledge.

The analysis of data in this research will be carried out utilizing the SPSS software. SPSS stands as an extensive software suite offering a variety of tools for statistical analysis. This software encompasses a diverse set of statistical methods, including descriptive statistics, inferential statistics, factor analysis, and regression analysis. SPSS is structured with a user-friendly interface, enabling users to analyze and understand data easily, without the need for advanced technical skills (Jagarlapoodi, 2023).

3.7.1 Descriptive Analysis

Descriptive analysis is a method of summarizing, organizing, and interpreting set of scores known data (Sage Publications, 2019). Descriptive analysis is commonly depicted through graphs, presented in tables, or conveyed as summary statistics, such as single values. For instance, one might summarize the average (mean), middle (median), or most frequent (mode) quantity or amount (Sage Publications, 2019). The descriptive analysis encompasses the calculation of central tendency measures (such as mean, median, and mode) as they are deemed highly informative descriptive metrics (Bush, 2020); and variability measures (such as range, standard deviation, and variance) for every variable in the dataset. The use of descriptive analysis simplifies and organizes large amounts of data into a few key numbers or visual representations, allowing patterns and outliers to be detected more easily. Besides, it contributes to a more in-depth understanding of the distribution of data.

3.7.2 Reliability Test

Test reliability refers to how error-free a test is. Analysis of reliability investigates the quality of measuring scales and the items that make up the scales (Franzen, 2011). Reliability testing in statistics assesses the accuracy and dependability of research instruments or survey questionnaires. Cronbach's alpha, a widely used method in reliability testing, measures the internal consistency dependability of a scale. Represented by a coefficient between 0 and 1, a higher Cronbach's alpha suggests greater internal consistency among scale elements, indicating a more reliable measurement instrument (Taber, 2018). Typically, the internal consistency of Cronbach's alpha should be 0.7 or above (Taber, 2018).

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Table 3.3: Cronbach's alpha scale. Credit to: (Habidin et al., 2015).

3.7.3 Relative Importance Index (RII)

The relative importance index (RII) stands as a statistical instrument employed to evaluate the importance of various factors in forecasting outcomes within a research study. Its applicability becomes prominent in scenarios where multiple factors can affect a specific outcome. The RII proves valuable by ranking these factors according to their influence on the outcome. The calculation involves assigning ratings to factors, typically on a scale of 1 to 4, based on their impact on aspects such as a construction project (Annigeri & Kelkar, 2018).

In computing RII for each factor, the frequency of each response is multiplied by its assigned weight. For instance, a response labeled "Strongly disagree" might carry a weight of 1. If this response occurs 10 times, the resultant product would be 10. This procedure is iterated for all response options, and the sum of these products is then divided by the total number of participants, multiplied by the highest weight assigned to any response option. This computation yields a score for each factor, indicating its relative importance within the context of the research study.

Formula of Relative Important Index (RII)

$$RII = \frac{\sum W}{(A \times N)}$$

Where:
W= Weightage given by the respondent to each factor
A= Highest Weightage
N= Total number of respondent

Figure 3.6: Formula of Relative Important Index (RII). Credit to: (Ghayal & Salgude, 2019).

3.8 Conclusion

The research methodology has been outlined, and each stage has been carried out employing the quantitative approach. The research design for collecting both primary and secondary data encompasses the sample design, research instrument, data processing, constructs measurement, and tools for data analysis. The proceeding chapter will present the outcomes, utilizing SPSS as the tool for conducting data analysis.

CHAPTER 4: DATA ANALYSIS

4.0 Introduction

In this chapter, the data information collected from those aged 60 years and above in Sabah state, with distinct individuals for both the pilot test (30 participants) and the subsequent actual survey (100 participants) will be examined. The accumulated data is examined, identified, and results are produced by using the SPSS software. Research data will be statistically analyzed through descriptive analysis and scale measurement stages. Additionally, this chapter includes the Reliability Test and the Relative Important Index (RII).

4.1 Reliability Test

A reliability test will be conducted for the information collected from 30 participants using Cronbach's Alpha. The scale measurement process will involve inputting the data into the SPSS system to generate the results.

Cronbach's alpha	Internal consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Table 4.1: Cronbach's alpha scale. Credit to: (Habidin et al., 2015).

Factors	Cronbach's Alpha	N of Items	N of Participants	Strength
Social Support	0.861	12	30	Good
Environmental Factors	0.940	9	30	Excellent
Housing Features	0.960	9	30	Excellent
Physical and Mental Health	0.913	4	30	Excellent

Table 4.2: Section B Cronbach's Alpha Analysis (Pilot Test)

Upon analysis of the Cronbach's alpha test results, it is evident that the questionnaire's three constructs (environment factors, housing attributes, physical and mental health) exhibit excellent internal consistency. Additionally, the social support factor displays a good level of internal consistency. As a result of these findings, it is clear that the questionnaire is reliable and not likely to cause validity problems when administered to participants.

4.2 Demographic Profile

To evaluate the demographic research data, descriptive analysis will be employed. This analysis will encompass nine questions of Section A regarding gender, age, living arrangements, house of ownership, length of residence, employment status, income status, district of staying in Sabah, and impairments among the elderly.

4.2.1 Descriptive Analysis

		N	Percentage (%)
Gender	• Male	59	59.0
	• Female	41	41.0
Age	• 60-69 years old	51	51.0
	• 70-79 years old	33	33.0
	• 80 years old or older	16	16.0
House Ownership	• Renting a house	12	12.0
	• Owning a house	47	47.0
	• Staying in children's house	41	41.0
Living Arrangements	• Living alone	15	15.0
	• Living together with spouse	71	71.0
	• Living together with family members	14	14.0
Length of Residence	• Less than 10 years	16	16.0
	• 11-20 years	33	33.0
	• 21-30 years	24	24.0
	• More than 30 years	27	27.0
Employment Status	• Employed	7	7.0
	• Unemployed	12	12.0
	• Retired	69	69.0
	• Self-employed	12	12.0
Income Status	• No income	26	26.0
	• Below RM 2000	18	18.0
	• RM 2000 – RM 5000	28	28.0
	• Above RM 5000	28	28.0
District of Sabah	• Keningau	11	11.0
	• Kota Belud	1	1.0
	• Kota Kinabalu	36	36.0
	• Penampang	23	23.0

	• Sandakan	10	10.0
	• Tawau	19	19.0
Impairments	• Diabetes	7	4.7
	• Stroke	5	3.4
	• Arthritis	7	4.7
	• Cancers	4	2.7
	• Cardiovascular diseases (e.g. coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism)	5	3.4
	• Chronic respiratory diseases (e.g. chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, pulmonary hypertension)	8	5.4
	• Decline in balance	16	10.7
	• Decline in muscle strength	30	20.1
	• Decline in agility	5	3.4
	• Decline in overall physical coordination	13	8.7
	• Depression	5	3.4
	• Anxiety disorder	11	7.4
	• None of these	33	22.1

Table 4.3: Section A Demographic Profile Analysis

The survey questionnaire was completed by 100 participants (N=100). They were identified as being between 60 years old and above and staying in the State of Sabah. With a sample size of 100 elderly participants, the frequency and percentage figures aligned except for the multiple options question in Section A Question 9 regarding impairments.

The majority of elderly participants are male with 59% while the other 41% are female. Next, there were three groups of age range: 60-69 years old, 70-79 years old, and 80 years old or older. In this study, majority of elderly participants fall into the age group of 60-69 years old (51%), followed by 33% in the age group of 70-79 years old, and the remaining 16% are 80 years old or older.

Moving to house ownership, while 47% of elderly participants own their own houses, a significant proportion (41%) stay in their children's house. Additionally, 12% are renting a house.

The survey also uncovers diverse living arrangements among elderly in Sabah, which reveals that a majority of elderly participants (71%) live together with their spouses, while 15% of them live alone. The remaining 14% of elderly participants live together with their family members.

Further, length of residence data provides insights into the stability of housing situations, with majority of elderly participants (33%) have lived in their current residence for more than 11-20 years. 27% of elderly participants have lived in their current residence for more than 30 years. 24% of them have lived in their current residence for 21-30 years, while the remaining small proportion of them (16%) for less than 10 years.

In addition, employment and income status highlight the economic circumstances of elderly population in Sabah. A significant majority of elderly participant (69%) are retired, 12% of participants are still self-employed and unemployed, respectively. Another remaining 7% of them are still employed. Moreover, the income distribution among elderly participants is

varied, with both 28% reporting an income above RM 5000, and between RM 2000 and RM 5000, respectively. 18% of elderly participants have an income below RM 2000, and alarmingly, 26% of them reporting no income.

For elderly participants' district of staying, Kota Kinabalu emerges as the district with the highest concentration of elderly participants, comprising 36% of elderly population. Tawau and Penampang follow with 19% and 23% of elderly participants, respectively. Keningau (11%), Sandakan (10%), and Kota Belud (1%) represent smaller proportions of elderly participants.

Lastly, several health impairments were reported in the survey questionnaire. The majority of elderly participants, comprising 22.1% with 33 participants, reported none of the listed impairments, indicating a segment of the elderly population relatively free from these specific health conditions. A significant proportion of elderly participants, constituting 20.1% with 30 participants, reported a decline in muscle strength. Similarly, a considerable portion, comprising 10.7% with 16 participants, reported a decline in balance. Anxiety disorder was reported by 7.4% of participants (11 participants), while chronic respiratory diseases affected 5.4% of participants (8 participants).

There are seven remaining impairments, each accounting for equal to or less than 4.70% of elderly participants. These impairments represent Arthritis (4.70%), Diabetes (4.70%), Stroke (3.4%), cardiovascular diseases (3.4%), Decline in agility (3.4%), Depression (3.4%), and Cancers (2.7%).

4.3 Relative Important Index (RII)

Factor 1: Social Support	Strongly Disagree	Disa gree	Agree	Strongly Agree	RII	Rank	Avera ge RII
A. Contact with friends							
1. Having enough friends and opportunities to engage with friends (e.g.: attending church services, birthday parties, funerals) that contribute to a sense of everyday life participation, influence me to age in place	3	9	39	49	0.8350	1	0.8050
2. Having consistent communication with friends (face to face or through social media) makes me happy. Thereby, influence me to age in place	3	7	51	39	0.8150	2	
3. Having dinner with friends regularly influence me to age in place	3	17	51	29	0.7650	3	
B. Contact with family							
4. Having regular contact with my children (face-to-face or phone interaction) influence me to age in place	1	10	35	54	0.8550	1	0.7825
5. Having regular contact with my siblings (either in person, over the phone, via email, via text messaging or through social media) influence me to age in place	2	9	52	37	0.8100	2	
6. Having the responsibility to frequently babysit my grandkids influence me to age in place	10	25	47	18	0.6825	3	
C. Contact with the community							
7. Being able to participate in physical activities in my community (e.g.: walking, hiking, yoga, tai chi, swimming) influence me to age in place	4	16	47	33	0.7725	1	0.7300
8. Being able to participate in intellectual activities in my community (e.g.: memory sessions, language courses) influence me to age in place	5	27	47	21	0.7100	2	
9. Being able to participate and volunteer myself in intergenerational activities (e.g.: reading picture books to local neighbourhood children; teaching and playing musical instruments with local neighbourhood children) influence me to age in place	7	26	44	23	0.7075	3	
D. Contact with neighbours							
10. Having supportive neighbours who regularly reached out to inquire	3	18	57	22	0.7450	1	0.7242

	Strongly Disagree	Disagree	Agree	Strongly Agree	RII	Rank	Average RII
about my needs influence me to age in place							
11. Having neighbours stayed in close proximity, able to provide immediate assistance during my emergency situation (e.g.: twisted ankle) influence me to age in place	4	17	61	18	0.7325	2	
12. Having support of neighbours for everyday tasks (e.g.: fetch items from the store, provide rides to attend medical appointments or grocery shopping, cook meals) influence me to age in place	8	26	46	20	0.6950	3	
Factor 2: Environmental Factors	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**RII**	**Rank**	**Average RII**
A. Housing location							
1. Housing close to commercial spaces (e.g.: convenient store, mall, supermarket, restaurant, coffee shop, beauty salon, hair salon, fitness centre) influence me to age in place	1	11	44	44	0.8275	1	0.8008
2. Housing close to green spaces, parks, and recreational facilities influence me to age in place	2	10	58	30	0.7900	2	
3. Housing close to public transportation (e.g.: train station, bus station) influence me to age in place	3	12	53	32	0.7850	3	
B. Pedestrian infrastructure							
4. Presence of street lightings allow me to identify fall hazards during nighttime walks. Thereby, influence me to age in place	4	10	51	35	0.7925	1	0.7658
5. Absence of uneven pavement, potholes, curbs influence me to age in place	3	16	56	25	0.7575	2	
6. Presence of pedestrian crossing influence me to age in place	3	23	46	28	0.7475	3	
C. Elevator							
7. An elevator that has handrail on the three sides influence me to age in place	6	23	51	20	0.7125	1	0.6950
8. An elevator that is large in size influence me to age in place	4	29	46	21	0.7100	2	
9. Incorporation of mirrors on elevator walls influence me to age in place	8	35	41	16	0.6625	3	
Factor 3: Housing Features	**Strongly Disagree**	**Disagree**	**Agree**	**Strongly Agree**	**RII**	**Rank**	**Average RII**

A. Toilet							
1. Anti-slippery floor in the toilet influence me to age in place	2	6	46	46	0.8400	1	0.8208
2. Raised toilet seats influence me to age in place	2	9	51	38	0.8125	2	
3. Having handrails/toilet grab bars in the toilet influence me to age in place	2	7	56	35	0.8100	3	
B. Kitchen							
4. Anti-slippery floor in the kitchen influence me to age in place	3	6	49	42	0.8250	1	0.7758
5. Upper kitchen cabinets that can be raised or lowered influence me to age in place	3	14	60	23	0.7575	2	
6. Having alert system for gas leak in the kitchen influence me to age in place	5	15	57	23	0.7450	3	
C. Technology							
7. Application of security cameras in the house influence me to age in place	5	19	53	23	0.7350	1	0.7200
8. Application of smart lightings in the house influence me to age in place	4	24	55	17	0.7125	2	
9. Application of wearable fall detection sensors (e.g.: embedded in a watch, pendent, belt or clip-on device) influence me to age in place	5	22	56	17	0.7125	2	
Factor 4: Physical and Mental Health	**Strongly Disagree**	**Disa gree**	**Agree**	**Strongly Agree**	**RII**	**Rank**	**Avera ge RII**
A. Physical health							
1. Decline in motor skills (e.g.: decline in balance, muscle strength, agility, overall physical coordination) influence me to age in place	7	19	38	36	0.7575	1	0.7388
2. My chronic illnesses (e.g.: diabetes; stroke; arthritis; cancers; cardiovascular diseases - coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism; chronic respiratory diseases - chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, pulmonary hypertension) influence me to age in place	6	18	58	18	0.7200	2	
B. Mental health							

1.	My anxiety disorder influence me to age in place	14	27	40	19	0.6600	1	0.6525
2.	My depression influence me to age in place	14	26	48	12	0.6450	2	

Table 4.4: Section B Summary of RII

The use of Relative Important Index (RII) for Section B is to achieve the research objective 2 stating to rank the most factors that influence elderly to age in place in Sabah. According to the data in Table 4.3, housing features ranks the highest in average RII, followed by social support, environmental factors, and lastly, physical and mental health. The computed RII allows the four factors to be ranked as follows:

Factor	Average RII	Rank
Housing Features	0.7722	1
Social Support	0.7604	2
Environmental Factors	0.7539	3
Physical and Mental Health	0.6956	4

Table 4.5: Section B Ranking of Factors

Based on this analysis, it is evident that housing features is the most main factor that influence elderly to age in place in Sabah. Following closely behind is social support factor, which holds the second most significant factor. The third critical factor is environmental factors, while physical and mental health factor rank as the least important among the four factors.

4.4 Conclusion

In conclusion, this chapter presents the results obtained from the questionnaire, facilitating the achievement of the study's research objective 2. The findings are based on responses from 100 participants in Sabah state. The results have met certain standards and are visually represented using tables generated through SPSS and Excel software. The subsequent discussion and analysis will be connected to Chapter 5.

CHAPTER 5: DISCUSSION, CONCLUSION AND IMPLICATIONS

5.1 Introduction

In the preceding chapter, the research delved into a comprehensive examination of data through descriptive analysis, relative important index analysis tool, and the utilization of SPSS computer software. This chapter will build upon those analyses to draw conclusions. It will delve into discussions of statistical analyses and major findings, explore the implications of the study, address any limitations encountered during the research process, propose recommendations for future research, and finally, provide a conclusive summary of the entire research study project.

5.2 Summary of Statistical Analyses

5.2.1 Descriptive Analysis for Demographic Profile

Firstly, examining the gender distribution reveals a slight skew towards males, comprising 59% of the participants compared to 41% females. These results reflect the fact that number of male elderly is more than number of female elderly in Sabah, proven by Department of Statistics Malaysia (2020), according to them, Sabah's elderly population aged 60-85+ for male is 104,139 and for female is 93,885.

Moving on to age distribution, the majority of participants fall within the age group of 60-69 years old, constituting 51% of the surveyed population. However, there are also considerable numbers in older age groups, with 33% aged 70-79 and 16% aged 80 or above. This indicates a significant portion of elderly population in Sabah is still in their active senior years. These results align with the data provided by Citypopulation in 2023. Referring Table 2.3 in Chapter 2, it can be observed that in 2023, elderly in Sabah who aged 60-69 years old were 185,500, 70-79 years old were 90,500 in number, and those aged above 80 years old were 32,300.

Examining living arrangements reveals that a majority of elderly participants (71%) live together with their spouses. Besides that, 15% of them live alone. The remaining 14% of elderly participants live together with their family members.

Regarding house ownership, 47% of elderly participants own their homes. Notably, 41% stay in their children's house, showcasing strong familial support. Meanwhile, 12% opt for renting a house.

The length of residence data reveals the stability of housing situations among elderly participants. A majority (33%) have resided in their current homes for over 11-20 years, followed by 27% for more than 30 years. Additionally, 24% have lived in their current homes for 21-30 years, with a smaller proportion (16%) residing for less than 10 years.

Employment and income status highlight the economic circumstances of elderly population in Sabah. A significant majority (69%) are retired, indicating a reliance on retirement benefits or savings for financial support (The Star, 2022), while 12% are self-employed and 12% are unemployed. Regarding income, 28% report an income above RM 5000 and between RM 2000 and RM 5000, respectively, while 18% have an income below RM 2000. Additionally, 26% report no income, highlighting potential financial vulnerabilities within this demographic segment.

Looking at the district of staying for elderly participants within Sabah state, the results reveal concentrations of elderly in urban centre like Kota Kinabalu, where 36% of elderly participants stay. These findings are consistent with data provided by United Nations Population Fund (n.d.), indicating that Kota Kinabalu was the most densely populated district in 2019, with a population of 572,500. Following closely are Tawau and Penampang, accommodating 19% and 23% of elderly participants, respectively. Meanwhile, smaller proportions of elderly stay in Keningau (11%), Sandakan (10%), and Kota Belud (1%).

In the impairments reported, 22.1% of elderly participants reported none of the listed conditions, suggesting a relatively healthy segment. Decline in muscle strength was reported by 20.1% (30 participants), and decline in balance by 10.7% (16 participants). Anxiety disorder affected 7.4% (11 participants), while chronic respiratory diseases affected 5.4% (8 participants). The remaining seven impairments each affect 4.7% or fewer of elderly participants, which include Arthritis (4.70%), Diabetes (4.70%), Stroke (3.4%), cardiovascular diseases (3.4%), Decline in agility (3.4%), Depression (3.4%), and Cancers (2.7%).

5.3 Discussions of Major Findings

The use of Relative Important Index (RII) for Section B is to achieve the research objective 2 stating to rank the most factors that influence elderly to age in place in Sabah. According to the data in Table 4.3, housing features ranks the highest in average RII, followed by social support, environmental factors, and lastly, physical and mental health. In this section, first and second ranked subfactors of each factor will be mainly discussed. The computed RII allows the four factors to be ranked as follows:

Factor	Average RII	Rank
Housing Features	0.7722	1
Social Support	0.7604	2
Environmental Factors	0.7539	3
Physical and Mental Health	0.6956	4

Table 5.1: Section B Ranking of Factors

5.3.1 Housing Features

Based on the results of the ranking using the relative importance index, it can be interpreted that the majority of the participants consider housing features (toilet,

kitchen) as the most crucial factor that influence them to age in place in Sabah. Indeed, by applying suitable housing features, elderly's living environment can be made sure is safe, accessible, and supportive of their needs as they age.

According to previous literature reviews, the use of slippery floor tiles in toilet has led to inevitable incidents of injury due to accidental slipping and falls (Nguluma & Kemwita, 2018). Therefore, anti-slippery floor is suggested to facilitate ageing in place (Zaid et al., 2019; Azmi et al., 2021; Bamzar, 2019; Mulliner et al., 2020). Furthermore, as reported by Kioh & Rashid in 2018, between 19.1% and 47.0% of elderly Malaysians fall each year. Some Malaysia researchers also found that 120 elderly participants, or 37.27 percent, were reported to have fallen in the previous year by Leong Joyce et al. (2020). According to these data, prevalence of falls might be the reason why elderly prioritize housing features as the most important factor that influence them to age in place.

In order for elderly to sit comfortably, stand up, and maintain balance, toilet seats must be of the proper height. Several studies have shown that raised toilet seats are crucial for age-friendly housing, including Kuboshima et al. (2018), Choi (2020), and Nguluma & Kemwita (2018). Furthermore, elderly participants in Ramsamy-Iranah et al.'s study expressed safety concerns about high kitchen cabinets, suggesting lowering or removing them. A solution proposed by Bamzar (2019) that was supported by Kaczor et al. to improve accessibility and safety (2023) was adjustable upper cabinets.

Based on the information presented above, it is reasonable to conclude that housing features such as anti-slippery floors, raised toilet seats in bathrooms, and adjustable upper kitchen cabinets address safety concerns, improve accessibility, and minimize the chance of accidents and injuries. Furthermore, accessible housing features promote independence by allowing elderly to complete everyday tasks with less help, encouraging a sense of autonomy and control over their surroundings (Bamzar, 2019;

Carnemolla & Bridge, 2019), which align with the definition of ageing in place defined by Centers for Disease Control and Prevention (2009).

Another reason that this factor ranked first may also be due to elderly spend most of their time at their homes. Their homes serve as the hub for various activities and routines (Amián et al., 2021). Housing features are crucial for assisting elderly in performing daily living activities independently, providing safety, improving their satisfaction with their homes, and their quality of life.

5.3.2 Social Support

The participants ranked social support as the second most important factor. As a result of this finding, participants place high value on family and friends who provide emotional support, companionship, and a sense of belonging, all of which are essential for elderly well-being. In elderly, social networks reduce the risk of social isolation and loneliness, which are associated with poorer health outcomes and lower quality of life (Moreno-Tamayo et al., 2020).

López Doblas (2018) and Pani-Harreman et al. (2021) conducted studies that emphasized the importance of regular family contact for elderly to age in place, whether face-to-face or through communication channels. Stocker et al. (2020) found that elderly participants maintained contact with their siblings through various methods on average once a week to several times a week. For example, through face-to-face interactions, phone calls, or social media. These interactions act as sources of support and are able to alleviate loneliness while improving well-being of elderly (Stocker et al., 2020).

It can also be observed from the responses in Section A that, focusing on living arrangements and house ownership, social support from family is important to elderly

population in Sabah. Regarding house ownership, 41% of participants (a substantial proportion) stay in their children's house; this indicates a strong familial support system within the community. Moreover, in regards to living arrangements, a majority of elderly participants (71%) live together with their spouses, which implies that many families in Sabah are close together and spouses support each other.

For elderly to age in place successfully, maintaining friendships is also crucial. In studies by Loa et al. (2023), Shin & Park (2022), and Badache et al. (2023), it has been demonstrated that consistent communication with friends boosts self-esteem and ageing related stress-coping abilities. The authors of Stephens et al. (2015) and Tavares et al. (2017) also emphasize how having enough friends and attending gatherings and events boost overall well-being in elderly.

5.3.3 Environmental Factors

Environmental factors were ranked as the third most important factor by the participants. The subfactor that ranked first for this factor was housing location. This finding implies the participants place an important emphasis on convenience and accessibility. Having housing close to amenities, public transportation, and green spaces enhances convenience and accessibility. A convenient housing location makes it easier for elderly to participate in social and recreational activities. The second-ranked subfactor was pedestrian infrastructure. Walking on well-lit streets, accessible pedestrian crossings, and even the absence of pavement, potholes, and curbs reduce the risk of falls among elderly during outdoor mobility. Appropriate pedestrian infrastructure improves safety, elevates the quality of life and fosters active community engagement among elderly population.

Based on previous literature reviews, ensuring that neighbourhood facilities such as commercial spaces (convenient store, mall, supermarket) and recreational spaces

(park, minor open space) are conveniently located within a reasonable walking distance supports the daily lives of elderly and enhances their overall well-being (Wang et al., 2022). Accessibility to green spaces, parks, and recreational facilities encourage elderly to age in place by contributing to physical activity promotion among elderly, particularly walking (Portegijs et al., 2023). Furthermore, prior research has demonstrated that elderly benefit significantly from access to public transportation (train station, bus station), as it affords them the chance to reach distant destinations of their choice, thereby encouraging increased physical activity levels and supporting them to age in place (Cerin et al., 2017; Mulliner et al., 2020; Wang et al., 2022; Yu et al., 2021).

According to research, elderly's physical comfort and safety can be seriously hampered by badly maintained outdoor areas, such as uneven pavement, potholes, and curbs. This might impair elderly's physical abilities and deter them from participating in outdoor activities (Yu et al., 2021). According to Gaglione et al. (2021) and Pulvirenti et al. (2020), elderly's perception of critical issues concerning pedestrian infrastructure includes the lack of pedestrian crossings, and the absence or inadequacy of street lighting. Absence or inadequate street lightings hinder elderly from identifying fall hazards during nighttime walks (Gaglione et al., 2021; Pulvirenti et al., 2020). Gaglione et al. further added that with these problems solved, the quality of life of elderly population can be elevated, and an active role in community life can be facilitated.

5.3.4 Physical and Mental Health

Finally, the physical and mental health factor were ranked last in the ranking. At first, it might appear that this factor should be one of the leaders since, without good health, the ability to age in place undoubtedly decreases. However, according to the results of the study, physical and mental health were ranked last because this factor is less influential than housing features, social support or environment factors. Physical and mental health was ranked last could be because most of the surveyed participants (22.1%) do not have health impairments. Therefore, it might have been difficult for

them to relate with questions about the health impairments or put themselves in a position of illness. Because of this, they may not have strongly agreed or agreed with the question that health impairments influence their ability to age in place. It could be that this was the reason that this factor has the lowest Relative Important Index.

5.4 Implications of the Study

This study will examine the importance of understanding the needs and preferences of elderly in Sabah when it comes to ageing in place. There are a few parties that will be benefited by this study which include the government, urban planners, investors, elderly, middle-aged population, younger generations staying in Sabah.

With the government's understanding of elderly needs leads to a targeted approach for ageing in place. Recognizing the preference for independent living, the government could provide assistance, including financial aid to support housing features that suit elderly needs, introducing overseas technological innovations for housing modifications, and staffing for public healthcare system. This effort may raise awareness within society about the viability of ageing in one's own home. As society becomes more informed and supportive, ageing in place gains recognition as a respected choice for future housing arrangement. By diversifying options and promoting ageing in place, the government reduces the burden of rapidly solving insufficient elderly housing and the shortage of reasonably priced homes for elderly.

Other than benefiting the government, opportunities for developers may arise in the real estate market as a result of the growing number of people opt for ageing in place in their golden years. Developing housing that suit the needs of elderly (e.g.: housing features that suit elderly needs) has the potential to be a very profitable industry. Additionally, by concentrating on developing age-friendly communities, urban planners can make sure that upcoming projects take the requirements of the aged into account. The livability of urban environments can be improved by this inclusion. Urban planners could advocate and allocate areas for cost-effective housing solutions that cater to the unique requirements of elderly (e.g.:

environmental factors). These alternatives can include facilities such as pedestrian crossings and street lightings.

In addition, improved standards of living for elderly are guaranteed by easy access to suitable housing. The promotion of independence and safety enhances their entire well-being. Furthermore, middle-aged individuals (those approaching retirement) may improve their financial preparation in order to have a more seamless transition into retirement if they are aware that there are another suitable future housing arrangement.

5.5   Limitations of the Study

5.5.1 Small Sample Size

The research objectives of this study are to identify factors that influence elderly to age in place in Sabah, as well as rank the most factors that influence elderly to age in place in Sabah. The sample population are those aged 60 to above 80 resided in Sabah state. This may limit the applicability of this study to the wider Malaysian society. Additionally, changing environmental and time factors may render statistics obsolete, as elderly's preferences for ageing in place are constantly changing.

5.5.2 Sampling Bias

The study is a Sabah-state-focused research; however, the research did not fully cover participants that come from each district within the state. This is due to the lack of internet services in some rural districts. Social media are heavily used in this research to distribute survey questionnaires to participants. Limited internet connectivity in rural areas making participants staying in these areas difficult to respond to the survey questionnaire. With sampling bias happened in the sampling process as some districts were excluded from the study, the results of the study may not be applicable to all elderly in Sabah, as the sample may not accurately represent the entire elderly population in the state.

5.5.3 Limited Scope

This study only focuses on four factors that influence elderly to age in place, neglecting other potential factors like financial status, place attachment, healthcare services, etc. The reason why all relevant factors that influence elderly to age in place are not taken into consideration, which will facilitate a comprehensive understanding of the determinants of ageing in place for elderly in Sabah, is due to time constraints. The findings may not fully reflect the factors that influence elderly's decisions and preferences for ageing in place, making them unable to provide comprehensive policy and practical recommendations to help elderly in Sabah achieve ageing in place.

However, it is important to note that the factors that were taken into consideration in this study were based on three factors included in the research of (Bosch-Farré et al., 2020) titled "Healthy Ageing in Place: Enablers and Barriers from the Perspective of the Elderly. A Qualitative Study," and another additional factor that their research has neglected. Therefore, this study has addressed a limitation of Bosch-Farré et al.'s study.

5.6   Recommendations of the Study

5.6.1 Small Sample Size

To counter the limitation of small sample size, sample size of over 100 participants could be included in future studies. For example, 500 participants across a wider elderly age range and districts in Sabah to improve representativeness. In addition, future researchers should broaden their sources for information gathering beyond the traditional publications, journals, and websites. The information collected must be recent, not older than three years for it to remain up-to-date.

5.6.2 Sampling Bias

To counter the limitation of sampling bias, where not all participants from each district of Sabah state are covered. Future researchers can increase recruitment methods, seeking for other means of recruitment such as door-to-door surveys, local community meetings, or collaboration with organizations working with the elderly in the event the survey questionnaire is not feasible due to the lack of internet services in some rural districts.

5.6.3 Limited Scope

To solve the problem of limited scope, where only four factors that influence elderly to age in place were discussed. In this regard, future researchers can include additional factors, such as financial status, place attachment and healthcare services, etc. to present all determinants of ageing in the place in future research. Moreover, future researchers can also find sponsors to collect more resources for the future research, investing enough time and money resource to the study of ageing in the place in Sabah.

5.7 Conclusion

In conclusion, this study has identified factors that influence elderly to age in place in Sabah and ranked the most factors that influence elderly to age in place in Sabah. This study has achieved all research objectives. The first research objective is done based on previous literature reviews. The second research objective is justified through Relative Important Index. In addition, the first research objective has identified four factors that influence elderly to age in place, which encompasses social support, environmental factors, housing features, and physical and mental health. Lastly, the second research objective has the result of elderly choosing housing features as the most main factor that influence them to age in place in Sabah. Second most significant is social support factor. Environment factors are the third critical factor, while physical and mental health are the least important.

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Appendix A: Survey Questionnaire

FACULTY OF ACCOUNTANCY AND MANAGEMENT

BACHELOR OF BUILDING AND PROPERTY MANAGEMENT (HONOURS)

FINAL YEAR PROJECT

SURVEY QUESTIONNAIRE

A STUDY ON FACTORS THAT INFLUENCE ELDERLY TO AGE IN PLACE IN SABAH

Dear Sir/ Madam,

I am a final year undergraduate student from Universiti Tunku Abdul Rahman (UTAR), Elise Lim Wei Xin, who is currently pursuing in Bachelor of Building and Property Management (Honours). The aim of this questionnaire is to rank the most factors that influence elderly to age in place (age in own home independently) in Sabah.

A set of questionnaires will require 10 minutes to be completed. This questionnaire consists of TWO SECTIONS, which are Section A and Section B. Section A is about demographic profile while Section B is regarding the factors that influence elderly to age in place.

Information obtained is strictly confidential and will be used for statical and mathematical analysis for the purpose of study only. Your kind participation in this study is highly valued and appreciated. Should you have any enquiry regarding this study, kindly contact me through this email: eliselimwx@1utar.my

Thank you for your time and your input in this research.

Please tick ☑ in the box below to proceed with the survey.

I hereby consent you on my voluntary participant in this survey which will be conducted anonymously. (As proposed accordingly by Personal Data Protection Statement – UTAR)

(   ) Yes: proceed to the questionnaire.

(   ) No: thank you for your time.

Section A: Demographic Profile

INSTRUCTION: Please tick ☑ in the box next to your answer of your choice or write in the space provided.

1. Gender

(   ) Male

(   ) Female

2. Age

(   ) 60-69 years old

(   ) 70-79 years old

(   ) 80 years old or older

3. Living arrangements

(   ) Living alone

(   ) Living together with spouse

(   ) Living together with family members

4. House ownership

(   ) Renting a house

(   ) Owning a house

(   ) Staying in children's house

5. Length of residence

(   ) Less than 10 years

(   ) 11-20 years

(   ) 21-30 years

(   ) More than 30 years

6. Employment status

(   ) Employed

(   ) Unemployed

(   ) Retired

(   ) Self-employed

7. Income status

(   ) No income

(   ) Below RM 2000

(   ) RM 2000 - RM5000

(   ) Above RM 5000

8. Which district of Sabah are you staying at?

(   ) Beaufort

(   ) Beluran

(   ) Keningau

(   ) Kinabatangan

(   ) Kota Belud

(   ) Kota Kinabalu

(   ) Kota Marudu

(   ) Kuala Penyu

(   ) Kudat

(   ) Kunak

(   ) Lahad Datu

(   ) Nabawan

(   ) Papar

(   ) Penampang

(   ) Pitas

(   ) Putatan

(   ) Ranau

(   ) Sandakan

(   ) Semporna

(   ) Sipitang

(   ) Tambunan

(   ) Tawau

(   ) Tenom

(   ) Tongod

(   ) Tuaran

9. What kind of impairment do you have?

(   ) Diabetes

(   ) Stroke

(   ) Arthritis

(   ) Cancers

(   ) Cardiovascular diseases (e.g. coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism)

(   ) Chronic respiratory diseases (e.g. chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, pulmonary hypertension)

(   ) Decline in balance

(   ) Decline in muscle strength

(   ) Decline in agility

(   ) Decline in overall physical coordination

(   ) Depression

(   ) Anxiety disorder

(   ) None of these

Section B: Factors That Influence Elderly To Age In Place

1. What are the social factors that influence you to age in place? For this question, please circle your answer to each statement using four (4) Likert scales to indicate to what extent your perspective with each statement.

   (1) Strongly Disagree
   (2) Disagree
   (3) Agree
   (4) Strongly Agree

Contact with family	1. Having regular contact with my children (face-to-face or phone interaction) influence me to age in place	**1**	**2**	**3**	**4**
	2. Having regular contact with my siblings (either in person, over the phone, via email, via text messaging or through social media) influence me to age in place	**1**	**2**	**3**	**4**
	3. Having the responsibility to frequently babysit my grandkids influence me to age in place	**1**	**2**	**3**	**4**
Contact with friends	4. Having consistent communication with friends (face to face or through social media) makes me happy. Thereby, influence me to age in place	**1**	**2**	**3**	**4**
	5. Having dinner with friends regularly influence me to age in place	**1**	**2**	**3**	**4**
	6. Having enough friends and opportunities to engage with friends (e.g.: attending church services, birthday parties, funerals) that contribute to a sense of everyday life participation, influence me to age in place	**1**	**2**	**3**	**4**
Contact with neighbours	7. Having supportive neighbours who regularly reached out to inquire about my needs influence me to age in place	**1**	**2**	**3**	**4**
	8. Having support of neighbours for everyday tasks (e.g.: fetch items from the store, provide rides to attend medical appointments or grocery shopping, cook meals) influence me to age in place	**1**	**2**	**3**	**4**
	9. Having neighbours stayed in close proximity, able to provide immediate assistance during my emergency situation (e.g.: twisted ankle) influence me to age in place	**1**	**2**	**3**	**4**
Contact with the	10. Being able to participate in physical activities in my community (e.g.:	**1**	**2**	**3**	**4**

community	walking, hiking, yoga, tai chi, swimming) influence me to age in place				
	11. Being able to participate in intellectual activities in my community (e.g.: memory sessions, language courses) influence me to age in place	1	2	3	4
	12. Being able to participate and volunteer myself in intergenerational activities (e.g.: reading picture books to local neighbourhood children; teaching and playing musical instruments with local neighbourhood children) influence me to age in place	1	2	3	4

2. What are the environmental factors that influence you to age in place? For this question, please circle your answer to each statement using five (4) Likert scales to indicate to what extent your perspective with each statement.

(1) Strongly Disagree
(2) Disagree
(3) Agree
(4) Strongly Agree

Housing location	1. Housing close to public transportation (e.g.: train station, bus station) influence me to age in place	**1**	**2**	**3**	**4**
	2. Housing close to commercial spaces (e.g.: convenient store, mall, supermarket, restaurant, coffee shop, beauty salon, hair salon, fitness centre) influence me to age in place	**1**	**2**	**3**	**4**
	3. Housing close to green spaces, parks, and recreational facilities influence me to age in place	**1**	**2**	**3**	**4**
Pedestrian infrastructure	4. Absence of uneven pavement, potholes, curbs influence me to age in place	**1**	**2**	**3**	**4**
	5. Presence of street lightings allow me to identify fall hazards during nighttime walks. Thereby, influence me to age in place	**1**	**2**	**3**	**4**
	6. Presence of pedestrian crossing influence me to age in place	**1**	**2**	**3**	**4**
Elevator	7. An elevator that is large in size influence me to age in place	**1**	**2**	**3**	**4**
	8. An elevator that has handrail on the three sides influence me to age in place	**1**	**2**	**3**	**4**

		1	2	3	4
	9. Incorporation of mirrors on elevator walls influence me to age in place	**1**	**2**	**3**	**4**

3. What are the housing features that influence you to age in place? For this question, please circle your answer to each statement using five

(4) Likert scales to indicate to what extent your perspective with each statement.

(1) Strongly Disagree
(2) Disagree
(3) Agree
(4) Strongly Agree

Toilet	1. Having handrails/toilet grab bars in the toilet influence me to age in place	**1**	**2**	**3**	**4**
	2. Anti-slippery floor in the toilet influence me to age in place	**1**	**2**	**3**	**4**
	3. Raised toilet seats influence me to age in place	**1**	**2**	**3**	**4**
Kitchen	4. Upper kitchen cabinets that can be raised or lowered influence me to age in place	**1**	**2**	**3**	**4**
	5. Anti-slippery floor in the kitchen influence me to age in place	**1**	**2**	**3**	**4**
	6. Having alert system for gas leak in the kitchen influence me to age in place	**1**	**2**	**3**	**4**
Technology	7. Application of security cameras in the house influence me to age in place	**1**	**2**	**3**	**4**
	8. Application of smart lightings in the house influence me to age in place	**1**	**2**	**3**	**4**

	9. Application of wearable fall detection sensors (e.g.: embedded in a watch, pendent, belt or clip-on device) influence me to age in place	**1**	**2**	**3**	**4**

4. What are the physical and mental health that may influence you to age in place? For this question, please circle your answer to each statement using five (4) Likert scales to indicate to what extent your perspective with each statement.

(1) Strongly Disagree
(2) Disagree
(3) Agree
(4) Strongly Agree

Physical Health	1. My chronic illnesses (e.g.: diabetes; stroke; arthritis; cancers; cardiovascular diseases - coronary heart disease, cerebrovascular disease, peripheral arterial disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism; chronic respiratory diseases - chronic obstructive pulmonary disease (COPD), asthma, occupational lung diseases, pulmonary hypertension) influence me to age in place	**1**	**2**	**3**	**4**
	2. Decline in motor skills (e.g.: decline in balance, muscle strength, agility, overall physical coordination) influence me to age in place	**1**	**2**	**3**	**4**
Mental Health	3. My depression influence me to age in place	**1**	**2**	**3**	**4**
	4. My anxiety disorder influence me to age in place	**1**	**2**	**3**	**4**

____ Thank you ____

Appendix B: SPSS Raw Data