

# A Case Study on the Accessibility Factors of the Elderly in Kota Kinabalu, Sabah

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#### Abstract

The ageing population is a phenomenon in countries worldwide. The elderly will be marginalised when they travel less due to inaccessibility. This study distributed questionnaires to 600 elderly aged 60 and above in Kota Kinabalu. Factor Analysis is used to analyse 28 parameters of the factor implemented accessibility towards their living requirements. This study developed four main factors: personal, land use, transportation facilities, and temporal. Due to their physical incapacity, the land use aspect has the most significant concern. The findings can assist the government and agencies in implementing policies and strategies to fulfil the mobility needs of the elderly.

Keywords: Accessibility; the elderly; land use; mobility

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#### 1.0 Introduction

The elderly population has grown significantly, unknowingly shifting the structure of the country's population pyramid, whether in a foreign context or within Malaysia. On a global scale, the number of people over 60 is expected to grow from 841 million in 2013 to more than 2 billion by 2050 (United Nation Population Division, 2013). Malaysia's elderly population is expected to reach 9.5 per cent or 3.2 million by 2020, compared to 2.1 million or 7.3 per cent in 2011 (Department of Statistics Malaysia, 2018). In affluent nations such as Japan, the United States, Europe, China, and Hong Kong, ageing has become a phenomenon. The growing older population in emerging countries such as Malaysia is a timely reminder for the government or community to undertake early preparations to make public transportation more accommodating to the needs of the elderly. A well-managed transportation system will undoubtedly benefit a community and nation as it advances sustainable mobility (Idris et al., 2019). In addition, the transportation system should be reviewed thoroughly within a larger framework, notably on the public transportation system, to enable sustainable urban transportation growth in Kota Kinabalu (Besar et al., 2020). Sustainable transportation produces a balanced transportation system that optimises all types of transportation (Ladin et al., 2014).

The rise in the elderly population in Malaysia results from an increase in life expectancy, a decline in birth rates and mortality, and the expansion of medical facilities and health care. The living environment, improved food patterns, and developments in medical technology have contributed to increased life expectancy and low fertility rates (World Health Organization, 2008). Male life expectancy in Malaysia is projected to rise from 72.1 years in 2011 to 73.2 years in 2021 and from 76.8 years to 78.3 years within the same time frame. (Department of Statistics Malaysia, 2021). The decline in the birth rate can be attributed to the growing cost of living, early family planning, and the participation of women in the country's diverse economic activities. Statistics from the Ministry of Women, Family and Community Development (2017) show that the female labour force participation rate recorded was 49.5 per cent in 2012 and increased to 53.9 per cent in 2016. The government has improved access to services quality health care by upgrading health infrastructure, increasing the capacity of health officers or staff, promoting healthy lifestyle practices and expanding disease prevention treatment programs nationwide Ministry of Health Malaysia (2017). Klinik 1 Malaysia is yet another government programme to expand community access to health infrastructure. Klinik 1 Malaysia and Klinik Bergerak 1 Malaysia were established to develop low-income families' access to cheap healthcare services. As of 2014, 307 of 1 Malaysia Klinik have been constructed in metropolitan locations, while 16 of 1 Malaysia Mobile Clinics have been operating in rural regions utilising buses and boats (Ministry of Health Malaysia, 2017).

The travel habits and mobility requirements of the elderly differ from those of adolescents and adults. The elderly still require mobility to participate in various activities in their local community so they do not become marginalised and stay active as they age. However, several variables limit the accessibility of seniors throughout their daily journey,

causing their travel to be hindered and reducing their desire to leave the house. The elderly is a national treasure because they possess a variety of professions, skills, and experience that may contribute to the nation's growth. As a result, the accessibility of the elderly is essential so that their well-being is safeguarded, and they are more actively mobile in accessing numerous trips to places that might benefit them or the nation's socio-economic growth. The objectives of this study were to (1) identify the travel patterns of the elderly and (2) examine the accessibility factors that influence the accessibility of the elderly's ability to achieve well-being after ageing.

#### 2.0 Literature Review

#### 2.1 Definition of Elderly

Tinker (1997) states that the elderly refers to those older than the retirement age for which a person usually is eligible for a post-retirement pension. In the United Kingdom, the retirement age is 65 years old, while the European Union uses the age of 60, and in the United States, it is 55 years old. Hajimi Orimo et al. (2006) have divided the elderly into two categories, namely early elderly and late elderly. Early elderly refers to seniors aged 65 to 74, while late elderly is 75 years old and above. The definition of elderly in Malaysia is different from other developed countries because Malaysia follows the terms issued by the United Nations (UN), where the elderly are people aged 60 years and above. This definition is based on the "World Assembly on Aging 1982" in Vienna, Austria (Department of Welfare Malaysia, 2020).

#### 2.2 The Concept of Accessibility

According to Hansen (1959), accessibility is the opportunity for an individual in a particular location to participate in something or a group of certain activities. He also stated that land use and transportation networks are key elements to improving the degree of accessibility if the two aspects can interact more efficiently. According to him, more systematic land use has reduced the distance between nodes and improved telecommunications and transmission services within space. Helen (2000) argues that in the discipline of geography, accessibility is an opportunity for individuals to engage in required activities or explore new activities based on their ability to arrive at the right place at the right time and a reasonable expenditure of resources. Accessibility in the discipline of geography refers to the opportunity for an individual to engage in daily activities such as employment, services and other activities that rely on the individual's ability to reach the intended destination within a specified time at a reasonable expense using a particular mode of transportation (Helen, 2000).

The concept of accessibility carries different views and meanings from various scholarly perspectives. In conclusion, accessibility refers to the opportunity of an individual or a group of individuals to access social and economic activities that involve interaction between land use and transportation network systems through the medium of

the transportation mode chosen to lead to an attractive destination that has a function for certain individuals or groups. This study investigates the accessibility factors of the elderly in Kota Kinabalu City, Sabah, using the Geurs and Wee (2004) model as a guide.

#### 2.3 Accessibility of the elderly

Ageing is a challenge at the same time also as an opportunity. If the senior citizen is active and able to enjoy his life without considering himself old, more activities in daily life can be done to take advantage of his free time (Smita Pandey, 2018). The elderly face various accessibility issues, particularly the elderly aged 70 and up, who are less inclined to go out due to age being a factor in determining the elderly's mobility capacity (Olufemi, 2006). Hearing, eyesight, memory loss, urine incontinence, and impact significantly all cause the elderly to travel less because of physical and mental deterioration (De Luca et al., 2019; Saraswat et al., 2020). Due to health-related concerns, more elderly are giving up driving (Bob & Sara, 2016). According to Ipingbemi (2010), limited access to public transportation also impacts travel patterns. It highlights the issue of mobility accessibility among the elderly, as not all the elderly own private vehicles and live with children and family members. Some are disabled due to health issues. Saravanan (2019), stated that public transport in Kota Kinabalu City does not cover the entire area causing most city dwellers to use private vehicles. The findings of Kaniz and Sara (2018) in Melbourne, where seniors are more likely to drive privately. The elderly show dependence on children and family members to achieve accessibility, especially for those who no longer drive and for long-distance travel periods. Lack of companionship of children on the side will result in seniors not being interested in travelling because they find it difficult to plan trips privately (Kazeminia et al., 2013; Bob & Sara, 2016).

# 2.4 Accessibility factors of the elderly

According to Geurs & Wee (2004), there are four components to measure individual accessibility factors: the personal component, land use, transportation facilities, and the temporal component in a location. The personal component refers to an individual's ability to access a service. It is closely related to socio-economic statuses such as age, monthly income, level of education, and household conditions. Next, the land use component refers to public facilities such as spatial distribution, which is the opportunity for access to places for the elderly, shopping centres, health, social and recreational facilities based on demand and supply in a space (Geurs & Wee, 2004). Litman (2013) argues that this land use perspective is associated with better land use management by reducing the distance between destinations. Land use plays a major role in shaping elderly travel patterns (Goulias et al., 2007; Rosenbloom, 2001; Schmöcker et al., 2008).

Meanwhile, the transport facility component refers to the transport system (Geurs & Wee, 2004). It includes public transport facilities regarding timetables, comfort, reliability, and the number of road lines on a route (Saravanan, 2019). The next

component that affects the availability of mobility is the temporal component. According to Geurs & Wee (2004), the temporal component refers to the period to access a service in daily activities, for example, the period and frequency of accessing public transport services. For example, possessing a driver's license will influence an individual's mode of transport. A study by Ipingbemi (2010), found that a person with a driver's license will travel more than an individual without a driver's license.

The study is more in-depth on the issue of accessibility among the elderly to examine their mobility needs so that they are not neglected in the future. Therefore, the study's objectives examine the factors that influence the accessibility of the elderly.

## 3.0 Research Methodology

This research examined the accessibility factors of the elderly in achieving well-being after ageing. The survey method was performed using a survey form. A total of 600 elderly were purposefully selected, including those aged 60 years and above, as the respondents for this study. The questionnaire employed a four-point Likert scale, with 1 (Strongly Disagree), 2 (Disagree), 3 (Agree), and 4 (Strongly Agree). A quantitative approach was used to determine the travel patterns and accessibility factors of the elderly in Kota Kinabalu City, which included descriptive analysis such as percentage values, mean scores and Multiple-Choice Responses. In addition, Factor Analysis was used to reconstruct 30 accessibility factor parameters based on the same categories in this study. According to Chua (2016), factor analysis is a procedure commonly used by researchers to identify, reduce and organise a large number of questionnaire items into specific constructs under a dependent variable in the study. Based on the result of the factor analysis, only 28 variables were acceptable for further analysis. Mean values were used to analyse the dominant accessibility factors among the elderly (Table 1).

Table 1: Interpretation of Mean Scores

Ī	Mean score	Interpretation
Ī	1.00-1.75	Low
	1.76-2.50	Moderate
	2.51-3.25	High
	3.26-4.00	Very high

Source: Sahatsathatsana (2014)

# 3.1 Study Area

The researchers chose the city of Kota Kinabalu (Figure 1 above) as the study's focal point. Kota Kinabalu has a land area of 352.10 square kilometres and serves as the state capital of Sabah (Figure 1.1). With an annual population growth rate of 0.2 per cent, Sabah's Population grew from 3.89 million in 2018 to 3.90 million in 2019. In 2019, the citizen population accounted for 71.1 per cent of Sabah's total Population (Sabah Department of Statistics, 2019). The city of Kota Kinabalu has drawn the attention of scholars due to its faster socio-economic growth than other districts in Sabah. Various

facilities and infrastructure were thoroughly constructed to propel the country's economy. As a result, older folks have easier access to government-provided transportation. Furthermore, Kota Kinabalu is a hub for both local and foreign visitors. The Local Authority's income of RM142 million in 2019 indicates the city's rapid development.

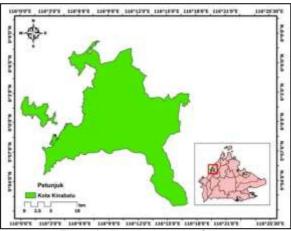


Figure 1: Kota Kinabalu city, Sabah Source: ArcGIS 10.3 (2021)

# 4.0 Findings of the Study

# 4.1 Demographic profile of respondents

Table 2 shows the demographic profile of the respondents, with most respondents aged 60 to 64 years old, recorded at 43.6 per cent, 65 to 70 years old (31.9%), and 85 years and older (1.1 per cent). The gender breakdown of respondents shows a nearly balanced number, with male respondents (56.4%) just outnumbering female respondents (43.6%) by 12.8 per cent. The marital status of the respondents revealed that the majority, which is more than half of the respondents (73.3%), are married, followed by the widowed/divorced category (18.2 %). The analysis showed the household status of the respondents, where most of the elderly live with family members (children or guardians), which is 72.4 per cent. The elderly live with a partner (12.4%), while those living as a single person account for 10.2 per cent. The result has shown dependence on children because of the belief that the old age life of the elderly will be taken over by children (Nur Syakiran et al., 2017). Strong family ties contribute to senior age planning for the elderly, especially those with health problems (Siti Norehan et al., 2016).

Table 2: Socio-demographic profiles of respondents

Characteristics		Percentage
		(%)
Age (years)	60-64	43.6
	65-70	31.9
	71-74	10.2
	75-80	9.0
	81-84	4.2
	85 & above	1.1
Sex	Male	56.4
	Female	43.6
Marital status	Married	73.3
	Divorced/Widowed	18.2
	Single	8.5
Household status	Living Alone	10.2
	Living with a Spouse only	12.4
	Living with children/caretaker/family	72.4
	Living with relatives/friends	2.4
	Elderly Care Center	2.6

#### 4.2 Travel patterns of the elderly

The elderly travel less frequently and shorter distances after retirement (Liu et al., 2017). Current travel habits of the elderly in Kota Kinabalu City, Sabah, are depicted in Table 3. Most of today's responders leave the house infrequently (53.7%), followed by often (23.4%). The most popular locations for seniors are grocery shops (30.2%), followed by markets (28.9%), places of worship (17.6%), hospitals/health clinics (12.4%), and social activities like dining out with family or friends (10.2%). The bulk of older mobility is within the range of 1 to 5 kilometres (36.5%), less than 1 kilometre (36.0%), 3 to 5 kilometres (18.9%), and beyond 10 kilometres (8%). As most respondents were unemployed, their travel times indicated a propensity to leave the house at any moment if necessary (54,2%). Many respondents went out in the morning (24.8%), avoided going out at busy hours such as midday (8.4%) and evening (8.8%), and went out at night only very seldom (4.0%).

Table 3 also showed that most respondents utilised private automobiles as passengers (29.1%) and drivers (26.5%). 16.1% of respondents took public transit, followed by walking (11.8%), taxis, Grab, Maxim, and rental vehicles (16.5%). Respondents stated they are not proficient in using the E-Hailing (Grab) transport service and are afraid to take the transport mode themselves. As such, they prefer to use private vehicles driven by their children and friends or public bus services to make any trip. According to Bob & Sarah (2016), health condition is an important issue that will be considered by the elderly before planning their trip. For example, senior citizens who still drive will avoid driving at night because of the high risk of being involved in a road accident.

Table 3: Travel patterns of the elderly

Travel patterns		Percentage (%)
Frequency of leaving the house (weekly)	Rarely (1-3 times)	53.7
	When necessary (3-6 times)	13.0
	Frequently (>6 times)	23.4
Frequently visited destination	Grocery store	30.2
	Market	28.9
	Place of worship	17.6
	Hospital/health clinic	12.4
	Social activities (dining out)	10.9
Estimated travel distance	>1KM	36.0
	1-5KM	36.5
	5-10KM	18.9
	>10KM	8.6
Travel time	When necessary	54.2
	Morning	24.8
	Afternoon	8.4
	Evening	8.7
	Night	4.0
Transportation mode used	Private car (driver)	26.5
	Private car (passenger)	29.1
	Public bus	16.1
	Walking	11.8
	Others	16.5

#### 4.3 Factors of Elderly Accessibility

Table 4 shows the factor analysis results for elderly accessibility factors in Kota Kinabalu City, Sabah. Respondents were given 30 accessibility parameters on a 4-point scale based on the accessibility. Items such as 'public facilities should be close to houses or residences' and 'provision of escalators in stair buildings' were excluded and remained 28 items because exploratory factor item loadings were less than 0.50. Accessibility factor items were generated through scientific studies and pilot studies that describe the needs of the elderly to improve their accessibility in daily life (Hayes, 2002).

The result of Barlett's Test of Sphericity for the items included was 0.000, which is a significant test result with a p<0.05 for all items of accessibility factors included and is suitable for conducting factor analysis. Data validity was also tested, with a result (KMO) of 0.874 for all items tested, indicating that the data did not have serious multicollinearity problems. Thus, those items were suitable for factor analysis. Multicollinearity allows researchers to test similar correlation values while identifying whether the items provided are appropriate for factor analysis. Cronbach's alpha values greater than 0.60 are frequently used in the reliability index and acceptable validity values, and Cronbach's alpha values greater than 0.80 are considered good. However, Cronbach's alpha value is considered low and unacceptable if it is less than 0.60.

EFA analysis showed that the personality factor recorded a variance value of 25.416 per cent in addition to an eigenvalue of 7.879 with seven (7) items, followed by the land use factor, which had an eigenvalue of 3.866 with nine (9) items and 15.404 per cent in variance contributor. The transportation convenience factor recorded an eigenvalue of 2.742 (8 items) with a variance contributor of 8.844 per cent. The last factor was the temporal factor, which contained four items with an eigenvalue of 1.714, in addition to the variance contributor equivalent of 5.529 per cent.

Table 4: Factor analysis for accessibility factors on elderly travel

ltem	Factor			
	1	2	3	4
Personality				
Discounted bus fares for the elderly	0.797			
Affordable transportation costs	0.772			
Need good health to move/travel	0.761			
Require a lot of free time to get anywhere	0.727			
Need companion when travelling	0.717			
I can drive myself to all destinations	0.636			
Need to have a strong financial position	0.580			
Land use				
Recreation facilities should be close to the residence		0.743		
CCTV cameras in public places		0.719		
Wheelchair access at stairways		0.716		
Handle/shade for pedestrians Resting benches along pedestrian		0.675 0.669		
walkways and recreation areas		0.003		
Signboards that are clear and easy to be seen		0.655		
Provision of elevators/escalators in stairwell buildings		0.653		
Police huts in crime-prone places		0.643		
Paved and safe road conditions		0.630		
Transportation facilities				
Special seats are provided for the elderly			0.832	
Can store wheelchairs in the bus			0.818	
The bus comes on time			0.737	
The bus design is suitable for the elderly			0.737	
Drivers/conductors are friendly			0.635	
The driver drops off passengers at a safe place			0.630	

Public buses are safe from crime and accidents			0.610	
Easy to get public bus			0.532	
Temporal				
Comprehensive bus/taxi/grab travel coverage				0.636
Continuous driver's license renewal facilitates travel				0.629
License ownership increases mobility				0.611
Ability to drive				0.602
Cronbach's Alpha	0.716	0.824	0.794	0.629
Total Variance Explained	5.630	4.775	3.842	0.954
Percentage Variance Explained	18.16	15.40	12.39	6.303
,	1	4	3	

The factor analysis successfully reconstructed the items into four main factors: personality, land use, transportation facilities and temporal. The interpretation of the mean value (Figure 2) will reveal the factors that are dominant and regarded as significant by the elderly in achieving their travel accessibility.

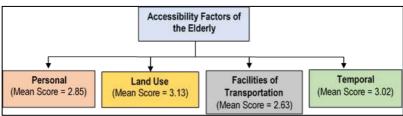


Figure 2: Mean value of elderly accessibility factors

Table 5 shows the mean score values for the elderly accessibility factor that can influence the travel accessibility of the elderly. All factors recorded an average mean value ranging from 2.63 to 3.13 at a high level. Land use is the most dominant accessibility factor, with the highest average mean value (3.13). The result has proven that the location of infrastructure facilities is essential in ensuring elderly accessibility. According to Mohamed Yusoff and Masran (2009), improving public infrastructure creates a healthier ageing environment for the elderly. The elderly are said to have lost their autonomy, rarely engage in activities, and have no meaningful social relationships (Maramingsan & Syamsul, 2014). Thus, accessibility has the potential to establish affinity or connection in social and economic interactions (Handy & Niemeier, 1997). According to Geurs and Wee (2004), temporal refers to the availability of opportunities for an individual to access a particular activity. The temporal factor recorded the second highest mean

df = 465

value (3.02), where owning a driver's license and driving ability among the elderly is an opportunity to achieve accessibility without relying on others. Re-participation in community activities can maintain the health and well-being of the elderly (Nurzaharah et al., 2016).

Table 5: Mean values for elderly accessibility factors

ltem	Mean value	Average mean value	Level
Personality			
Discounted bus fares for the elderly	2.09	2.85	High
Affordable transportation costs	3.07		
Need good health to move/travel	3.22		
Require a lot of free time to get anywhere	3.03		
Need companion when travelling	2.92		
I can drive myself to all destinations	2.51		
Need to have a strong financial position	3.08		
Land use			
Recreation facilities close to the residence	3.18	3.13	High
CCTV cameras in public places	3.15		
Wheelchair access at stairways	2.95		
Handle/shade for pedestrians	3.00		
Resting benches along pedestrian walkways and recreation areas	3.17		
Signboards that are clear and easy to be seen	3.34		
Provision of elevators/escalators in stairwell buildings	2.96		
Police huts in crime-prone places	3.06		
Paved and safe road conditions	3.35		
Transportation facilities			
Special seats are provided for the elderly	2.19	2.63	High
Can store wheelchairs in the bus	2.08		
The bus comes on time	2.47		
The bus design is suitable for the elderly	2.44		
Drivers/conductors are friendly	2.64		
The driver drops off passengers at a safe place	3.32		
Public buses are safe from crime and accidents	3.10		
Easy to get public bus	2.82		
Temporal			
Comprehensive bus/taxi/grab travel coverage	2.86	3.02	High
Continuous driver's license renewal	2.97		
License ownership increases mobility	2.95		
Ability to drive	3.29		

# 5.0 Discussion of findings

In Kota Kinabalu City, Sabah, the elderly travel less frequently and for shorter distances, usually less than one to five kilometres. Rosenbloom (2001) stated that the average daily

commute and distance travelled by the elderly had fallen substantially. Similar to senior citizens in the United Kingdom, the elderly are more prone to travel for non-work-related purposes. Typically, older individuals utilise private automobiles (passenger). Mao (2005) reports that in some European countries, the elderly rely heavily on private vehicles compared to other modes of transportation. Furthermore, 89 per cent of the elderly in the United States travel by private car, according to a monograph study on the travel characteristics of the elderly in the United States (Collia et al., 2003).

Personality factor can determine a person's capacity to attain their requirements. A good health state might influence a person's convenience in accessing his everyday activities. According to Rosenbloom (2001), health issues have made it difficult for the elderly to use vehicles such as public buses, which creates barriers for the elderly who want to take transit. Khadijah Alavi et al. (2011) found that the elderly are highly affected by ageing, causing them to reduce travel. The physical disabilities faced by the elderly could reduce their social involvement, which provides them with a sense of well-being in life (Sitinur et al., 2016).

The utilisation of transportation facilities was low among the elder since they tended to utilise private automobiles, and public bus services were less suitable for the elderly. Private vehicles are more comfortable for the elderly because, according to Kaniz and Sara (2019), the elderly in Melbourne who use the service must stand for a certain period during their travels by bus due to a lack of seats. The temporal component involves possession of a driver's licence and current driving skills, giving a person options to access products and services and the desired location.

The land use aspect is the most important factor determining the mobility access of the elderly. The location of facilities or destinations close to the residence is a significant need for the elderly since they can reach them anytime if necessary. The sustainable placement of amenities and infrastructure that is strategic and adjacent to their houses can assist the elderly keep their mobility (Goulias et al., 2007; Schmöcker et al., 2008). Closed-circuit television (CCTV) cameras in hot spots can generate confidence for the elderly when travelling. According to Berita Ehwal Semasa Radio Televisyen Malaysia, Sabah (2016), the installation of 24 closed circuit television (CCTV) cameras in several hot spots around Kota Kinabalu City since 2014 is now fully operational to lower crime rates in urban areas.

#### 6.0 Conclusion

Overall, the corpus of this study has detailed several factors that affect the availability of mobility, especially among the elderly in Kota Kinabalu. The study's findings show that land use is the most dominant factor affecting the mobility of the elderly. In this regard, the location of infrastructure facilities is crucial to ensure that the elderly can use the facilities provided, such as the location of hospitals, clinics, and social activity centres nearby, as well as being easily accessible by the elderly. In addition, temporal factors also affect the mobility of the elderly. That is, the possession of a driver's license and the

ability to drive is an important requirement for them to travel, especially long-distance travel, so they are not dependent on others.

The factor of transportation facilities also has an impact on the accessibility of mobility for the elderly in Kota Kinabalu. In this regard, public transport services are currently unable to meet the mobility needs of the elderly because the services provided are said to be less elderly-friendly. For example, there are no special seats for the elderly in public buses, buses are late picking up passengers, bus designs are not suitable for the elderly, and public bus services are difficult to access in some areas.

Therefore, elderly accessibility factors directly impact the elderly because these factors can influence their travel decisions. The distribution of the most important facilities and destinations should be within proximity to increase the mobility of the elderly because they will be able to access them without relying on others. Other accessibility factors such as personality, transportation facilities and temporal are also elements that can provide challenges or opportunities for the elderly to remain active after they reach elderly age.

The findings of this study provide the implications for all parties, including Local Authorities (PBT) such as the Social Welfare Department, Road Transport Department, and Kota Kinabalu City Hall, Sabah, in formulating effective policies and policies on the mobility needs of the elderly as well as submitting a comprehensive plan to overcome the problem of accessibility among the elderly so that they can actively age after retiring from the world of career. Incomplete coverage of public bus service routes in all areas of the city, especially in the main corridors.

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# Article Contribution to Related Field of Study

This study contributes to the knowledge of transportation geography, which is still less discussed among past scholars. Still, a transportation geography scholar researcher can explain the issues related to accessibility to the mobility of the elderly in Kota Kinabalu, Sabah.

### References

Akehsan Dahlana & Syamsul Anwar Sultan Ibrahimb. (2014). Effect of Lively Later Life Programme (3LP) on Quality of Life amongst Older People in Institutions. Procedia-Social and Behavioral Sciences Vol 202: 252 – 262.

Berita Ehwal Semasa Radio Televisyen Malaysia, Sabah. (5 April 2016). 24 CCTV di Bandaraya Kota Kinabalu Beroperasi Sepenuhnya. https://besrtmkk.wordpress.com/2016/04/05/542016-24-cctv-di-bandaraya-kota-kinabalu-beroperasi-sepenuhnya/

Besar, S. N. A., Ladin, M. A., Harith, N. S. H., Bolong, N., Saad, I., & Taha, N. (2020). An overview of the transportation issues in Kota Kinabalu, Sabah. *IOP Conference Series: Earth and Environmental Science*, 476(1). https://doi.org/10.1088/1755-1315/476/1/012066

Bob Lee & Sarah Bowes. (2016). A Study of Older Adults' Travel Barriers by Examining Age Segmentation. Journal of Hospitality and Tourism Management 4(2). American Research Institute for Policy Development: America

Chua Bee Seok, Ferlis Bullare @ Hj. Bahari, & Jasmine Adella Mutang. (2016). SPSS Principles and Analyze Data in Behavioral Science. Malaysia: Universiti Malaysia Sabah.

Collia, D.V., Sharp, J.& Lee, G. (2003). The 2001 national household travel survey: a look into the travel patterns of older Americans. *Journal Safety Research* 34: 461–470.

De Luca, K., Wong, A.; Eklund, A., Fernandez, M., Byles, J.E., Parkinson, L., Ferreira, M.L. & Hartvigsen, J. (2019). Multisite joint pain in older Australian women is associated with poorer psychosocial health and greater medication use. *Chiropractic Manual Therapies*, 27: 8

Department of Statistics of Malaysia. (2018). Older population (60+) in Malaysia, 1970-2040. https://www.dosm.gov.my/

Department Department of Statistics of Malaysia. (2021). Report of Life Expectancy in Malaysia, 2019-2021. https://www.dosm.gov.my/

Geurs dan Wee. 2004. Accessibility Evaluation of Land-Use and Transport Strategies: Review and Research Directions. *Journal of Transport Geography* (12), 127–140.

Goulias, K.G., Blain, L., Kilgren, N., Michalowski, T. & Murakami, E. (2007). Catching the next big wave: Are the observed behavioral dynamics of the baby boomers forcing us to rethink regional travel demand models? *Transportation Research Record: Journal of the Transportation Research Board 2014:* 67-75.

Hajimo Orimo, Hideki Ito, Atsushi Araki, Takayuki Hoson & Motoji Sawabe. (2006). Reviewing the Definition of "Ederly". University of Health Science Yamanashi, Japan.

Handy S.L & Niemeier D.A. (1997). Measuring accessibility: an exploration of issues and alternatives. Environment Plan A 29: 1175–1194.

Hansen Walter G. (1959). How Accessibility Shapes Land Use, Journal of the American Institute of Planners, 25:2.73-76.

Helen Couclelis. (2000). From Sustainable Transportation to Sustainable Accessibility: Can We Avoid a New Tragedy of the Commons? Social Change and Sustainable Transport (SCAST): 341-356.

Idris, S., Mansur, K., Ladin, M. A., Noordin, R., Ezzat, M. S., & Ismeth, F. (2019). Transportation Road Networks in Sabah Rural Area and Poverty Eradication: Study on East Coast of Sabah. *International Journal of Innovation, Creativity and Change*, 8(6), 154–166.

Ipingbemi, Olusiyi. (2010). Travel characteristics and mobility constraints of the elderly in Ibadan, Nigeria. Journal of Transport Geography, 18 (2): 285-291. Kaniz Fatima & Sara Moridpour. (2018). Measuring Public Transport Accessibility for Elderly. MATEC Web of Conferences. https://doi.org/10.1051/matecconf/20192 25 5903006 9 0

Kazeminia, Azadeh & Del Chiappa, Giacomo & Jafari, Ghasem. (2013). Seniors' Travel Constraints and Their Coping Strategies. *Journal of Travel Research*: 54.

Khadijah Alavi, R. Sail, K. Idris, A. A. Samah, Mustaffa Omar. (2011). Living arrangement preference and family relationship expectation of elderly parents. *Pertanika journal of social science and humanities* 19:65-73.

Ladin, M. A., Das, A. M., Najah, A., Ismail, A., & Rahmat, R. A. A. O. K. (2014). A review of strategies to implement sustainable urban transportation options in Malaysia. *Jurnal Teknologi*, 69(2)

Litman. 2013. The New Transportation Planning Paradigm. ITE Journal, 83 (6): 20-28

Mao, H. (2005). A Study on the Travel Characteristics of Chinese Urban Residents. Beijing University of Technology:Beijing, China.

Mohamed Yusoff Abbas & Masran Saruwono. (2009). Our 'Golden' Citizens with 'Golden' Facilities? *Procedia-Social and Behavioral Sciences Vol* 49: 127 – 146.

Ministry of Women, Family and Community Development. (2017). Women, family and community statistics. Putrajaya; Ministry of Women, Family and Community Development. www.kpwkm.gov.my

Ministry of Health Malaysia. (2017). *National Health Account of Malaysia*. https://www.moh.gov.my/moh/resources/Penerbitan/Penerbitan%20Utama/MNHA/Laporan\_MNHA\_Health\_Expenditure\_Report\_1997-2017\_03122019.pdf

Nur Syakiran Akmal Ismail, Norehan Abdullah, Kalthum Hassan, Shamzaeffa Samsudin, Ummu Atiyah Ahmad Zakuan, Rohana Yusof & Nurzalyna Mohamed Zaki. (2017). Well being among the elderly: Gender-based Planning. *Malaysia Journal of Society and space 13(3):*75-85.

Olufemi Odufuwa B. (2003). Enhancing Mobility of the Elderly in Sub-Saharan Africa cities though improved Public Transportation. Department of Urban and Regional Planning Faculty of Environmental Technology Olabisi Onabanjo University Ogun State, Nigeria.

Nurzaharah Binti Sajin, Akehsan Dahlan & Syamsul Anwar Sultan Ibrahim. (2016). Quality of Life and Leisure Participation Amongst Malay Older People in The Institution. *Procedia-Social and Behavioral Sciences Vol* 234: 83 – 89

Rosenbloom, S. (2001). Sustainability and automobility among the elderly: An international assessment. *Transportation* 28:375–408. https://doi.org/10.1023/A:1011802707259

Saravanan Sundara Sakaran. (2019). Residents' accessibility to public bus services in Kota Kinabalu City. Tesis Master (Unpublished). Universiti Malaysia Sabah

Saraswat L., Rehman H., Omar M., Cody JD., Aluko P. & Glazener CMA. (2020). Traditional suburethral sling operations for urinary incontinence in women. *Cochrane Database of Systematic Reviews* 2020, Issue 1.

Schmöcker, J.D., Quddus, M.A., Noland, R.B. & Bell, M.G.H., (2008). Mode choice of older and disabled people: A case study of shopping trips in London. *Journal of Transport Geography* 16: 257-267.

Social welfare Department. (2020). Annual statistical report. http://www.jkm.gov.my/jkm/index.php?r=portal/awantag&word=Warga%20Emas Smita Pandey. (2018). Factors Contributing of Ageing: Factors in Ageing. Handbook of Research on Geriatric Health. Treatment. and Care: 18.

Siti Norehan Ab Ghani, Husna Ahmad Ainuddin & Akehsan Dahlan. (2016). Quality of Life amongst Family Caregivers of Older Persons with Terminal Illnesses. *Procedia-Social and Behavioral Sciences Vol 234*: 135 – 143

Sitinur Athirah Mohammad, Mazuiyah Mohd Dom & Sabarinah Sh Ahmad. (2016). Inclusion of Social Realm within Elderly Facilities to Promote Their Well-being. *Procedia-Social and Behavioral Sciences Vol 234*: 114 – 124.

Tengku Asri Tengku Makhtar, Akehsan Dahlan, Mohamad Ghazali Masuri & Ajau Danis. (2016). Interdependence in Malay Older People who live in The Institutions: An interpretative phenomenological analysis. *Procedia-Social and Behavioral Sciences Vol* 234: 98-105.

Tinker Anthea. (1997). Older People in Modern Society. Routledge: CRC Press: London.

United Nation Office for the Coordination Humanitarian Affairs. (2020). Global Age Watch Index 2015, Insight report. https://reliefweb.int/report/world/global-agewatch-index-2015-insight-report

World Health Organization. (2008). Ageing-friendly primary healthcare center toolkits. http://www.who.int/ageing