

Review

# Understanding Travel Behavior and Sustainability of Current Transportation System for Older Adults in Malaysia: A Scoping Review

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**Abstract:** The rapid development of transportation infrastructure in Malaysia had changed the mobility landscape of the country. While it would be a welcome advancement for many, older adults might find it difficult to keep up with their transportation uses and remain active. This study reviewed published articles on the travel behavior of older adults and its associated transportation determinants to explore how sustainable the transportation system is for this vulnerable cohort. Four databases were searched: PubMed, Scopus, ProQuest, and EBSCOhost. Inclusion criteria were older respondents, living in a community in Malaysia, addressing any travel behavior characteristics and written in English language. Review paper, letters, book citations, comments, editorials, and experimental and animal studies were excluded from this study. All in all, this review included seven studies extending from the year 2007 to 2020. The result showed that transportation use of older adults had shifted from relying on public transports to driving their own vehicle to move around. According to the finding of this study, besides personal and health factors, transport use of older adults was affected mainly by cost, public transport availability, road traffic and safety, the complexity of the transportation system, distance to public transit, availability of parking space, road condition and signage. It is concluded that an effective strategy to improve the transportation system is lauded to prevent unmet travel needs among the older adults in Malaysia.

**Keywords:** elderly study; mobility; transportation; scoping review

## 1. Introduction

Over the past few decades, transportation infrastructure has expanded rapidly to accommodate Malaysia's growing demographic and economic demands. There were multiple transportation modes provided, new networks and lines were added from time to time and the services were upgraded as needed. It improves connectivity for the majority of citizens.

However, the evolving transportation landscape might be too challenging for older adults [1]. The deteriorating physiological function, [2] as well as poor health and wellbeing [3] can all affect their mobility. Living in a car-dependent nation, the traffic, hazards, and pollution can hamper their planned excursion [4]. Urban sprawl, an ever-complicated transportation system, and a limited source of income would further hinder their transport use [5]. As many of them prefer to age in place, they might be having difficulty maneuvering their daily routine on their own while living independently with limited child assistance. It might lead to social exclusion and poor self-care if the unmet travel need of the older adults is not addressed effectively [6].

Thus, is the rapidly developing transportation system in Malaysia capable of sustaining the mobility of older adults? Older adults have long battled to remain physically and socially active in their community [7]. The lack of age-friendly features of the present transportation system would cause an even greater detrimental impact on their mobility [3]. A push towards active ageing in this rapidly ageing population might be a challenge for the government. The demographic shift might indeed be a cause of concern for them.

This review will look at the travel behavior of older adults and the associated transportation determinants. Emphasis would be on comprehending the decision-making process of how they travelled, choice of transportation mode and impediments encountered while commuting. It will help the nations prepare for ageing population and benefit older adults by maximizing their mobility, health, and wellbeing.

## 2. Materials and Methods

The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) statement was adhered to while conducting the review. Observational studies including qualitative studies focusing on older adults' travel behavior and the transportation determinants were reviewed. Four electronic databases, namely Scopus, PubMed, EBSCOhost, and ProQuest, were systematically searched for prospective papers. Grey literature, mainly from the articles' citations was reviewed as well. All potential articles were reviewed regardless of the publication year.

The search concentrated on four key terms: (1) older adults; (2) travel behavior; (3) transportation determinants; (4) Malaysia. The search string was conducted as follow: ("older adult\*" OR older OR elder\* OR senior\* OR geriatric\* OR aged OR ageing OR aging OR "old age" OR "old people") AND ("travel behavi\*" OR travel OR trip OR transport\* OR commut\* OR driv\* OR rid\* OR cycl\* OR car OR motorcycl\* OR "public transport\*" OR bus OR train OR taxi OR "e-hailing") AND ("transport\* determinant\*" OR determinant\* OR factor\* OR cause\* OR influence\*) AND (Malaysia) were used in keywords boxes to conduct the literature search. Duplicates were deleted both electronically and manually.

### 2.1 Inclusion and exclusion criteria

Studies involving older Malaysians, living in a community, as well as addressing travel behavior and transport determinant of the older adults were included in the review. Articles of non-Malaysian origin, have unrelated themes, and not published in English language were excluded from the study.

### 2.2 Study screening and selection

Based on the inclusion and exclusion criteria, titles and abstracts were assessed. If the inclusion or exclusion criteria could not be determined based on the title and abstract, full-text publications were retrieved and reviewed. The following study criteria were sought:

study design, study location, sample size, study objective, and significant results. Whenever analyzed, significant transport factors were determined using the 95% confidence interval and odds ratio/adjusted odds ratio. Articles that employed community-based research, cross-sectional studies, secondary data and qualitative study were considered to be included in the study.

### 2.3 Data extraction

Following the screening of papers, duplicate publications were identified and eliminated by comparing author names, study titles, and sample size. Study results mentioning transport factors affecting any travel behavior components were included in the review.

Following the conclusion of the screening and selection of the retrieved papers, a methodological assessment for each research article was carried out, followed by data extraction. The data from the chosen studies were retrieved based on (1) study overview or research characteristics; (2) results of the study; (3) relevancy to the issue addressed.

### 2.4 Presentation of data

Table 2 showed the summarized of the data summary. The travel behavior and transport determinants of older adults were characterized using the same frequencies, percentages, and measures of association as were utilized in the research.

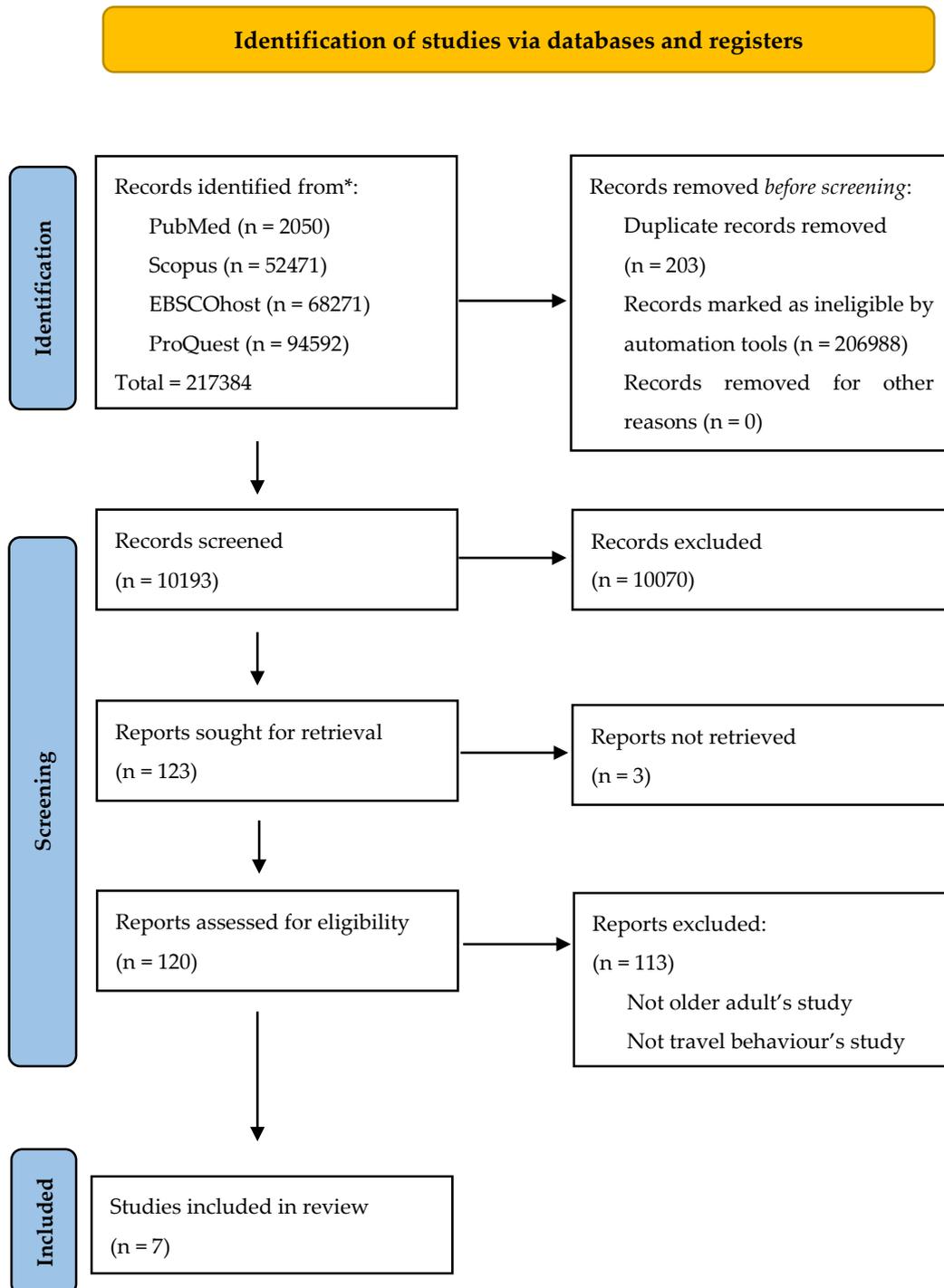
## 3. Results

### 3.1. Study inclusion

Four databases were searched, yielding a total of 217384 entries. After automation removal and duplicates were deleted, 10193 records remained. Based on their titles and abstracts, 10070 of the remaining records were arbitrated ineligible. Three articles could not be retrieved. Following the full-text review, 113 of the 120 articles were excluded because they did not meet the criteria of the review's eligibility. To end, seven articles were included in the review.

### 3.2. Characteristics of the included studies

The data were analyzed and interpreted using seven peer-reviewed studies. Table 1 summarizes the general features of the included studies as well as their study findings. Six included articles were cross-sectional in design, and one study was qualitative research. All research was conducted on the one-on-one interview, with two in combination with online and mailbox survey. Five studies were conducted in the multi-center setting, while the other two were done in single-center setting. In terms of the study population, two investigations were undertaken among the general population, while five other studies were conducted on the older population specifically.



**Figure 1.** PRISMA flowchart diagram.

Table 2. Main findings.

References (n=7)	Study design and methodology	Sample size, target population & area	Outcome measured	Indicative findings
<i>Travel frequency</i>				
Ang et al. (2020)[8]	Qualitative study	22 older adults age 60 and above in Selangor and Kedah.	Driving regulation	Older car drivers made fewer trips and avoid driving in challenging situations as a driving strategy to ensure continuous driving into later age.
Ang et al. (2019)[1]	Cross-sectional study	637 older adults age 60 and above in Selangor and Kedah.	Driving cessation	Most of older car and motorcycle drivers travelled everyday (46.8% and 59.4%, respectively), followed by almost every day, occasionally and rarely.
Mohd et al. (2019)[9]	Cross-sectional study	455 older adults aged 60 and above in Malacca and George Town.	Travel behavior	Average number of trips decreased with age. There was disparity in number of trips between older adults in Melaka and George Town.
<i>Travel destination</i>				
Kamaruddin (2008)[10]	Cross-sectional study	1356 older adults age 65 years and older in Kuala Lumpur, Petaling Jaya, Penang, Ipoh, Johor Bahru, and Kuantan.	Travel characteristics and mode of transportation	For both urban and rural older adults, they travelled the most for social visits. Then, it was for shopping trips and medical check-ups for urban older adults. But, those from rural areas went for medical check-ups more frequently than they went shopping.
Musa and Sim (2010)[11]	Cross-sectional study	1356 older adults age >55 in Kuala Lumpur, Ipoh, Petaling Jaya, and Penang.	Leisure travel behavior	Most holiday trips, domestic and foreign, were made to spent time with family and friends (55.3%), relaxation, to treat oneself and for religious reasons. They chose big cities, beaches, and rustic village for domestic trips. They favor big cities, religious sites, and historical places when travelling abroad.
Mohd et al. (2019)[9]	Cross-sectional study	455 older adults aged 60 and above in Malacca and George Town.	Travel behavior	Most trips of older adults were for personal reasons, followed by shopping and recreational purposes.
<i>Travel distance</i>				
Ang et al. (2019)[1]	Cross-sectional study	637 older adults age 60 and above in Selangor and Kedah.	Driving cessation	Most of older car and motorcycle drivers (86.2% and 82.0% respectively) drove short distances than long distances.
Mohd et al. (2019)[9]	Cross-sectional study	455 older adults aged 60 and above in Malacca and George Town.	Travel behavior	Distance travelled decreases with age.
Ang et al. (2020)[8]	Qualitative study	22 older adults age 60 and above in Selangor and Kedah.	Driving regulation	Older drivers changed their driving patterns by travelling locally to sustain their driving capabilities into later age.

<i>Mode of transportation</i>				
Nurdden et al. (2007)[12]	Cross-sectional study	1200 general population including elderly age >55 in Kuala Lumpur city center.	Preference for public transport versus driving over 3 proposed policies	As compared to younger people, the odds of older adults to choose public transport increase by 93% when travel cost and time reduced, 96.7% when distance to public transit reduced, and 98% when frequency and services improved.
Kamaruddin (2008)[10]	Cross-sectional study	1356 older adults age 65 years and older in Kuala Lumpur, Petaling Jaya, Penang, Ipoh, Johor Bahru, and Kuantan.	Travel characteristics and mode of transportation	Both rural and urban older adults preferred to rode bus, followed by car, taxi, and train. Reliability, staff attitude, confusing signage and affordability are main difficulties encountered by older adults when using public transport.
Musa and Sim (2010)[11]	Cross-sectional study	1356 older adults age >55 in Kuala Lumpur, Ipoh, Petaling Jaya, and Penang.	Leisure travel behavior	Cost, distance, safety, comfort and convenience of the facility were factors affecting older adults' decision to make leisure trip.
Mohammed et al. (2015)[13]	Cross-sectional study	400 general population including older adults age >63 in Petaling Jaya.	Travel behavior	Older adults are more likely to drive than to take a bus or train to move around. Car ownership, trip duration and distance to transit were significantly associated with the modal choice.
Mohd et al. (2019)[9]	Cross-sectional study	455 older adults aged 60 and above in Malacca and George Town.	Travel behavior	Older adults prefer to drive than taking public transport. Reliability and accessibility of public transport were found to be the main barrier of its uses.
Ang et al. (2019)[1]	Cross-sectional study	637 older adults age 60 and above in Selangor and Kedah.	Driving cessation	Most of older adults had moderate accessibility of public transports near their residence ( $p < .001$ ). However, they prefer to ride motorcycle since they are convenient, economical, and easy to maneuver.
Ang et al. (2020)[8]	Qualitative study	22 older adults age 60 and above in Selangor and Kedah.	Driving regulation	Older adults tended to forego driving in favor of taking public transport when dealing with distant destination, road congestion, and insufficiency of parking spaces. However, when using public transport, they encountered challenges to reach destinations, long waiting times, limited accessibility and unfamiliar with the system.

### 3.3. The study outcome

#### 3.3.1. Travel frequency

Most of the older car drivers in Malaysia travel every day (46.8%). It was followed by almost every day (36.5%), occasionally (15.4%) and rarely (1.3%). For older motorcycle drivers, most of them travelled every day too (59.4%), followed by almost every day (29.7%) and occasionally (10.9%) [1].

Through journal diary, it was found that the number of trips of the older adults decreased with age [9]. Young-old made an average of 1.29 excursions per day, reduced to 1.05 among middle-old and 0.99 for the old-old group of older adults. However, the number of journeys varied by location, with an average of 1.224 trips made by older adults in George Town compared to only 0.956 trips made by those in Malacca. Owning a private vehicle was found to increase the number of trips made.

Trouble in driving was significantly associated with driving cessation among older adults (OR: 1.08; 95% CI: 1.03-1.14;  $p=0.0028$ )[1]. As they chose to continue driving, they would adopt certain driving self-regulatory practices to cope with driving difficulty [8]. They would change their driving patterns by restricting their driving time for their own safety. As they refuse to stop driving altogether, owing to a reduction of driving abilities, they would cut down on the number of trips they took, drive more slowly, and avoid driving in hazardous conditions such as at night, in the rain, or during rush hour.

### 3.3.2. Travel destination

The majority of young-old groups of older adults in Malaysia made a personal trip for their first and second trip (26.8%), followed by a recreational trip as their third trip (40.8%) [9]. For middle old of older adults, the first trips were for personal reasons, as well (28.7%), with shopping for the second trips (25%) and recreational for the third trips (40.9%). Old-old group of older adults travelled for personal reasons (23.4%) on their first trip, then shopping (25%) for the second trips and either shopping (21.1%), recreational (21.1%) and other reasons (21.1%) for third trips. Older adults from different cities showed little discrepancy, except for the old-old age group where Malaccans made more trips for medical reasons than those from George Town.

There was little difference in travel purposes between older adults living in rural and urban areas. In a study, older adults living in an urban setting were found to travel for social visits the most (49.2%), followed by shopping trips (47.8%) and medical check-ups (40.6%) [10]. For rural older adults, the most common purpose for them to travel is to visit family and relatives too (58.0%), followed by medical check-ups (50.0%) and shopping (41.6%). Other trip purposes frequented by rural and urban older adults included banking (30.5%), religious activities (27.2%), working (8.1%), sports participation (6.5%), and charity events (4.1%).

For leisure, older adults cited to prefer to make such trips to spend time with friends and family (60.5%), for relaxation (42.8%), giving themselves a treat (20.4%), for religious reasons (18.4%) and as learning experience (10.0%). Their favorite domestic sites to visit included big cities (46.9%), beaches (43.5%) and rustic villages (34.1%). Meanwhile, they favored big cities (31.6%), religious sites (24.9%), and historical places when travelling abroad (14.2%) [11].

### 3.3.3. Travel distance

The majority of older car drivers travelled short distances (86.2%), as compared to just 13.8% who travelled long distances. Similarly, the majority of older motorcycle drivers (82.0%) travelled short distances, while only 18.0% travelled long distances [1]. About 48.26% of older adults travelled between one to five kilometers per day [9]. Travelling for long distances becomes less common with age. About 19% of the young-old group of older

adults travelled more than 10km per day, and it depleted to 10.56% among middle-old and 8.51% among the old-old age group.

The reduction in travelling distance with age was a part of coping mechanism of older adults towards the depletion of driving ability. They imposed driving limitations such as making shorter trips and driving locally as a self-regulatory practice and driving strategy to sustain mobility and prevent complete cessation of driving as they grow old [8].

### 3.3.4. Mode of transportation

#### 3.3.4.1. Transportation determinants of older adults to travel

In a study of leisure trips made by older adults, it was found that most of them chose to travel in tour groups (44.2%) [11]. However, cost (61.7%), distance (35.1%), safety (31.5%), comfort and convenience of facilities (22.3%) were reported to be the major factor in travel making-decision.

#### 3.3.4.2. Transportation determinants of older driver

The number of trips taken by older adults significantly increased with ownership of a vehicle [9]. They were reported to make a predicted travel frequency of 1.396 trips as compared to 0.776 trips among those without a private vehicle and 1.216 trips of those who depend on others for transportation. No disparity was found across age groups and cities. However, car ownership decreased the odds of taking the bus (OR:-0.954;  $p=0.002$ ) and train (OR:-0.875;  $p=0.007$ ) and further promoted car use [13].

Older adults prefer to drive a car than to ride a motorcycle ( $p<.001$ ) [1]. They cited driving a car as safer than riding a motorcycle. On the other hand, those who favor riding a motorcycle cited it to be more convenient, economical, and easier to maneuver, especially in heavy traffic. Additionally, this study also revealed that, as compared to car drivers, more motorcycle riders had ceased riding as they aged (OR: 4.78;  $p<.001$ ). It was statistically associated with level of difficulty ( $p=0.0028$ ) and avoidance from facing challenging situations ( $p=0.0035$ ) while driving.

A qualitative study was also conducted where older drivers' self-regulatory practices was studied [8]. Among challenges for them to continue driving were petrol price affordability, safety concerns, poorly maintained road signage, road conditions, complex road networks, unfamiliar places, and a lack of parking spaces. They would reduce number and distance of the trips, driving at slower pace and avoid driving in challenging situations such as at night, in the rain and during peak hours.

#### 3.3.4.3. Transportation determinants older public transport commuters

For as early as 2007, age had been found to be significantly associated with modal choice behavior among the local older adults [12]. When travel cost and time were reduced, the odds for older adults to use public transports increased by 93.8% ( $p=0.036$ ) as compared to younger commuters. Older adults also were more likely to use public transport as opposed to driving when the distance to public transport facility reduced, as compared to younger people (OR: 0.967;  $p=0.003$ ). More, the improvement of public transports' frequency and services would increase the odds of older adults using public transport by 98.0% ( $p=0.047$ ) as compared to younger commuters. Additionally, the odds

of older adults switching to public transport also would increase by 36.0% ( $p=0.001$ ) when the minimum driving age increase to 23 years old.

A study done in 2008 reported high usage of public transport among older adults [10]. Older adults from the urban area chose to ride public transport, mainly buses (40.6%) and taxis (32.7%), than to drive private vehicle, mainly their own car (43.7%), to reach their destination. Similarly, older adults from rural areas predominantly rode public transport, including buses (50.4%) and taxis (33.0%), over driving their own transport (37.0%). However, few difficulties were conveyed concerning the public transport usage. For urban older adults, they encountered issues of reliability (29.8%), safety (22.3%), the attitude of the staff (21.0%), confusing signage (19.9%) and affordability (19.8%) when using public transport. Issue of availability (19.4%), accessibility (17.0%) and long journey (16.4%) was not as concerning for them. For older adults living in a rural area, issues of reliability (34.3%), affordability (29.2%), safety (24.6%), the attitude of the staff (24.1%), long journey (21.0%), and confusing signage (19.7%) were major difficulties they faced when using public transport. Issue of accessibility (17.0%) and availability (14.4%) were not considered major difficulties faced by them. Trains are less preferred by older commuters due to difficulties of boarding or alighting at terminals, inconvenience and hassle during travel.

In 2015, another study was conducted to analyze the determinant of choice of transportation modes [13]. At this time, an increase in age was found to increase the likelihood to drive than taking a bus ( $p=0.014$ ) or a train ( $p=0.005$ ). The larger distance between one's residence and transport station reduced the odds of using public transport than owning a car (aOR=-0.875;  $p=0.007$ ). It also statistically increased the likeliness to drive than using public transport (aOR=0.748;  $p<.002$ ).

Similarly, another study done in 2018 also reported that older adults prefer to drive their private vehicle than to ride public transport [9]. However, they found discrepancies when comparing the modal choice of older adults living in different cities. Only 3.92% of older adults in Malacca used public transport. Most who live in Malacca prefer to be chauffeured as passengers of a private vehicle (49%). In contrast, a greater percentage of older adults in George Town (20.47%) travelled using public transportation. Thirty per cent of them chose to drive their own vehicle. Only 20% of older adults in George Town depend on others for transport. A small percentage of those who live in George Town cycle to travel, while none from Malacca did so. The percentage of older adults from George Town who use public transport was five times than those from Malacca. Better establishment of facilities in George Town than in Malacca was found to be substantial in determining the use of public transport among older adults there.

When it came to the accessibility of public transport near their residence, there was a statistically significant disparity between older car and motorcycle drivers ( $p<.001$ ) [1]. More older car drivers had excellent (6.7%) and good (33.5%) accessibility to public transport near home than older motorcycle drivers (1.9% and 21.2%, respectively). Accordingly, more older motorcycle drivers faced moderate (45.9%) and poor (31.0%) accessibility to public transport near home than older car drivers (36.3% and 23.5%).

It was also reported that older adults used public transport as a mobility coping strategy. When the traffic was bad, they had to travel to distant destinations or there is a lack of parking space, their mode of transportation gradually changed to compensate for the deteriorating abilities and discomfort in dealing with the challenging situations [8]. However, they expressed difficulty in reaching their destination when travelling by public transport, besides the long waiting time, limited accessibility and a lack of familiarity with the transit system.

#### 4. Discussion

This study identified evidence on the travel behavior of older adults in Malaysia and their transportation determinants. Their number and distance of excursions decreased with age [1][8][9]. They travelled every day [1], albeit only once a day [9] and only for short distances [1][8][9]. The majority of their trips were for everyday necessities and self-care, such as grocery shopping, medical appointments, and visiting family and friends [9][10].

There was a shift in travel mode preferred by older adults; from taking public transport in earlier studies [10][12] to driving private vehicles in many recent studies [9][13]. Many were also discovered to use interchange of multi-modal, while some depend on others for private transportation [8]. There were disparities in transportation modes used between study areas, mainly due to differences on the establishment of public transports in those locations [9].

A few transportation determinants were reported to have an impact on their transport's selections. However, the study was unable to locate any local research that examined transportation characteristics that influence older adults' travel time, duration, destination, route and other aspects of travel behavior.

The most recurring hurdle reported by older adults was the high expenses of transportation [8][10][12]. The expenses of commuting by private or public transports were perceived as prohibitive due to their limited income after retirement. In similar study, more Malaysian prefer to ride a motorcycle than a bus for its affordability, with 95.4% increase in the likelihood of them ditching motorcycles for the bus if the ticket price was cheaper [14]. This was also a concern in countries like China [15] and South Korea [5]. In countries like the United Kingdom and Hong Kong, free passes and minimal cost rate for older adults have been shown to be effective in boosting mobility and transport use [16][17]. There was transportation concession fare for older adults in Malaysia as well. While its aim is to promote the use of public transport among older adults, they were restricted to only a few bus and train services [18]. Further research is needed to determine their travel needs, awareness, and use of such financial assistance.

Another eminent difficulty for older adults in Malaysia was coping with an insufficient in public transport services [9][12]. The shortcomings of public transportation infrastructure served as a backdrop for their everyday travel experiences. The miles they had to go to reach the transit [12][13], the insufficiency of services' frequency [12], and the long duration of travelling [10] were all limiting their public transports use. It was also one of the causes for high rate of private automobile ownership in Malaysia [13]. In a similar study in Malaysia, it was reported that 24% and 49% of respondents have no transport alternative other than motorcycle and bus, respectively [14]. The study also found that the likelihood of the motorcyclists to choose bus riding increase by 85.4% if the trip duration by bus reduces [14]. A comparable situation has been seen in a few other nations such as Japan [2] and Australia [19], albeit mostly in rural regions. These accessibility and reliability difficulties should be addressed in accord with promoting active ageing and more sustainable transport use among the older adults [20].

The next most common stumbling block encountered by older commuters was the issue of safety [1][8][10]. Those who drive expressed their worry for the safety of their own and other commuters while on the road [1][8]. A past study had shown a significant relationship between extended response time to unanticipated hazards, as well as a number of times of getting honked when driving slowly, with age among the local older drivers ( $p < .05$ ) [21]. Safety was also been documented earlier, especially for the older adults,

as a latent factor affecting commuters' choice of transportation mode [22]. This cost of safety will restrict them from their independence and being self-reliant, which is important to enable them to age-in-place [6]. Being able to travel without worry encourages them to choose sustainable public transportation, which further help them to enjoy their mobility for a long period of time [4].

They also had to deal with the inferior of services available [10][12]. The transportation system, including the signage on the road [10], was perceived as novel, complex, and perplexing [8][10], and were considered to be a source of stress for older adults. There was also a raised issue of staffs' poor attitude [10], insufficient parking spaces [8] and poor road condition [8]. With the majority of older adults preferred private transportation for its convenience and comfort [1], service providers must enhance their services to meet demand and ensure ease of transport utilization while still delivering a pleasant ride. This would attract general population to use public transport as well, as comfort and travel flexibility were reported to be essential factors in their modal choice too [22]. More, poor availability of parking facilities also had been reported as a source of dissatisfaction among the general public [22]. Initiatives taken by European countries in incorporating age-friendly elements into their community transportation should be replicated in order to make it easier, not only for older adults, but also for the whole demography, to get to their destinations, hence encouraging mobility and positive wellbeing [23].

Evidence from the household survey further demonstrated the need for better mobility amenities in order to encourage their community mobility. According to the report, 17.0% of older adults are incapable to execute activities of daily living (ADL) and 42.9% have functional limitation in instrumental activities of daily living (IADL), including being dependent on others for mobility, commute, shopping, health care and finances' activities [24]. Furthermore, older adults were also reported to have less quality of life than the general cohort with 28.6% suffering from poor quality of life [24]. Developing a comprehensive strategic plan to offer accessible and affordable transportation as well as a safe environment, specifically to cater the needs of older adults will benefit not just them, but the whole society.

Nevertheless, a few shortcomings of this study should be mentioned here. First, the number of publications included was small, due to the paucity of research on the topic. Aside from that, several studies were excluded as the age range of older adults were under 55 years old (as per old definition). There was also a concern with data interpretation, since some outcome of included studies presented with descriptive data instead of analytical data. Nonetheless, it was included here owing to their pertinence, the scarcity of relevant local research on the topic, and gravity of the issues.

## 5. Conclusions

Understanding older adults' travel behavior and transportation use is fundamental to promote sustainable mobility and healthy ageing for this vulnerable cohort. As they age, older adults in Malaysia travel less and for shorter distance. There has been a shift in transportation mode towards using and integrating private transport into their daily commute. Transportation cost, availability, safety, comfort, and convenience were revealed to be the biggest components influencing their transportation use. Future research should be directed towards designing efficient policies for age-friendly public transport to minimize the barriers that hinder older commuters from using public transport.

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