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Travel Behaviour and Mobility Constraints among Older Adults in the Klang Valley, Malaysia

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ABSTRACT

Older adults' mobility is a cornerstone of quality of life, social inclusion, and active aging. Within widely used quality-of-life frameworks, mobility is recognised as one of the key dimensions shaping independence and well-being. Yet, limited empirical evidence exists on how mobility is shaped and constrained in rapidly urbanising contexts such as Malaysia. This study examines weekly travel frequency and its determinants among 497 older adults (aged 60+) in the Klang Valley, Malaysia. Using an ordered logit model, the analysis shows that gender, age, income, education, ethnicity, vehicle ownership, and health conditions significantly influence travel frequency. Male, younger, healthier, and financially better-off older adults travel more frequently, while chronic illness, mobility difficulties, limited financial resources, and advanced age act as constraints. Interestingly, education is negatively associated with mobility, reflecting the substitution of physical trips with digital solutions such as online shopping and telehealth. These findings highlight widening disparities in travel opportunities and the need for inclusive, health-sensitive, and gender-responsive transport policies. Strengthening Transit-oriented Development (TOD) by integrating housing, services, and public transport within walkable catchment areas offers a concrete pathway to reduce barriers, enhance accessibility, and support active ageing as Malaysia transitions into an aged nation by 2030.

Keywords: Active ageing, determinants of mobility, older adults, travel frequency, transit-oriented development (TOD)

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INTRODUCTION

The rapid growth of the older adults population has become a defining demographic trend of the 21st century. Globally, the number of individuals aged 60 and above surpassed the population of children under five in 2020, marking an unprecedented demographic shift (United

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Nations Department of Economic and Social Affairs, Population, 2020). While this global trend is significant, its implications are particularly pressing in developing countries, where the pace of aging is faster than in advanced economies (Villena-Sanchez & Boschmann, 2022). Malaysia is one such country currently experiencing this transition. The 2020 Population and Housing Census estimated that 3.8 million Malaysians, or 11.1% of the total population, were aged 60 and above. This proportion is expected to rise to nearly one-fifth of the population (19.8%) by 2040, indicating that Malaysia is on the cusp of becoming an aged nation (Ismail et al., 2017; Population and Housing Census of Malaysia, 2020).

This demographic shift has wide-ranging implications, particularly for healthcare systems, social protection, and mobility. Among these, mobility is crucial because it directly influences the ability of older adults to remain independent, socially connected, and engaged in their communities. In Malaysia, older adults individuals frequently travel for purposes such as medical appointments, shopping, social gatherings, and religious activities (Borowska-Stefańska et al., 2020; Wong et al., 2017). Understanding the travel behavior of this population group is therefore essential, as it is closely tied to their quality of life and ability to age actively. This relationship is also reflected in the EuroQol (EQ-5D) framework, which identifies mobility as one of the five core dimensions of health-related quality of life (Devlin & Brooks, 2017). In this sense, the ability to travel beyond the home is not only a matter of transport accessibility but also a critical determinant of independence, social participation, and overall well-being in later life. While policies such as the National Policy for Older Persons (Ministry of Women, Family and Community Development, 2011) aim to promote active participation in society, effective implementation requires evidence-based insights into the daily mobility patterns of older adults individuals.

The challenge is particularly pronounced in the Klang Valley, Malaysia's most urbanised and densely populated region. Home to more than 8 million residents, the Klang Valley is the country's economic engine but also its most congested urban corridor (Department of Town and Country Planning, 2017). Traffic congestion remains a persistent issue, with residents reportedly spending more than 500 hours annually, or over 40 hours each month, in traffic jams (Kamarudin et al., 2023). Despite significant investment in public transport infrastructure, reliance on private vehicles continues to dominate: as of 2018, nearly 80% of trips were made using private vehicles, compared to only 20% by public transport (Isham et al., 2022). This reliance is reinforced by Malaysia's high rate of vehicle ownership, with annual vehicle sales exceeding 500,000 units between 2010 and 2022 and peaking at over 720,000 units in 2022 (Rahman et al., 2023). For older adults residents, such conditions create unique mobility challenges, as they may face physical, financial, and health constraints that limit their ability to drive, while public transport may not always be accessible or senior-friendly.

Recognising these issues, both federal and state governments have introduced initiatives to enhance transport accessibility and urban liveability. The promotion of Transit-Oriented Development (TOD), for example, seeks to integrate housing, services, and public transport in ways that reduce dependence on private cars and improve accessibility for vulnerable groups, including older adults (Ministry of Economy, 2018). However, despite these policy efforts, empirical research assessing how older adults individuals in the Klang Valley actually travel—and what factors influence or constrain their mobility—remains limited.

Against this backdrop, this study examines the travel behaviour and mobility constraints of older adults in the Klang Valley. Specifically, it has two main objectives. The first is to analyse travel behaviour through descriptive analysis, focusing on weekly trip frequency, timing, purposes, and transport mode choices. The second is to identify the personal attributes, household attributes, and health condition that influence, and in many cases constrain, weekly trips frequency using ordered logit modelling. By addressing both behavioural patterns and underlying barriers, this study provides a more comprehensive understanding of older adults mobility. Insights from this research are expected to support the development of more effective and sustainable transport strategies, including Transit-Oriented Development (TOD) initiatives, that can address the specific needs and constraints of Malaysia's ageing population.

LITERATURE REVIEW

Various factors significantly influence travel frequency among older adults, shaping their mobility patterns and overall quality of life. Due to age-related changes, older adults are generally categorized as less frequent travelers compared to younger generations, both in terms of the number of trips and the distances covered (Bernal et al., 2019; Borowska-Stefańska et al., 2020; Han et al., 2021). Travel frequency is closely linked to individual characteristics, health conditions, household circumstances, and the broader social and built environments (Cheng et al., 2019).

Age remains one of the most important determinants of travel behavior. Studies have consistently found a negative correlation between age and travel frequency, with older age groups making fewer trips (Ahmad et al., 2019; Borowska-Stefańska et al., 2020). Alsnih and Henscher (2003) emphasised the need to distinguish travel patterns across age cohorts, as age-related limitations often constrain mobility opportunities. Beyond age, health conditions are also central in shaping travel capacity. For example, Böcker et al. (2017) observed that while obesity did not significantly influence travel behavior, disabilities reduced travel frequency. Similarly, Luiu and Tight (2021) noted that chronic illnesses and physical limitations frequently restrict travel decisions among older adults.

Socioeconomic and household factors further interact with travel frequency. Higher levels of education, being married, higher household income, larger household

size, and greater access to vehicles or transport services are all associated with increased mobility among older adults populations (Berg et al., 2011; Luiu & Tight, 2021). Ethnic background may also influence travel patterns, reflecting cultural and social variations in mobility needs. Gender differences, however, present mixed findings. While Berg et al. (2011) reported that women tend to travel more frequently than men, Luiu and Tight (2021) and Cheng et al. (2019) found evidence to the contrary, with older men making more trips than older women. These inconsistencies suggest that gender effects may be context-dependent and mediated by cultural norms, household roles, and access to resources.

In terms of mode choice, older adults are generally more reliant on private vehicles, particularly cars, as their main form of transportation (Cheng et al., 2019; Cui et al., 2017; Li et al., 2012; Oxley, 2015). While this reliance provides flexibility, it also has implications for environmental sustainability and long-term well-being. Car usage typically declines with age as health limitations reduce driving ability (Li et al., 2012). Moreover, deteriorating health may limit the feasibility of alternative modes, such as active travel or public transportation (Gitelman et al., 2016). This creates a potential "mobility gap," where older adults struggle to replace lost driving opportunities with accessible alternatives.

Mobility is not only a matter of practical necessity but also a cornerstone of active aging. Travel facilitates independence, supports social participation, and contributes to physical and mental health (Rahman et al., 2020). However, barriers such as limited transport options can restrict participation in desired activities, increasing risks of loneliness, isolation, depression, and deteriorating well-being (Groth, 2019). The modes most commonly used by older adults—private, public, and active transportation—thus play a critical role in determining not only their mobility but also their capacity to maintain social connectedness and quality of life in later years.

METHODS

Research Design

This study adopted a quantitative, non-experimental, cross-sectional research design. The choice of a quantitative approach was appropriate as it enables the collection of large-scale data within a relatively short period and allows for the application of robust statistical analyses to objectively examine relationships between variables (Li et al., 2019). The cross-sectional design was particularly suitable as it involved collecting data from older adults at a single point in time, which facilitated the identification and analysis of patterns and determinants of travel frequency without the need for long-term monitoring (Ziauddin et al., 2023).

The target population consisted of older adults aged 60 years and above residing in the Klang Valley, representing an estimated 827,800 individuals in 2021, representing approximately 7.5% of the total Klang Valley population (Department of Statistics Malaysia, 2021). This metropolitan region, encompassing Kuala Lumpur and Selangor,

is characterized by rapid urbanization, diverse demographic profiles, and a wide range of transport infrastructures (Ministry of Transport Malaysia, 2019; Wahab et al., 2016), making it an ideal setting for investigating older adults mobility.

The sampling technique employed was convenience sampling, a type of non-probability sampling. This approach allowed the researcher to select respondents who were readily accessible and willing to participate in the study, though it did not provide every individual in the population with an equal chance of selection (Ajithakumari, 2024). In other words, not all older adults had the same probability of being included, as selection was largely determined by accessibility and willingness to respond to the survey.

$$\mathrm{n} = \frac{N}{1 + Ne2}$$

$$= \frac{827{,}800}{1 + 827{,}800(0.05)2} \approx 400 \text{ respondents}$$

The minimum sample size required was calculated using Yamane's (Lamola & Yamane, 1967) formula, with a 95% confidence level and a 5% margin of error, which resulted in a requirement of at least 400 respondents. To enhance reliability and robustness of the findings, the study successfully surveyed 497 older adults, exceeding the minimum sample size.

Data were collected through face-to-face surveys conducted during community programs organised by Urbanice Malaysia in collaboration with local municipal councils. These programmes were held in residential areas and community halls, offering a safe and engaging environment for older adults participation. Financial incentives were provided, alongside assurances of confidentiality and the social value of the research. Trained enumerators assisted respondents in completing the structured questionnaires, ensuring clarity of questions and accuracy of responses.

To account for heterogeneity within the older adults population, respondents were categorized into three commonly used age cohorts in transport and ageing studies which Young-Old (Y-O: 60–64 years old), Middle-Old (M-O: 65–75 years old), and Old-Old (O-O: 75 years old above) (Lim et al., 2023). These mutually exclusive categories minimised overlap and offered clearer insights into differences across age cohorts (Table 1).

Table 1
Older adults sampling details

Age Group	Percent	N	Sex	Percent	N
Young-Old (Y-O)	59.56%	296	Female	52%	154
			Male	48%	142
Middle-Old (M-O)	34.01%	169	Female	67.4%	114
			Male	32.6%	55
Old-Old (O-O)	6.44%	32	Female	50%	16
			Male	50%	16

Data Collection

Data for this study were collected using a 7-day weekly travel diary, which was specifically designed to comprehensively capture the mobility patterns of older adults. The diary was structured to gather two main types of information. First, it recorded background information covering personal attributes such as age, gender, ethnicity, and education level; household attributes including household size, income, vehicle ownership, and the possession of a discount card for public transport; as well as health conditions, such as the presence of chronic illness, frequency of doctor appointments, difficulties in walking, and the use of mobility aids.

Second, it documented trip-related information. For the purpose of this study, a trip was defined as any movement away from home to a destination beyond the immediate dwelling boundary (Tam, 2005). Walking trips were included only if they exceeded approximately 100 metres (e.g., to nearby shops, prayer facilities, or healthcare centres), thereby excluding very short indoor or within-compound movements. For each trip, details were collected on the purpose of travel—such as work, shopping, healthcare visits, religious activities, social gatherings, or visits to relatives and friends—as well as the mode of transportation used, including private vehicles, public transport, or active transport. In addition, the diary recorded the timing of trips, which was categorised into weekdays versus weekends and further subdivided into morning, noon, and evening/night.

Although dimensions such as travel distance, travel duration, and travel cost are widely acknowledged as key aspects of travel behaviour, these variables were intentionally excluded from the present study. This decision was made in light of the study's primary objective, which is to identify frequency-based travel patterns and to examine how personal, household, and health-related factors influence weekly trip frequency. While distance, duration, and cost are undeniably important, the focus on trip frequency was considered more relevant as a baseline for informing mobility policies for older adults in Malaysia.

Another important feature of this study was the deliberate inclusion of non-travelers, defined as those who reported zero trips during the 7-day reference period. Their inclusion was essential to capture the full spectrum of mobility patterns, from those who remain actively mobile to those who are completely immobile. By incorporating non-travelers into the analysis, the study provides a more comprehensive understanding of older adults' travel behaviour and sheds light on potential barriers that may prevent them from engaging in out-of-home activities.

Ethical Consideration

The survey was administered directly by the research team, assisted by trained enumerators. All respondents were fully briefed on the objectives of the study, assured of confidentiality, and provided informed consent prior to participation. Ethical approval for this study was obtained from Universiti Putra Malaysia (UPM) under a

collaborative research grant with Universiti Sains Malaysia (USM) and Universiti Kebangsaan Malaysia (UKM), funded by the Ministry of Higher Education (KPT). In line with research ethics and the protection of participants' rights, modest incentives were provided as an acknowledgment of respondents' time and contributions.

Data Analysis

Data were coded and analysed using STATA version 14.2. Descriptive statistics were applied to profile respondents according to personal, household, health, and travel information.

The primary analytical focus was weekly travel frequency, which served as the dependent variable. This variable was categorised into four ordinal levels: 0 = no travel, 1 = 1–5 trips, 2 = 6–10 trips, and 3 = more than 10 trips. This categorisation draws on guidance from the World Health Organization (2007), which emphasises that age-friendly urban planning should ensure access to basic facilities within a 5–10 minute walking distance. It also reflects the actual travel behaviour of older adults in the Klang Valley, thereby offering a practical framework to distinguish between low-, medium-, and high-mobility groups. Such categorisation enhances the interpretability of the results and provides policy-relevant insights.

Given the ordinal nature of the dependent variable, the most appropriate analytical methods were the Ordered Logit and Ordered Probit models (Reynolds, 2023). These models are specifically designed for ordered categorical outcomes, in contrast to linear regression models such as OLS, which are only suitable for continuous dependent variables.

Although the variance of the raw trip count data exceeded the mean—suggesting potential overdispersion—the use of ordinal categories mitigated this concern. As the study did not model raw count data directly but instead focused on ordered categories of mobility, Negative Binomial regression was not required.

Both models were estimated and compared using the Akaike Information Criterion (AIC) and the Bayesian Information Criterion (BIC). The model with lower AIC and BIC values was considered superior, as smaller values indicate a better model fit (Cakmakyapan & Goktas, 2013; Sihombing, 2022). The results showed that the Ordered Logit model provided the best fit (AIC = 976.14, BIC = 1085.56), outperforming the Ordered Probit model (AIC = 978.99, BIC = 1088.42).

The Brant test was then conducted to assess the proportional odds assumption underlying the Ordered Logit model. The test produced a p-value of 0.332 (> 0.05), indicating no violation of this assumption (Pfarr et al., 2010; Xu et al., 2022). This confirms that the coefficients of the independent variables are consistent across all outcome categories (i.e., weekly travel frequency levels: 0, 1–5, 6–10, and 11 or more trips).

Figure 1 presents the conceptual model showing the independent variables, divided into three main categories: personal attributes,

household attributes, and health condition, which influence weekly trip frequency as the dependent variable. Table 2 provides a summary of respondent characteristics.

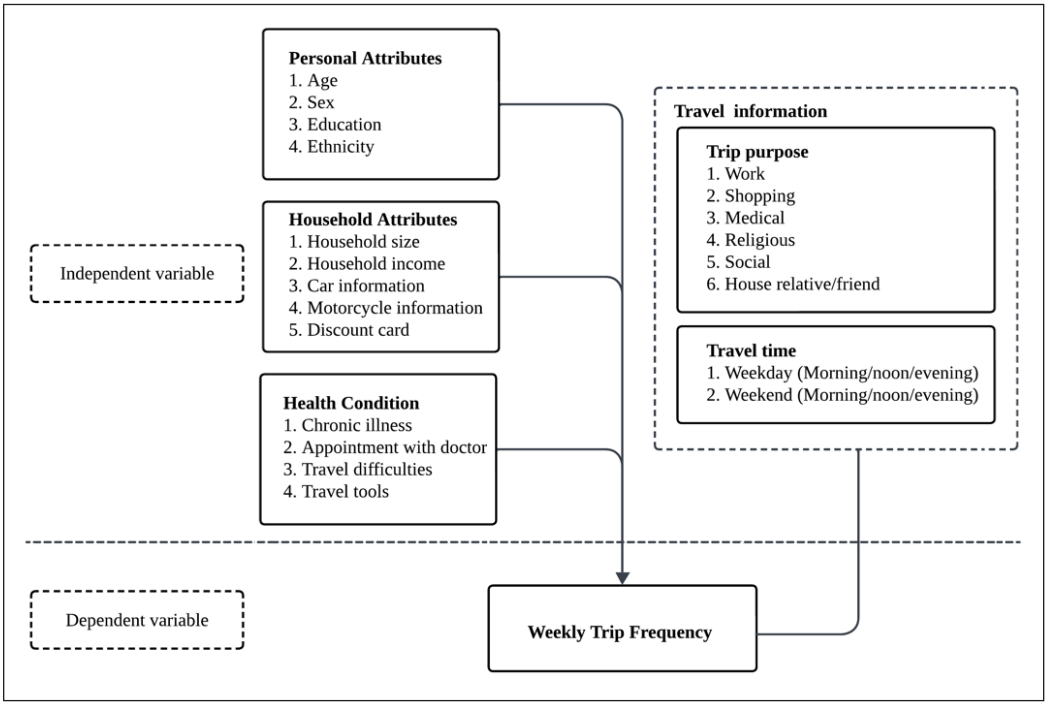

Figure 1. Conceptual model
Source: Authors' own work

Table 2
Summary of data on older adults respondents

Variable description	% per category			
	1	2	3	4
Individual attributes				
Age group (1=60-64 years old, 2=65-75 years old, 3= >75 years old)	59.56	34.01	6.44	
Sex (1=female, 2=male)	57.14	42.86		
Education (1= informal education no education, 2= school education, 3= tertiary education)	5.03	76.26	18.71	
Ethnic (1=malay, 2=chinese, 3=indian)	64.59	27.36	8.05	
Household attributes				
Household size (1= 1-2 person, 2= 3-4 person, 3= > 5 person)	26.36	31.79	41.85	
Household income (1= no income sources, 2= ≤ RM1000, 3= RM1001-RM4000, 4= > RM4000)	15.3	21.13	50.5	13.07
Car information (1= no private car, 2= 1 car, 3= > 2 cars)	47.69	38.63	13.68	
Motocycle information (1= no private motocycle, 2= 1 motocycle, 3= > 2 motocycles)	62.37	25.14	12.49	

Table 2 (*continued*)

Variable description	% per category			
Discount card (RapidKL) (1= no, 2= yes)	75.05	24.95		
Discount card (KTMB) (1= no, 2= yes)	81.29	18.71		
Discount card (Express bus) (1= no, 2= yes)	90.14	9.86		
Health attributes				
Chronic illness (1= no, 2= yes)	4.43	95.57		
Doctor appointment (1= no, 2= yes)	66.4	33.60		
Walking difficulty (1= no, 2= yes)	67.2	32.8		
Mobility aids (1= no, 2= yes)	95.57	4.43		
Trip attributes				
Trip frequency per week (1= not travelling, 2= 1-5 trips, 3= 6-10 trips, 4= ≥11 trips)	7.24	52.72	36.42	3.62
Weekday morning trips (1= no, 2=yes)	20.72	79.28		
Weekday afternoon trips (1= no, 2= yes)	70.22	29.78		
Weekday evening/night trips (1= no, 2= yes)	65.79	34.21		
Weekend morning trips (1= no, 2= yes)	37.42	62.58		
Weekend afternoon trips (1= no, 2= yes)	68.21	31.79		
Weekend evening/night trips (1= no, 2= yes)	64.99	35.01		
Work trips (1= no, 2= yes)	64.59	35.41		
Groceries and services trips (1= no, 2= yes)	6.44	93.56		
Medical trips (1= no, 2= yes)	15.29	84.71		
Religious trips (1= no, 2= yes)	20.52	79.48		
Social trips (1= no, 2= yes)	26.16	73.48		
House of relatives/friends trips (1= no, 2= yes)	24.55	75.45		
Walking trips (1= no, 2= yes)	47.69	52.31		
Car trips (1= no, 2= yes)	40.44	59.56		
Motorcycle trips (1= no, 2= yes)	74.04	25.96		
Bicycle trips (1= no, 2= yes)	95.37	4.63		
Bus trips (1= no, 2= yes)	74.25	25.75		
Train trips (1= no, 2= yes)	82.09	17.91		
Taxi trips (1= no, 2= yes)	89.94	10.06		
ODM trips (1= no, 2= yes)	90.74	9.26		

Source: Authors' own workw

RESULTS

Descriptive Analysis of Travel Behaviour

Trip Taken per Week

In general, Figure 2 shows the frequency categories of trip among the older adults. The majority of respondents (52.72%) reported traveling 1 to 5 trips per week, followed by 36.42% who traveled 6 to 10 trips. A small proportion (7.24%) reported not travelling, while 3.62% reported more than 11 trips per week.

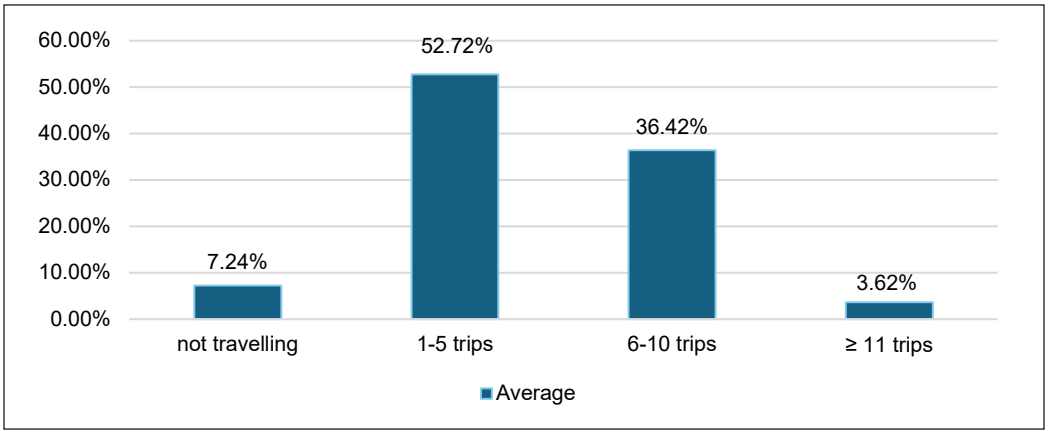

Figure 2. Proportion of participants reporting weekly trip frequency (not travelling, 1-5 trips, 6-10 trips, ≥11 trips)
Source: Authors' own work

Trip Taken per Week across Age Groups

Figure 3 illustrates the weekly travel frequency among older adults individuals across different age groups. The Y-O (60–64 years, n=296) group shows the highest mobility, where 47.6% (141) make 1–5 trips weekly and 40.5% (120) make 6–10 trips. Only 6.1% (18) reported not travelling, while 5.7% (17) make >11 trips. For the M-O (65–74 years, n=169) group, mobility declines, with 60.4% (102) making 1–5 trips and 30.8% (52) making 6–10 trips. A smaller share, 8.3% (14), reported not travelling, and just 0.6% (1) make >11 trips. The O-O

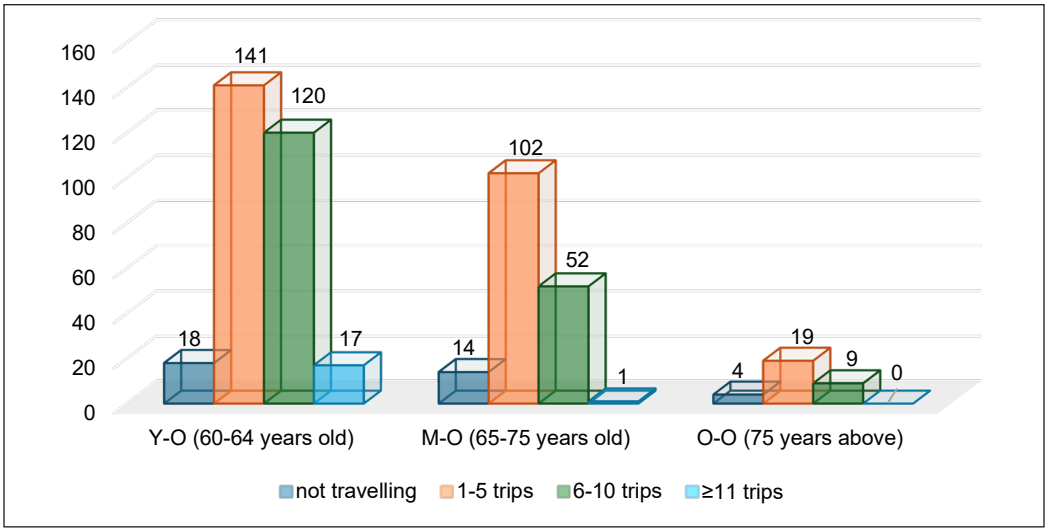

Figure 3. Distribution of weekly travel frequency by age groups (Y-O: 60–64 years, M-O: 65–75 years, O-O: 75 years above)
Source: Authors' own work

(>75 years old, n=31) group demonstrates the lowest mobility, with 61.3% (19) making 1–5 trips and 29.0% (9) making 6–10 trips, while 9.7% (3) reported not travelling and none make >11 trips. Overall, the results highlight a clear downward trend in travel frequency with advancing age, with the most significant decline observed among the oldest group.

Travel Time

In terms of travel time, table 2 presents data obtained from respondents, where each category (morning, midday, evening/night) carries its own proportion of 100%. Since these categories are independent, the overall percentage inevitably exceeds 100%. This question was designed to identify travel time preferences among older adults individuals.

On weekdays (Figure 4), the majority (79.28%) prefer morning travel, with the M-O group recording the highest share at 80.47%. Evening and night trips (34.21%) are more popular than midday travel, with the O-O group showing the strongest preference for evening/night travel at 46.88%.

On weekends (Figure 5), a similar trend is observed. Most older adults individuals (62.58%) prefer morning travel, led again by the M-O group (67.46%). Evening and night trips (35%) remain more favorable than midday travel, with the O-O group recording the highest share at 37.5%. Overall, these findings suggest that older adults individuals consistently prefer morning travel, followed by evening/night, while midday remains the least favored across both weekdays and weekends.

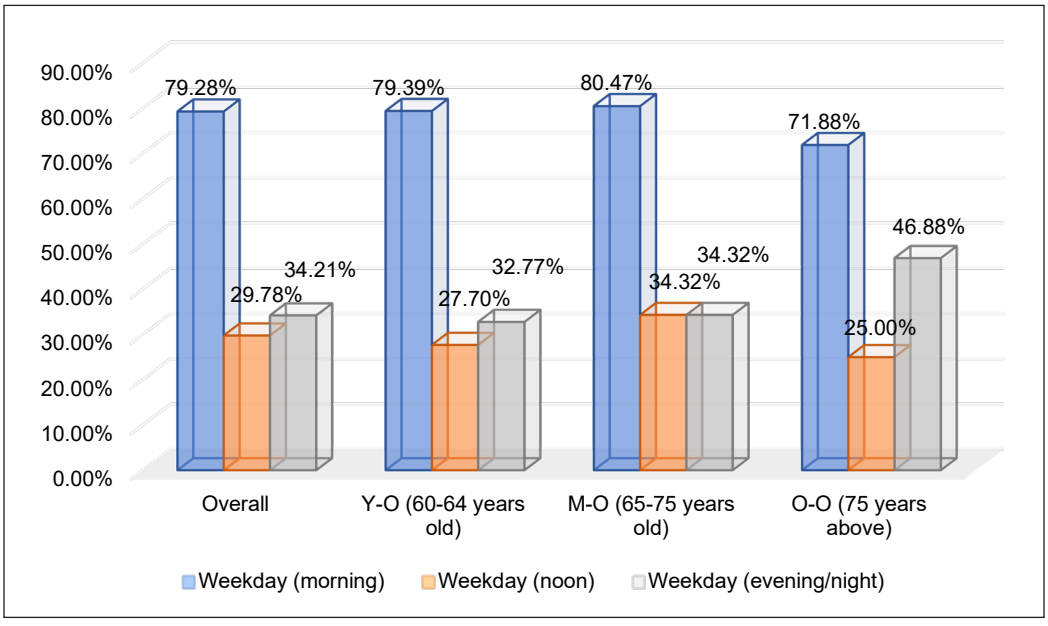

Figure 4. Older adults travel timing preferences on weekday patterns
Source: Authors' own work

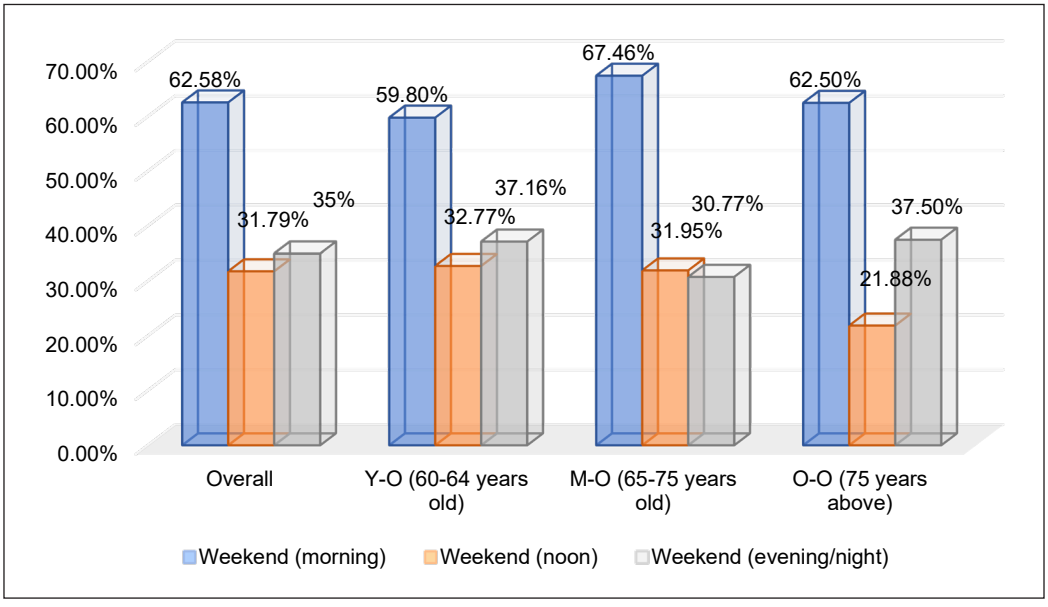

Figure 5. Older adults travel timing preferences on weekend patterns
Source: Authors' own work

Trip Purpose

In terms of trip purposes, Table 3 presents older adults travel purposes, where each category (work, shopping, medical, religious, social, and visiting relatives/friends) represents an independent choice. Since each category carries its own proportion of 100%, the total inevitably exceeds 100%. This question was designed to identify the priority purposes of travel among older adults individuals.

Figure 6 shows that shopping is the primary travel purpose, reported by 93.56% overall, followed by medical trips (84.71%), religious trips (79.48%), house of relatives/friends trips (75.45%), and social trips (73.84%). Work trips recorded the lowest share at 35.41%.

When disaggregated by age groups, the Y-O (60–64 years) display the highest engagement across nearly all purposes, with 94.59% shopping, 85.81% medical trips, 84.12% religious trips, 78.38% social trips, and 83.45% visiting relatives/friends. Work trips is also most common in this group (46.96%).

Among the M-O (65–75 years), participation declines in most categories which 92.31% shopping, 83.43% medical trips, 74.56% religious trips, 67.46% social trips, and 63.91% visiting relatives/friends, with a sharp reduction in work trips (18.93%).

For the O-O (75 years above), travel purposes narrow further. While 90.63% still shop and 81.25% make medical trips, only 62.5% participate in religious trips or visit relatives/friends, and 65.63% engage in social trips. Work trips is minimal (15.6%).

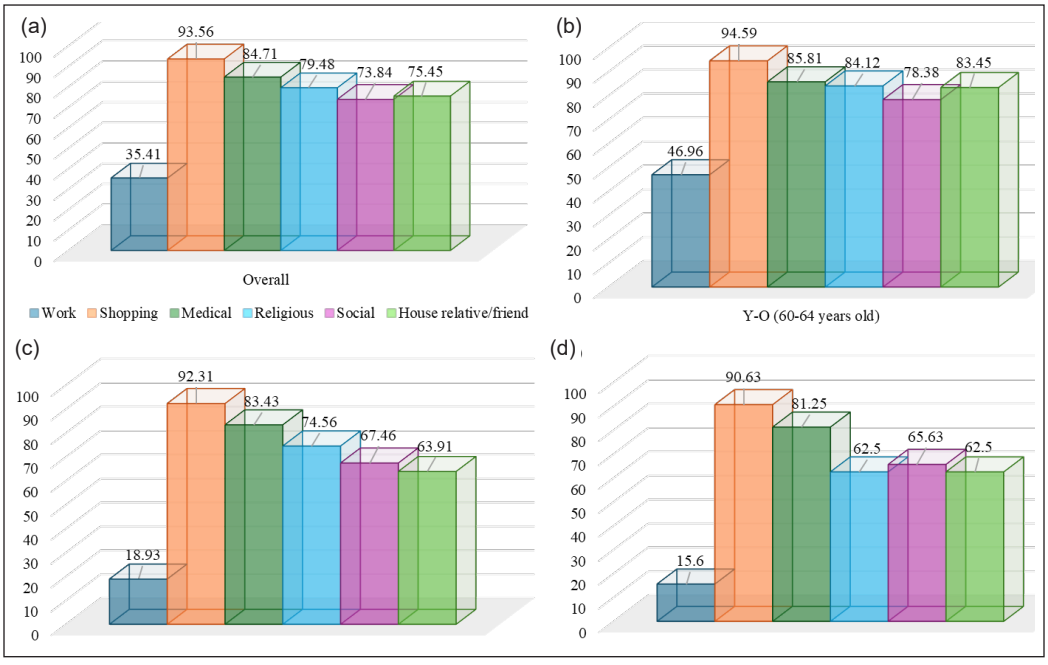

Figure 6. Older adults travel purposes in the Klang Valley; a) Overall, b) Y-O (60-64 years old), c) M-O (65-75 years old), d) O-O (75 years above)
Source: Authors' own work

Mode of Transportation

Figure 7 illustrate the modes of transportation used by older adults individuals in the Klang Valley which (a) Overall, (b) Y-O (60–64 years old), (c) M-O (65–75 years old), and (d) O-O (75 years above). Each mode of transport (walking, car, motorcycle, bicycle, bus, train, taxi, and ODM) represents an independent category of choice. Since each category carries its own proportion of 100%, the total inevitably exceeds 100%. This question was designed to capture the preferred modes of transport among older adults individuals for their weekly trips.

As shown in Figure 7(a), private cars are the most frequently used mode of transport (59.56%), followed closely by walking (52.31%). Motorcycles (25.96%) and buses (25.75%) are moderately utilized, while trains (17.91%) and taxis (10.06%) play smaller roles. The least used modes are ODM (9.26%) and bicycles (4.63%), reflecting limited adoption of emerging mobility services and active transport beyond walking.

When disaggregated by age groups, variations become evident. Among the Y-O (60–64 years), reliance on private transport is the highest, with 67.32% using cars and 30.74% using motorcycles. Walking is also common (48.65%), while public transport usage is comparatively lower (bus 21.62%, train 14.53%).

In contrast, the M-O (65–75 years) show a shift toward more accessible modes.

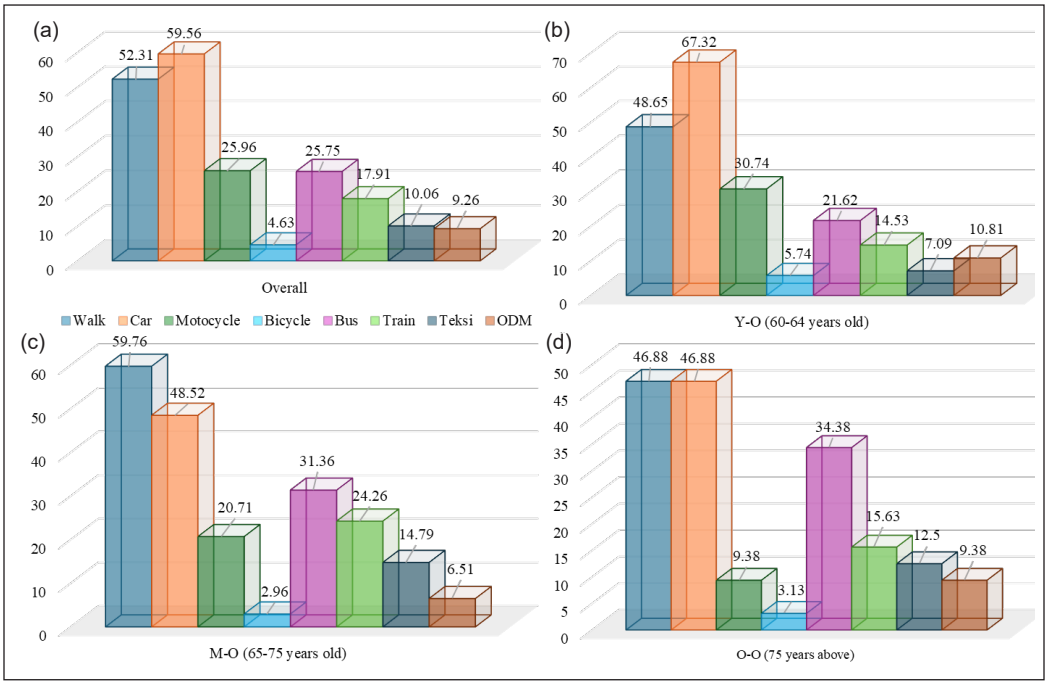

Figure 7. Older adults mode of transportation in the Klang Valley; a) Overall, b) Y-O (60-64 years old), c) M-O (65-75 years old), d) O-O (75 years above)
Source: Authors' own work

Walking emerges as the dominant choice (59.76%), while private car use decreases to 48.52%. Public transportat usage rises, with 31.36% using buses and 24.26% using trains. Taxi use also increases (14.79%) compared to the Y-O group, reflecting reduced reliance on driving.

For the O-O (75 years above), transportation preferences narrow further. Private car use declines to 46.88%, while walking remains equally common (46.88%). Bus usage increases substantially (34.38%), while motorcycle use drops sharply to 9.38%, reflecting reduced ability or willingness to ride. Taxis (12.5%) and ODM (9.38%) remain supplementary, while bicycles are rarely used (3.13%).

DISCUSSION

Factors Influencing Trip Frequency

Table 3 shown the ordered logit estimation results for the factors influencing weekly trip frequency among older adults in the Klang Valley. The results indicate that the model fits reasonably well, as confirmed by two key components of the model fitness test. The Nagelkerke Pseudo R-Square value is 0.0847, which, although relatively modest, suggests that the explanatory variables contribute meaningfully to variations in travel frequency. More importantly, the Log-Likelihood Ratio test is statistically significant (Chi-Square = 85.47, df = 23, $p < 0.001$), confirming that the model provides

Table 3
Results for the Ordered Logit models on the number of trips per person per week

Variable	Coefficient	Odd Ratio	Marginal Effect			
			(0) not travelling	(1) 1–5 trip	(2) 6–10 trip	(3) > 11 trip
Personal attributes						
Sex (ref= female)	0.435**	1.545	-0.028**	-0.062**	0.075**	0.015*
Age (ref= 60-64 years old)						
65-75 years old	-0.661*	0.516	0.042***	0.094***	-0.114***	-0.022***
> 75 years old	-1.011**	0.364	0.065**	0.144**	-0.175**	-0.034**
Education (ref= informal education no education)						
School education	-1.027**	0.358	0.066**	0.146**	-0.178**	-0.034**
Tertiary education	-1.162**	0.313	0.074**	0.166**	-0.201**	-0.039**
Ethnic (ref= malay)						
Chinese	1.002*	2.722	-0.064***	-0.143***	0.173***	0.034***
Indian	-0.326	0.722	0.021	0.046	-0.056	-0.011
Household attributes						
Household size (ref= 1-2 people)						
3-4 people	-0.312	0.732	0.020	0.045	-0.054	-0.010
> 5 people	-0.049	0.952	0.003	0.007	-0.008	-0.002
Household income (ref= no income sources)						
< RM1000	0.500	1.649	-0.032	-0.071	0.087	0.017
RM1000-RM4000	1.084*	2.957	-0.069***	-0.155***	0.188***	0.036***
> RM4000	0.752**	2.121	-0.048*	-0.107**	0.130**	0.025**
Car information (ref= no private car)						
1 car	0.281	1.324	-0.018	-0.040	0.049	0.009
> 2 cars	0.149	1.161	-0.010	-0.021	0.026	0.005
Motocycle information (ref= no private motocycle)						
1 motocycle	-0.359	0.699	0.023	0.051	-0.062	-0.012
> 2 motocycles	-0.841*	0.431	0.054**	0.120***	-0.146***	-0.028**
Discount card (RapidKL)	0.306	1.358	-0.020	-0.044	0.053	0.010
Discount card (KTMB)	-0.275	0.759	0.018	0.039	-0.048	-0.009
Discount card (Expres bus)	0.318	1.374	-0.020	-0.045	0.055	0.011
Health attributes						
Chronic illness (ref= no)	-0.962**	0.382	0.062**	0.137**	-0.166**	-0.032**
Doctor appointment (ref= no)	0.567*	1.762	-0.036***	-0.081***	0.098***	0.019**
Walking difficulty (ref= no)	-0.526**	0.591	0.034**	0.075**	-0.091***	-0.018**
Mobility aids (ref= no)	-0.384	0.681	0.025	0.055	-0.066	-0.013

Note. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$
Source: Authors' own work

a good overall fit and significantly improves upon the null model.

The findings highlight that gender, age, ethnicity, education, income, vehicle ownership, and health factors significantly shape mobility among older adults. Gender emerges as an important determinant, with men being more mobile than women (Coef. = 0.435, OR = 1.545). Marginal effects indicate that being male reduces the probability of not travelling by 2.8%, while increasing the likelihood of making 6–10 trips by 7.5% and more than 11 trips by 1.5%. This is consistent with Sim-Gould et al. (2018), who found that men tend to retain greater independence and physical capacity. However, unlike Canada where older adults women's mobility is gradually improving (Hosford et al., 2025), cultural norms, caregiving responsibilities, and safety concerns continue to constrain women's mobility in Malaysia (Visnudharshana & Kishore, 2024).

Age also plays a decisive role. Compared to the Y-O (60–64 years), the M-O (65–75 years) are less likely to travel frequently (Coef. = -0.661, OR = 0.516), while the O-O (75 year above) show the greatest constraints (Coef. = -1.011, OR = 0.364). Marginal effects reveal an increasing probability of not travelling (+4.2% for M-O; +6.5% for O-O) and a declining probability of making 6–10 weekly trips (-11.4% and -17.5%, respectively). These results are consistent with the Travel Life Cycle Theory, which links ageing with declining physical and cognitive capacity and greater social dependency (Rosenbloom, 2001). In contrast, older adults in Japan and Sweden maintain mobility for longer due to well-developed, older adults-friendly transport systems (Geng et al., 2025; Helmer & Murray, 2025), underscoring how limited systemic support in Malaysia accelerates mobility decline (Zakaria et al., 2024).

Interestingly, education shows a negative association with travel frequency. Older adults with school education (Coef. = -1.027, OR = 0.358) and higher education (Coef. = -1.162, OR = 0.313) are less likely to travel compared to those without formal education. Marginal effects suggest a higher probability of not travelling (+7.4%) and reduced likelihood of making 6–10 trips (-20.1%). Rather than reflecting reduced accessibility, this may reflect behavioural adaptation, where educated older adults adopt digital solutions such as online shopping, e-banking, and telehealth, reducing the need for physical travel (Li, 2023; Pangbourne, 2018).

Ethnicity further differentiates travel behaviour. Chinese older adults are significantly more mobile than Malays (Coef. = 1.002, OR = 2.722), with higher probabilities of making 6–10 weekly trips (+17.3%) and more than 11 trips (+3.4%). This echoes Wang et al. (2021) and Zhang et al. (2018), who linked higher mobility among Chinese older adults to stronger community ties and ongoing work engagement. Indian older adults, however, do not differ significantly from Malays. Unlike developed countries such as Finland, where ethnic mobility patterns are more balanced (Baum et al., 2025), Malaysia's

cultural and social context continues to shape these disparities.

Household economic resources are another critical factor. Older adults from households earning RM1,000–4,000 monthly are nearly three times more likely to travel (Coef. = 1.084, OR = 2.957), while those earning above RM4,000 also remain significantly more mobile (Coef. = 0.752, OR = 2.121). Marginal effects confirm higher probabilities of making 6–10 weekly trips (+18.8% and +13.0%, respectively). This finding supports Rational Choice Theory, whereby greater financial capacity expands mobility options and access to opportunities (Sun & Chen, 2022). Unlike Indonesia and the Philippines, where structural barriers limit the effect of income (Fabillar et al., 2025; Irawan et al., 2024), older adults in Malaysia's Klang Valley benefit more directly from financial resources that enhance mobility.

Vehicle ownership, however, shows mixed effects. While car ownership often facilitates mobility, owning two or more motorcycles significantly reduces travel frequency (Coef. = -0.841, OR = 0.431). In multigenerational households, motorcycles are usually used by younger family members, leaving older adults dependent on others. Marginal effects reveal a higher probability of not travelling or making only 1–5 trips per week. This supports Brim et al. (2021), who argued that ownership does not equate to access within households. Moreover, cultural norms in Malaysia discourage older adults from riding motorcycles due to safety concerns, unlike in Japan or Taiwan where older adults continue using scooters supported by safety systems and training (Buhnik, 2024; Hwang et al., 2025).

Finally, health remains a fundamental constraint on mobility. Chronic illness (Coef. = -0.962, OR = 0.382) and walking difficulties (Coef. = -0.526, OR = 0.591) substantially reduce travel, consistent with the Andersen Behavioural Model, which frames health as a critical need factor shaping access (Babitsch et al., 2012). Hosford et al. (2025) also found that poor health particularly limits non-essential trips. In contrast, older adults in Sweden and Canada remain active despite health challenges due to supportive transport services and age-friendly environments (Alousi-Jones et al., 2025; Helmer & Murray, 2025). Conversely, regular doctor appointments increase mobility (Coef. = 0.567, OR = 1.762), with higher probabilities of making 6–10 (+9.8%) and >11 trips (+1.9%). This confirms that medical needs are a primary driver of mobility, reinforcing Rational Choice Theory, as older adults rationally prioritise health-related trips in contexts where telemedicine is still limited (McCarthy, 2022).

CONCLUSION

This study set out to examine older adults mobility in the Klang Valley with two main objectives: first, to identify travel behaviour patterns through descriptive analysis; and second, to determine the personal attributes, household attributes, and health condition influencing weekly trip frequency using ordered logit modelling.

Both objectives were successfully achieved, and the findings provide valuable insights into the opportunities and constraints surrounding mobility in Malaysia's ageing society (Rahman et al., 2020; Luiu & Tight, 2021).

From the descriptive analysis, most older adults in the Klang Valley were found to travel moderately—typically one to five trips weekly—while very few undertook more than 11 trips. A clear age-related decline emerged: the Y-O remain the most mobile, while mobility drops sharply among the O-O. Morning is consistently preferred as the safest and most convenient time to travel, while shopping and medical trips dominate as the primary purposes of mobility. Transport mode choices also shift with age, from heavy reliance on private vehicles among the younger group to greater dependence on walking and buses among the oldest group. These findings demonstrate that ageing not only reduces overall mobility but also reshapes travel purposes and preferred modes, consistent with the Travel Life Cycle Theory (Alsnih & Hensher, 2003; Rosenbloom, 2001).

The ordered logit analysis complements these results by identifying the constraints that drive mobility differences. Male older adults, those of Chinese ethnicity, and those from higher-income households were more likely to travel frequently, while chronic illness, walking difficulties, and lower education levels significantly restricted mobility. Household vehicle ownership showed mixed effects, as access does not always guarantee use, particularly in multi-generational households (Brim et al., 2021). Importantly, regular doctor appointments were found to increase mobility, confirming that health-related needs remain a central driver of travel (Babitsch et al., 2012; McCarthy, 2022). Overall, older adults mobility is shaped by the intersection of individual, household, and health attributes (Sims-Gould et al., 2018; Sun & Chen, 2022).

Several policy implications arise from these findings. First, mobility among older adults in the Klang Valley remains constrained by health conditions, safety concerns, and unequal access to resources, underscoring the importance of inclusive and age-friendly transport systems (Gitelman et al., 2016; Groth, 2019). Second, the results reinforce the relevance of Transit-Oriented Development (TOD) initiatives, which integrate housing, services, and public transport within walkable catchment areas (Ministry of Economy, 2018). By enhancing pedestrian infrastructure, ensuring affordable and accessible public transport, and reducing dependence on private cars, TOD can help overcome many of the barriers identified in this study (Zakaria et al., 2024). Third, policies that specifically target older adults women, low-income households, and those with health limitations are crucial to prevent mobility-related social exclusion (Hosford et al., 2025; Visnudharshana & Kishore, 2024).

In terms of contributions, this study provides one of the few empirical analyses of older adults travel in Malaysia, offering both descriptive insights and econometric

modelling of mobility determinants. By drawing on Rational Choice Theory, the Travel Life Cycle perspective, and the Andersen Behavioural Model, the study enriches understanding of how personal, household, and health attributes jointly shape mobility (Rosenbloom, 2001; Babitsch et al., 2012; Sun & Chen, 2022).

Future research could expand this analysis in several directions. Comparative studies between older adults and non-older adults populations, as well as between urban and rural settings, would deepen understanding of contextual differences in mobility needs (Cheng et al., 2019; Luiu & Tight, 2021). Longitudinal approaches could further track how mobility evolves across ageing stages, while incorporating dimensions such as travel cost and distance would provide a fuller picture of travel behaviour and transport mode choices (Berg et al., 2011; Li et al., 2012).

In conclusion, while older adults in the Klang Valley remain moderately mobile, their travel behaviour is heavily shaped by age, gender, income, health, and cultural factors. Strengthening TOD strategies and developing targeted, inclusive transport policies are essential to ensure that Malaysia's rapidly ageing population can maintain mobility, independence, and active participation in the years ahead (Rahman et al., 2020; Zakaria et al., 2024).

LIMITATIONS AND FUTURE RESEARCH

This study is limited to older adults residing in the Klang Valley, with respondents identified through the Urbanice Malaysia program and local municipalities, based on clusters in residential areas and locations frequently visited by the older adults. Consequently, the findings cannot be generalized to rural areas or other states, where mobility constraints may differ due to variations in accessibility, infrastructure, and socio-economic conditions. Future research should therefore expand its scope to rural contexts, enabling comparative analyses between urban and rural settings. Such comparisons would help to uncover regional disparities in mobility and inform place-based interventions. In addition, comparative studies with non-older adults populations would provide deeper insights into generational differences in travel behaviour, thereby supporting the formulation of transport policies that are more inclusive and equitable across age groups.

IMPLICATIONS OF THE STUDY

The analysis of travel behaviour and mobility constraints among older adults in the Klang Valley provides several critical implications for policy, planning, and social well-being. First, the findings offer evidence-based direction for transport policies tailored to the older adults population. Measures such as subsidized fares, discounted transit passes, and the expansion of accessible public transport can help sustain independence and encourage social participation. Second, the study highlights the importance of embedding age-friendly infrastructure in urban design. Safe pedestrian pathways,

barrier-free access to buses and trains, and comfortable, well-shaded waiting areas are essential to ensure that mobility remains convenient, safe, and inclusive for older adults. Third, the strong link between health and mobility underscores the need to integrate transport planning with healthcare access. Affordable and reliable transport enables older adults to attend medical appointments, access preventive care, and maintain social connections, thereby supporting active and healthy ageing. Finally, the results reinforce the relevance of Transit-Oriented Development (TOD) in addressing older adults mobility constraints. By integrating housing, services, and public transport within walkable catchment areas, TOD initiatives can reduce dependence on private cars while improving accessibility for vulnerable groups. Strengthening TOD, alongside policies targeting older adults women, low-income households, and those with health limitations, would be a vital step toward creating a more inclusive and age-friendly transport system as Malaysia transitions into an aged society.

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