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Smart Cities, Stranded Seniors? Assessing Digital Integration and Technological Barriers in Elderly Mobility

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Abstract: Malaysia is digitizing at an accelerated pace, especially in urban areas. Meanwhile, its population is rapidly ageing, leaving a narrow window to develop integrated mobility solutions for active ageing within the framework of smart cities. This research explores the use of transport technologies by the elderly in urban Malaysia and analyses the factors influencing their choices of transportation services. This study reviews different transport technologies, including e-hailing, online/contactless transport ticketing and payment, and other mobility technologies and services. The research employs a qualitative approach to understand transport-related concerns of the elderly in the urban area in Selangor. The main source of data was a series of in-depth interviews. The main influences on the elderly's mobility behavior were found to be health conditions, personality, and travel confidence. Among the elderly with mobility challenges, there was a preference for private vehicles over public transport. Public transport was perceived as affordable and convenient. However, the elderly identified many usability barriers, including inadequate seating and extreme crowding. Many of the barriers would be mitigated with the use of various transportation mobility services. Generally, the elderly had positive views about safe, convenient, and affordable transport services. This study illustrates that incorporating integrated, accessible design and smart technology into the urban environments can provide secure, accessible transportation options for older adults living in 'smart cities'.

Keywords: *Ageing population, elderly mobility, public transportation, smart mobility, age-friendly cities*

1. Introduction

Growing older brings many changes to everyday life. Simple activities such as walking to the shop, going to the clinic, taking a bus, or visiting family and friends may become more difficult with age. At the same time, cities are changing, with new transport services and technologies becoming part of daily life. While these changes can make traveling easier, they may also create new challenges for older adults.

The number of older people worldwide is increasing. According to the United Nations, by 2050, one in every six people worldwide is expected to be aged 65 or older (Angel et al., 2011; Bloom et al., 2016; Keating, 2022). This growing older population shows the need for cities to provide better support for older adults, especially in helping them move around safely, easily, and independently. At the same time, a rapid digital transformation is changing how essential services, including transportation, are managed and used. For older adults, mobility extends far beyond convenience; it is essential for maintaining independence, accessing healthcare and vital services, participating in social life, and safeguarding overall well-being (Rogers & Mitzner, 2017; Vrančić et al., 2024; Webber et al., 2010). Urban environments that fail to accommodate the mobility needs of the elderly risk exacerbating social exclusion, dependence, and health disparities among an ever-growing portion of the population (Naughton et al., 2023; Ramalho & Petrica, 2023; Regnier, 2018; Rogers & Mitzner, 2017).

In Malaysia, the tendency for the population to age is growing stronger. By 2020, more than 7 per cent of the population were aged 65 or over; this figure is expected to reach 14% by 2040 (Abd Mutalib et al., 2020; Azhar & Omar, 2025). The Twelfth Malaysia Plan (RMK-12) recognizes this demographic situation and emphasizes

the need to improve liveability and mobility, particularly for older people (Rosnu et al., 2025). The RMK-12 sets out strategic aims to develop age-friendly cities, improve access to public transport, and ensure that all people have equal access to infrastructure and services. The National Transport Policy 2019–2030 (NTP) also supports these priorities by promoting a transport system that is people-oriented, sustainable, and inclusive (Abidin, 2020; Rosnu et al., 2025). According to the NTP, strategies should be put in place to enhance accessibility and convenience for the elderly and for persons with disabilities, such as applying universal design principles and improving first- and last-mile connections. Furthermore, the National Policy for Older Persons and the Action Plan for Active Ageing (2011–2020) confirm the need to promote health, participation and security among older people, with a focus on bettering community mobility. Yet even with such strong policy frameworks, implementation in Malaysian cities remains inconsistent. A number of urban areas still lack basic age-friendly facilities, such as smooth pavements, adequate seating, clear signage, and accessible transit stations (Liao, 2024; World Health Organization, 2007). The extent to which paratransit and community-based mobility programs reach people is often limited, so many older people continue to rely on private vehicles or family support for transport (Hosford et al., 2024; Liao, 2024; Sara, 2019).

Driven by these challenges, this paper aims to critically examine the mobility experiences of elderly individuals in urban Malaysia. Specifically, the study pursues twofold objectives: (i) to understand the current mobility behaviours and preferences of older adults, and (ii) to explore the technological factors that support or constrain their access to public areas and transportation facilities. Based on qualitative evidence, the study contributes to advancing strategies for inclusive and sustainable urban mobility systems that align with Malaysia's national development goals and international frameworks such as the UN Sustainable Development Goals.

2. Literature Review

As people grow older, moving around the city may become more difficult than it used to be. Simple activities such as grocery shopping, attending medical appointments, visiting friends, or using public transportation can become increasingly challenging as people age. These challenges often arise from a combination of health-related limitations, characteristics of the built environment, and the growing integration of digital technologies into transportation systems. As a result, older adults may need to adjust how they plan their journeys, select travel destinations, and choose their preferred modes of transport. Understanding the mobility experiences of older adults in contemporary urban settings requires careful consideration of both physical and technological factors that influence daily travel. Drawing on the previous literature, this review focuses on four interconnected domains, including transportation modes commonly used by older adults, travel patterns and destination choices, the role of the urban spatial environment, and the adoption of smart mobility technologies by the elderly. Examining these dimensions provides a more comprehensive understanding of how older adults navigate urban environments and the challenges they encounter in maintaining mobility and independence. In Malaysia, such insights are valuable for informing the development of more age-friendly, accessible, and inclusive urban transportation systems.

Transportation Modes

Forecasts indicate that there will be 2.1 billion adults aged 60 and over by 2050, double the amount reported in 2020 at 1.4 billion. As a means of preserving independence and self-respect, driving remains the mode of transportation of choice for the elderly (Adler et al. 2006). The primary characteristic of the travel behaviour of senior individuals in many countries is their reliance on automobiles, whether as drivers or passengers. However, the physical abilities and health of older adults tend to deteriorate with age, resulting in a loss of driving ability. Previously, a study found that the number of individuals aged 85 years and older who drove a car declined significantly (Boschmann & Brady, 2013). Instead, they opted to be passengers in cars, walk, or use transit. As people grow older, they tend to take fewer trips, shorter journeys in both distance and duration, and more trips that do not involve driving as their ability to drive declines. In urban areas, the concept of vehicle sharing has begun to take on significance through private chauffeuring, ride sourcing, ride sharing, and on-demand rides. By 2025, the number of car shares is anticipated to increase from 7 million in 2015 to 36 million. A study in Korea reported that private cars, public transportation, and walking are the main modes of mobility for the elderly (Lee et.al., 2021). While the use of transit and walking is crucial for sustainable transportation, the use of private vehicles is gradually increasing. Recent empirical research on private chauffeuring and

companionship services categorises these products as viable alternatives to mobility solutions. Research incorporating viewpoints from transport operators, governmental entities, and municipal providers indicates that private chauffeuring has evolved alongside traditional models (peer-to-peer and business-to-consumer) and now encompasses a government-to-consumer (G2C) component, in which public institutions contract for or offer chauffeuring or companionship specifically for senior citizens. This diversity shows that people are aware of the mobility gap and that the service ecosystem has grown (Abdul Latiff et al. 2023).

Travel Pattern and Destination

Studies of varying depth and sophistication have examined the travel patterns and habits of older people. Findings generally show that older individuals make fewer trips and travel shorter distances, and for shorter travel durations than their nonelderly counterparts (Szeto et al. 2017; Boschmann & Brady, 2013). The activity patterns of the elderly differ from those of the nonelderly: the old engage in fewer activities, spend more time at home, and partake in activities such as visiting, shopping, recreation, and leisure. Shao et al. (2019) studied how older individuals travel differently on weekdays and weekends compared with younger people. Jordan et al. (2019) examined the travel-time disparities between two groups of older adults and identified significant differences in their trip durations and travel characteristics. Shi et al. (2020) examined the bus travel characteristics of the elderly using smart card data and compared their temporal, spatial, and trip-related patterns with those of non-elderly individuals. Boschmann and Brady (2013) found that the overall number of trips and average distance decrease with age; however, each age cohort within the senior population exhibits distinct patterns. Liu et al. (2017) found that younger and middle-aged adults with high household incomes travelled less, whereas older adults did so more. Women in the older group took fewer excursions than men, but there was no difference in the number of journeys between men and women in the middle-aged and younger groups. Factors affecting travel behaviours among the elderly include the regional context. In developed nations such as the United States and Europe, the elderly tend to depend more on automobiles, whereas in emerging urban areas in China, walking, cycling, and public transportation are more prevalent (Lee et. al., 2021). Additionally, physical health significantly impacts an elder's ability to travel; for instance, a physical disability has a strong negative effect on travel frequency.

The Urban Spatial Environment

The geographical and built environment characteristics of urban areas play a significant role in shaping the physical activity, health and social participation of older adults. Age-friendly cities that offer safe, walkable streets, accessible green spaces and opportunities for social engagement can enhance both physical and mental well-being in later life (Wood et al., 2022). A lack of access to or poorly maintained infrastructure may lead to social isolation and inactivity, which can lower quality of life (Tsai et al., 2022). Some countries have passed laws to make it easier for people to move about, which has led to more community involvement. For example, they help the elderly pay for their transportation needs (Karmacharya et al., 2022). Compared to rural areas, cities have better access to healthcare, education, and social services. This makes them appealing to the elderly, even when they have problems like heavy traffic, noise pollution, and high living costs (Tiwari, 2022; Wang et al., 2022). But urbanisation also makes inequity worse. People often think that cities are better places to live since they are close to important services. People who live in rural areas may benefit from programs that reduce social and spatial isolation (Fan et al., 2022). Fair growth in both urban and rural areas is necessary to ensure that everyone has a fair experience as they grow older (Aravin Pillai, 2016). To promote active ageing in cultures that are becoming more urbanised, it is important to develop places that are safe, welcoming, and easy to access.

Smart Mobility for the Elderly

Smart mobility has become an essential element of sustainable urban development, especially in accordance with the United Nations Sustainable Development Goals (United Nations, 2015). Smart mobility is a transportation system that is connected to the internet and uses technology to make it easier, safer, and more efficient for everyone, including the elderly (Lam & Head, 2012; Joumard et al., 2010). Smart mobility solutions can help the elderly be more independent and get more involved in their communities. Combining smart transportation systems with designs that are easy for the elderly to use makes walking safer, provides real-time trip information, and improves public transportation for the elderly (Battarra et al., 2018). These solutions make it easier to get around and give people more opportunities to participate in social and economic activities. Malaysia, for example, has begun implementing smart city projects such as traffic control systems that use

sensors and lighting systems that adjust based on the time of day. These may help the elderly go around (Fan et al., 2022; Torrens, 2022). Smart mobility makes it easier to get around by offering services like the Smart Selangor Bus, which provides free Wi-Fi, GPS tracking, and free rides for senior citizens (Smart Selangor Bus, 2025). It is important to include age-friendly ideas in plans for smart mobility. Smart cities that prioritize comfort, safety, and inclusion ensure that new technology improves the lives of the elderly (Emlet & Moceri, 2012; Kano et al., 2018; Tiraphat et al., 2017; Luciana Castro Gonçalves, 2022). As cities grow and change, it is important to ensure that smart transportation meets the needs of the elderly. This will help build cities that are both technologically advanced and socially stable.

3. Methodology

Research design and data collection procedures

An exploratory qualitative research design operating within an interpretivist paradigm was employed to achieve the research objectives. This research design focuses on understanding the variations in elderly behaviour, particularly in mobility activities and expectations. Qualitative research is well-suited for exploring complex social phenomena to enable researchers to gain in-depth insights into participants' lived experiences (Jailani et al., 2023). This approach enabled the collection of rich, descriptive data that captured the perspectives of elderly individuals regarding their mobility challenges and expectations (Lim et al., 2023). Face-to-face interviews were the primary data collection method because they elicit detailed and contextually relevant responses. A key advantage of this approach was that the interviewer's ability to clarify questions in real-time could minimise misunderstandings and enhance data accuracy (Mohd Hairi et al., 2022). Furthermore, while interviews were structured around pre-assigned themes, new questions were iteratively incorporated based on participants' responses to comprehensively explore emerging concepts and ensure robust data saturation (Lim et al., 2023).

The study employed a purposive sampling technique, selecting participants based on predefined criteria to ensure that their lived experiences aligned with the core research objectives (Jailani et al., 2023). Participants comprised older adults residing in Shah Alam, Selangor. This specific location was selected due to its high population density and favourable built environment. The urban infrastructure and accessibility features of Shah Alam provided a highly suitable context for investigating mobility behaviours among older adults. Studies have shown that the built environment significantly influences mobility patterns and access to essential services among older populations (Mohd Hairi et al., 2022). Prior to data collection, informed consent was obtained, ensuring participants' voluntary participation, confidentiality, and the right to withdraw at any time (Patton, 2015). This study has received ethical approval from the Faculty Research Ethics Committee.

Data analysis

The interview data collected in this study were analysed using thematic analysis, a common qualitative approach that identifies patterns and themes in the data (Braun & Clarke, 2021). This method was chosen because it allows for a systematic, flexible, and detailed interpretation of the perspectives of elderly participants on their mobility experiences and expectations. The data collection was carried out through a structured interview with previously assigned themes. To enhance this present research analysis, interviews were audio-recorded and paired with detailed field notes to facilitate familiarity with the data and ensure the precise capture of verbal and non-verbal narratives. The analytical process then progressed to develop initial codes across the dataset that were subsequently clustered into broader potential themes, guided by the pre-assigned interview structure. The researchers systematically reviewed these themes with raw data to ensure they accurately reflected the core mobility challenges and adaptive strategies of the elderly participants. Finally, the themes were clearly defined and synthesized to address the research objectives directly.

Qualitative rigour was applied using explicit trustworthiness criteria to systematically and reliably analyse the elderly mobility experiences in Malaysia (McKim, 2023). To enhance credibility, real-time member-checking techniques were employed to ensure the findings reflected the perspectives of the participants accurately. Recent advancements in member-checking techniques, such as the ARC (Asking, Recording, Confirming) method, have been introduced to validate data in real time, thus reducing data loss and misinterpretation (Zairul, 2021). The interviews were audio-recorded to allow accurate capturing of the stories of participants. This method is recognised for its effectiveness in qualitative research, enabling in-depth analysis of verbal data.

After each interview, the researchers compiled a summary of the key discussion points and presented this to participants for confirmation and verification. Furthermore, as a form of data triangulation, researchers maintained detailed field notes to document key remarks and contextual information provided by informants in case of possible technical issues with audio recording devices. Transferability was established by detailing Shah Alam's urban environment. These explicit sampling criteria would thus allow later researchers to evaluate the applicability of these findings to other settings. Finally, methodological precautions against technical failure secured dependability and confirmability. This data collection was conducted using the structured application of the ARC validation method to ensure findings are firmly grounded in the narratives of participants rather than researcher bias.

4. Findings

The data for this study were collected through recorded audio interviews, complemented by manually documented notes to ensure the accuracy and completeness of the information. Following the interviews, the researchers meticulously transcribed the recordings into text format. An initial review of the transcripts and interview notes was conducted to enhance the depth of analysis and identify four key themes and underlying patterns in the conversations. A comprehensive summary of the participants' demographic profiles is presented below.

Demographics background

The demographic data highlights several important characteristics relevant to elderly mobility. Results show 80% of the participants are female, and 20% are male. This gender difference reflects global patterns in older adult populations, where women generally outnumber men, a phenomenon attributed to longer female life expectancy.

In terms of age, respondents are between 60 and 73 years old. This age range places respondents in the younger-old and middle-old categories of ageing populations. People in this age group often experience gradual physiological changes, including decreased stamina, slower reflexes, and more chronic illnesses. These changes have a direct impact on their mobility, particularly when they are moving around in urban public areas and using transport systems. According to the World Health Organisation (2015), mobility limitations tend to increase significantly after the age of 60, highlighting the importance of having accessible and age-appropriate infrastructure for sustaining independence and quality of life among older adults. Referring to the level of academic background, it was found that respondents with higher education levels, such as PhD holders, tend to receive larger pensions compared to those with only SPM or a bachelor's degree. This pattern is consistent with previous studies, which found that education significantly influences both lifetime earnings and retirement benefits. Individuals with higher academic qualifications generally secure higher-paying jobs, enjoy greater career progression, and contribute more to retirement schemes, which results in larger pensions at retirement (Alaudin, Ismail & Isa, 2020).

In Malaysia, retirement wealth adequacy is closely linked to educational attainment. Research has demonstrated that those with tertiary education are more likely to accumulate sufficient savings and pensions to sustain their post-retirement life, while those with only secondary education often face challenges in meeting basic needs (Baharifar et.al., 2025). Furthermore, financial literacy, which tends to be higher among better-educated groups, plays an important role in planning and managing pensions effectively (Selvadurai, Kenayathulla, & Siraj, 2021).

Meanwhile, findings show that a majority of respondents (80%), continue to drive, while 20% no longer do so. Driving supports independence and social participation among older adults; however, declining cognitive and physical capacity often leads to driving cessation. Research demonstrates that driving cessation is associated with heightened risks of social isolation and reduced quality of life, emphasising the need for accessible alternatives in public transport (Liddle et al., 2020; Curl et al., 2020). Furthermore, in terms of health, 40% of respondents report good health, while 60% live with chronic conditions such as hypertension, diabetes, or high cholesterol. Multimorbidity of this nature is highly prevalent in older populations. A Malaysian study found that more than 40% of adults aged 60 years and above experience multiple chronic illnesses, which significantly influences their mobility, daily functioning, and healthcare needs (Ghazali et al., 2021). This supports the

current findings, where chronic illness appears to be a dominant feature of the sample.

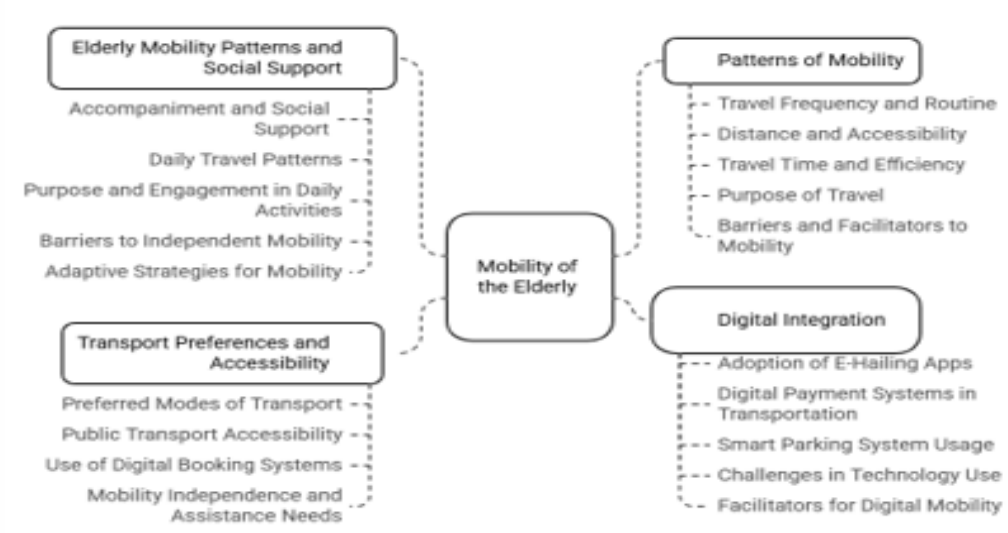
Thematic analysis

After transcribing and carefully reviewing the interview transcripts, a thematic analysis was conducted to uncover the recurring patterns in experiences of participants. As illustrated in Figure 1, this process analysis highlights four core themes that shape how older adults navigate urban spaces, including transport preferences and accessibility, elderly mobility patterns and social support, established mobility routines, and the ongoing challenges of digital integration.

Transport Preferences and Accessibility

Older adults in Malaysia face a complex range of considerations when choosing transportation, balancing the need for comfort, affordability, and convenience. Public transport such as RapidKL buses, KTM Komuter trains, MRT, and LRT remains a practical option for many, especially pensioners and those on fixed incomes, due to its lower cost. Yet, this affordability often comes at the expense of comfort and accessibility. For instance, elderly passengers in Kuala Lumpur may find it difficult to board overcrowded LRT trains during peak hours, while many suburban buses lack shelter, exposing users to both intense heat and rainfall common in Malaysia's tropical climate. Private transport options, including taxis and personal vehicles, are generally preferred by individuals who prioritise comfort, privacy, or have specific mobility needs. Nonetheless, these alternatives are not universally accessible; higher costs and the requirement to drive can pose significant barriers. The rise of e-hailing services such as Grab and MyCar has provided a valuable middle ground, offering door-to-door convenience and streamlined booking processes. However, the utility of such services is frequently limited by disparities in digital literacy and smartphone access, particularly among older adults residing in rural areas who may be unfamiliar with app-based platforms. Accessibility continues to represent a substantial challenge within the public transportation network. While some MRT stations in the Klang Valley have made strides in improving facilities with ramps and elevators, many older transit stations and bus stops still lack basic accessibility features such as ramps or priority seating. Physical barriers, including high bus steps, narrow aisles, and insufficient seating, further impede use for those with mobility impairments. In addition, crowded vehicles and complicated ticketing systems exacerbate discomfort and confusion. The adoption of digital solutions, such as online ticketing and e-hailing apps, is limited among the elderly population, largely due to low digital literacy, limited smartphone access, and concerns regarding privacy and security. As a result, many older individuals must rely on family members, caregivers, or community organisations for assistance with booking rides or navigating transport systems. While community support initiatives exist- for example, local NGOs sometimes help seniors with transportation- such assistance is not consistently available, and many elderly people express a strong preference for maintaining their independence.

Figure 1: Thematic analysis of mobility of the elderly in urban spaces



Source: Authors' own work.

Elderly Mobility Patterns and Social Support

Elderly mobility patterns in Malaysia are closely connected with prevailing social support structures and daily behavioural routines, reflecting the nation's profound cultural prioritisation of familial and community-oriented care. Among seniors, it is commonplace to seek accompaniment from family members, caregivers, or trusted peers when travelling. This reliance does not merely facilitate practical assistance but also instils a heightened sense of confidence and security, particularly in public environments that may otherwise be perceived as overwhelming or unfamiliar. Routine travel for older adults in Malaysia typically centres on essential destinations: local wet markets, clinics, religious institutions such as mosques and temples, and community parks. There is a clear preference for off-peak travel times, which allows elderly individuals to avoid crowded situations and potential physical strain. The rationale for these excursions is primarily to attend practical medical appointments, procure daily necessities, participate in religious observances, and engage in social or recreational activities. Collectively, these activities serve to maintain social inclusion and overall well-being. Nonetheless, significant physical and environmental barriers impede independent mobility for many elderly citizens. Long distances to transit points, uneven or hazardous pedestrian infrastructure, inadequate seating in waiting areas, and safety concerns, such as poor lighting or heavy traffic, are persistent issues, especially outside of urban centres. As a result, the elderly population's mobility is often contingent upon family or community support, and the frequency of independent outings may decline correspondingly. To navigate these challenges, adaptive strategies have emerged. Many elderly individuals opt for travel routes with superior infrastructure, adjust their schedules to less congested periods, or utilise specialised transportation services, such as community shuttles or volunteer driver initiatives organised by local non-governmental organisations. For instance, in the Klang Valley region, community-based transport assistance programs are available to facilitate seniors' access to healthcare appointments. Moreover, the use of mobility aids or reliance on family members when navigating complex transit systems is widespread.

Patterns of Mobility

The mobility of older adults in the areas of urban Malaysia is shaped by factors such as health status, transportation availability, and the built environment. Older adults generally make several trips per week for essential purposes, including medical appointments, grocery shopping, religious observances, and social engagements. As people age and encounter more health issues, the frequency of their travel trips declines. For example, research conducted in Kota Kinabalu found that individuals aged 75 and above travel less frequently and tend to limit trips to daylight hours due to concerns about night vision. Most of their journeys are short, which indicates the impact of physical limitations and the accessibility options of transport. Typical destinations include local markets, clinics, places of worship, and community centres. Malaysia's dependence on private vehicles results in reduced mobility for seniors who are unable to drive, particularly in areas where public transportation is unreliable or not tailored to their needs. Issues such as unpredictable schedules, extended waiting times, and inadequate route connectivity further discourage travel and lengthen journey durations. The lack of adequate rest spaces and the limited availability of priority seating on public transit compounds these challenges, often resulting in discomfort for elderly passengers. The motivations for travel among the elderly are predominantly driven by medical necessity, religious obligation, and the pursuit of social inclusion and mental well-being. Physical obstacles, extended walking distances to transit points, uneven pavements, suboptimal lighting, and broader safety hazards are considered barriers to mobility. These factors frequently necessitate a reliance on family members or caregivers for transportation. On the other hand, certain cities such as Penang and Ipoh have introduced initiatives to improve age-friendly infrastructure and transportation policies, including priority seating and the adoption of age-friendly urban frameworks.

Digital Integration

The adoption rate of digital mobility solutions among the elderly population, particularly e-hailing platforms like Grab and MyCar, remains notably lower than among younger cohorts. This trend is driven by several interrelated barriers, most prominently limited digital literacy, issues of trust, and the perceived complexity of app interfaces. Empirical studies consistently indicate that users of e-hailing services in Malaysia are predominantly young adults, especially those aged 18 to 28, while participation among individuals above 50 is minimal. Older Malaysians frequently encounter difficulties navigating smartphone applications, handling digital payment systems, and trusting online financial transactions. These challenges significantly restrict their ability to access the convenience that e-hailing offers. For instance, while Grab enjoys widespread popularity in urban centres such as Kuala Lumpur and Penang, many senior citizens continue to rely on conventional taxis

or depend on family members to arrange their rides. The ongoing transition from cash to digital payment systems, including e-wallets like GrabPay and Touch 'n Go eWallet, presents additional obstacles. Concerns about transaction security, the risk of digital fraud, and a lack of familiarity with online banking diminish confidence among elderly users. These issues are further exacerbated by limited smartphone ownership and digital skills, particularly in rural regions. Similarly, the uptake of smart parking solutions such as QR code scanning, RFID access, and app-based reservations remains very low among older adults, as these systems require a level of technological competence that many do not possess. Several technology-related challenges persist for Malaysian seniors, including complicated user interfaces, a shortage of tailored technical support, and a general reluctance to adopt unfamiliar technologies without adequate assistance. Nonetheless, certain facilitators have demonstrated promise in improving digital engagement within this demographic. Notable examples include government initiatives aimed at promoting digital inclusion, family members who provide technology guidance, and community-based educational programs. For example, local NGOs and senior groups in Klang Valley have organised workshops designed to help older adults safely utilise smartphones and e-hailing applications. Such efforts are pivotal in narrowing the digital divide and supporting mobility independence among Malaysia's ageing population.

Discussion

This study explored the mobility experiences of elderly individuals in urban public spaces and transportation facilities in Malaysia. The findings offer important insights into behavioural patterns, technological engagement, and environmental factors that influence mobility among older adults. The discussion is organised according to the two research objectives.

Objective 1: To Understand the Current Behaviour of the Elderly Towards Mobility Activities

The study found that older adults in urban Malaysia primarily engage in mobility activities for essential purposes such as medical appointments, religious obligations, grocery shopping, and social participation. These behavioural trends are consistent with recent studies that report similar mobility motivations among older adults in developing cities (Rosnu et al., 2023). The frequency and nature of travel are influenced by physical health, access to transport, and perceived safety within the built environment (Salim et al., 2019). Although public transport options such as MRT, LRT, and buses are considered affordable, they are often not perceived as convenient or comfortable by elderly users. The presence of physical barriers, such as high steps, crowded vehicles, and limited seating, contributes to low satisfaction with public transport systems among older adults (Zakaria et al., 2024). These findings align with previous literature highlighting that accessibility features in Malaysian transport systems remain inadequate, particularly for vulnerable populations (Ramli et al., 2022).

Apart from that, social support plays an essential role in facilitating elderly mobility. Most older adults rely on family members, caregivers, or friends to accompany them during travel. This reliance is embedded in Malaysian cultural norms, where intergenerational care is deeply valued (Rosnu et al., 2023). However, this dependency may also reduce autonomy, particularly for those who desire independent travel. Despite the challenges, older individuals demonstrate adaptive behaviours such as avoiding peak hours and choosing destinations with better infrastructure. These strategies reflect a level of resilience among older adults who continue to seek active participation in society despite environmental limitations (Salim et al., 2019).

Objective 2: To Explore the Technological Factors That Support Mobility in Accessing Public Areas and Transportation Facilities

The digitalisation of transportation in Malaysia, including e-hailing services and online ticketing, has improved mobility for many. However, its uptake among older adults remains low. This study found that limited digital literacy, low confidence in online systems, and limited smartphone ownership prevent many elderly individuals from using these platforms independently. These findings are supported by Md Fadzil et al. (2023), who observed a significant gap in digital adoption among older adults with cognitive or physical impairments. The transition to fully digital ticketing systems for rail and bus travel has further complicated access for seniors. The Federation of Malaysian Consumers Associations reported that the removal of physical ticket counters and the requirement for digital-only bookings exclude many older adults who are unable or unwilling to navigate these platforms (FOMCA, 2025). These findings underscore the need for hybrid solutions that combine digital and traditional methods to ensure equitable access.

Nevertheless, alternative mobility services such as private chauffeur and companionship programs have shown potential to improve the mobility experience for older adults. Abdul Latiff and Mohd (2023) reported that such models provide safety, comfort, and autonomy, especially for non-driving seniors or those who face difficulties with public transport. Community-based digital education and intergenerational learning programs are emerging as important tools to address the digital divide. For instance, initiatives organised by local non-governmental organisations and community centres have provided digital literacy workshops that improve older adults' confidence in using smartphones and mobility applications (Zaid et al., 2023). These efforts are essential to promote digital inclusion and empower older adults to make independent travel decisions.

Implications for Urban Planning and Policy

The research highlights the lack of integration in the strategies implemented by authorities to address the mobility of the elderly in the physical and virtual worlds. In terms of the physical world, more attention should be paid to designing and building improved facilities for pedestrian and accessible transport. Age-appropriate design of the transport facility should include the provision of protected facilities and waiting seats at transport stops (Ramli et al., 2022). In the virtual world, mobile applications must be simplified and designed with older users in mind. Voice-enabled assistance, larger text, and local language support can improve usability for seniors. In addition, retaining some level of physical service, such as staffed counters or phone-based support, is necessary to prevent exclusion during the transition to digital services (FOMCA, 2025). Following that, urban planners and experts in transport should also take into account the diverse needs of the elderly. Factors including income, health condition, educational background, and living arrangements affect the mobility preferences and abilities of older adults. For this reason, any policy intervention must be inclusive, flexible, and context-specific.

5. Conclusion and Recommendations

This study identifies methods for examining the mobility of older adult populations, including the factors that pose challenges for older adults when using existing infrastructure and transportation systems. The study considers challenges older adults face while using different modes of transportation and the barriers to their independent movement within the built and social environments. Improving transportation systems and related technologies, as well as addressing the challenges older adults face when using various transportation systems, requires integrating social, transportation, and digital systems. Improving the above-mentioned systems would ultimately enable older adults to engage in social activities, gain and maintain independence, and improve their quality of life. Consequently, these findings indicate the urgent need for targeted strategies to improve transportation infrastructure, enhance digital literacy, and strengthen community-based support systems. Aligning these initiatives with Malaysia's national development agenda and international frameworks such as the Sustainable Development Goals (SDGs) will enable policymakers to advance a more inclusive, age-friendly urban environment.

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