

Assessing Public Transportation Accessibility for Rural Communities: The Case of Kampung Jeram, Pasir Puteh, Kelantan

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ABSTRACT

Public transportation is vital for urban areas, efficiently moving commuters and providing economical access to services. However, rural areas often struggle with limited public transportation, primarily along major roads far from communities, leading to transportation disadvantages for rural residents. This study evaluates public transportation accessibility for Kampung Jeram residents in accessing workplaces, commercial centers, healthcare, and education. A survey of one hundred seventy-eight (178) rural residents assessed their ability to reach key services in the town center. Findings show that Kampung Jeram's settlements are distant from essential facilities, such as schools, clinics, and shopping areas. The absence of bus services exacerbates travel challenges, particularly for students, the elderly, and those without private vehicles. These results underscore the need for local governments to adopt strategic measures to enhance rural public transportation accessibility. This study aims to support improved planning and management of public transportation in rural areas like Kampung Jeram.

INTRODUCTION

Accessibility planning and transport disadvantage in rural areas have been key concerns in transport geography and urban planning. The notion of transport disadvantage typically refers to the difficulties faced by individuals in accessing essential services, employment opportunities, healthcare, and education due to inadequate transport options. This issue is particularly pronounced in rural areas where population density

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is low, and infrastructure investment is limited. In Malaysia, a country with diverse geographical terrains and a mix of urban and rural populations, the challenge of ensuring equitable transport access remains significant. This review examines the concepts of accessibility planning, transport disadvantage in rural contexts, and relevant case studies from Malaysia to highlight the critical issues and potential solutions.

Accessibility refers to the ease with which people can reach desired goods, services, activities, and destinations. According to Geurs & Van Wee (2004), accessibility can be seen as a function of four (4) main components: land use, transport, time, and individual characteristics. Effective accessibility planning involves considering these components to improve the spatial and temporal availability of services and opportunities. However, several barriers affect the decision to allow children to walk to school, including distance, traffic safety, parental employment schedules, and socio-economic status (Shokoohi et al., 2012).

Transport Disadvantage in Rural Areas

Transport disadvantage in rural areas is characterised by limited public transport options, longer travel distances, and higher travel costs. These challenges disproportionately affect specific demographic groups, such as the elderly, school children, low-income households, and people with disabilities (Shergold & Parkhurst, 2012). In Malaysia, rural areas face unique challenges due to their geographical isolation, underdeveloped transport infrastructure, and limited economic resources. Research indicates that rural residents often rely on private vehicles due to the scarcity of public transportation options Syed Mohd Azlan & Ghani (2015). However, the high cost of vehicle ownership and maintenance can be prohibitive for low-income households, exacerbating the transport disadvantage. Moreover, road conditions in rural Malaysia can be poor, with limited maintenance leading to further accessibility issues (Gungat & Chandra, 2019).

Malaysia presents a unique context for examining rural transport disadvantage due to its diverse geography, ranging from dense forests to mountainous terrains. Rural communities, particularly in the states of Kelantan, face significant transport challenges due to geographic isolation and underdeveloped infrastructure. Kampung Jeram, located in the Pasir Puteh district of Kelantan, is a rural area characterised by low population density and a reliance on agriculture as the primary economic activity. Kelantan, being one (1) of the less urbanised and economically developed states in Malaysia, faces several transport-related challenges typical of rural settings. These include inadequate public transportation infrastructure, poor road conditions, and a lack of connectivity to major urban centers.

Rural areas like Kampung Jeram often lack reliable and frequent public transport services. Studies on rural transport in Malaysia have shown that buses, which are the primary form of public transport in such regions, are often infrequent and do not cover all areas (Azmi & Karim, 2012). This situation forces residents to rely on private vehicles, motorcycles, or informal transport options, which may not be accessible to all, particularly low-income households, the elderly, or individuals without driving capabilities. The transport disadvantage in rural Malaysia has a profound impact on access to essential services. Research by Eliasson & Attefall (2017), found that rural residents face difficulties accessing healthcare services due to the lack of public transport. The study noted that the nearest healthcare facilities could be several kilometers away, necessitating private transport, which is not always affordable or available. Additionally, access to educational institutions and employment opportunities is also limited, contributing to social and economic inequalities between urban and rural areas.

The Malaysian government has undertaken several initiatives to address transport disadvantage in rural areas, such as the Rural Road Development Program and subsidies for rural public transport services. However, these interventions often face challenges, including limited funding, maintenance issues, and the need for comprehensive planning that considers the unique needs of rural communities (Ismail & Ariffin,

2021). Moreover, the focus has largely been on road improvements rather than expanding public transport networks, which limits the potential impact of these policies on reducing transport disadvantage.

The efficiency of public transport services in rural areas is often challenged by low population density, long distances between destinations, and limited demand, which can make regular and frequent services economically unviable. To enhance efficiency in rural settings, it is important to adopt flexible and demand-responsive transport solutions, such as on-demand shuttle services and community transport options, which can provide more tailored and cost-effective services to residents. Improving route planning, integrating digital technologies for better coordination, and ensuring connectivity with main transport networks can help increase the efficiency and accessibility of public transport in rural areas, making it a viable alternative to private vehicle use. Table 1 shows the indicators contributing to the efficiency of public transport service.

Table 1. Indicators Contributing to the Efficiency of Public Transport Service

Indicator	Attributes
Network Effect and Connectivity	Coverage of route services, as well as distance and connection between bus stops and other modes of transportation
Punctuality	Time spent waiting for the bus to arrive.
Simplicity and Ease of Use	The service's simplicity in terms of information provision, such as route services, time schedules, and on-board methods.
Comfortability	Travel comfort in terms of seat access, noise levels, driver disposition, and availability of services.
Affordability	The monetary cost of travel

Source: Ojo (2019)

Additionally, it is possible to see how transportation disadvantages develop because a lack of access to transportation can result in other disadvantages. Numerous factors, including the physical topography of the area, human health, socioeconomic condition, and the availability of government services, can have a negative impact on transportation (Wang & Chen, 2018). A prominent though underappreciated example of a transportation disadvantage is observed when the prevalence of car ownership in contemporary culture is considered. Families who are compelled to acquire cars due to convenience or a lack of substitute services and those who must possess more than one (1) vehicle to carry out daily activities may encounter challenges and experience strain on their finances, physical and mental health, and interpersonal relationships. Individuals and families are compelled into challenging and perhaps unfavourable conditions when faced with transportation disadvantages. Even though there are public transportation options available for those without access to a car, there are still drawbacks for people who must use these services to get to work, school, or other community resources. This is especially true in areas where it is difficult to travel to transportation services due to broken or non-existent routes, bad illumination, steep terrain, long walks, and other circumstances that all add to disadvantages. Other drawbacks include becoming time-poor or completely missing out on possibilities due to lengthy and far-reaching destinations.

METHODOLOGY AND BACKGROUND OF THE STUDY AREA

Kampung Jeram is a village located in Pasir Puteh, in the state of Kelantan Darul Naim, which is a state in the north of Malaysia. The town of Pasir Puteh is situated on the bank of Semerak River, about 30 kilometres to the south of Kota Bharu. Kampung Jeram area has a total population of 8,552 in 2021, covering an area of 14,922 km².

Table 2. Population of Pasir Puteh

Rank	District (<i>Mukim</i>)	Population
1	Semerak	21,670
2	Bukit Jawa	19,329
3	Limbongan (Pasir Puteh Town)	14,164
4	Padang Pak Amat	13,360
5	Bukit Abal	10,624
6	Gong Datok	8,721
7	Jeram	8,552
8	Bukit Awan	7,984

Source: Authors (2024)

Development in the rural settlement of Kampung Jeram has four (4) main land use categories, namely rural settlement of residential, commercial, institutional and community facilities. The reason for selecting a small settlement in the Kampung Jeram as the study's site is that it is a rural area without access to the Cityliner bus network. Since the Pasir Puteh district's bus routes are only concentrated on the federal road route, it is considerably more difficult to obtain taxi and unlicensed taxicab services due to the comparatively limited infrastructure facilities for public transportation. Taxis and unlicensed taxicabs, however, only pick up passengers on public roads, and they only use private roads in remote settlements to drop off passengers.

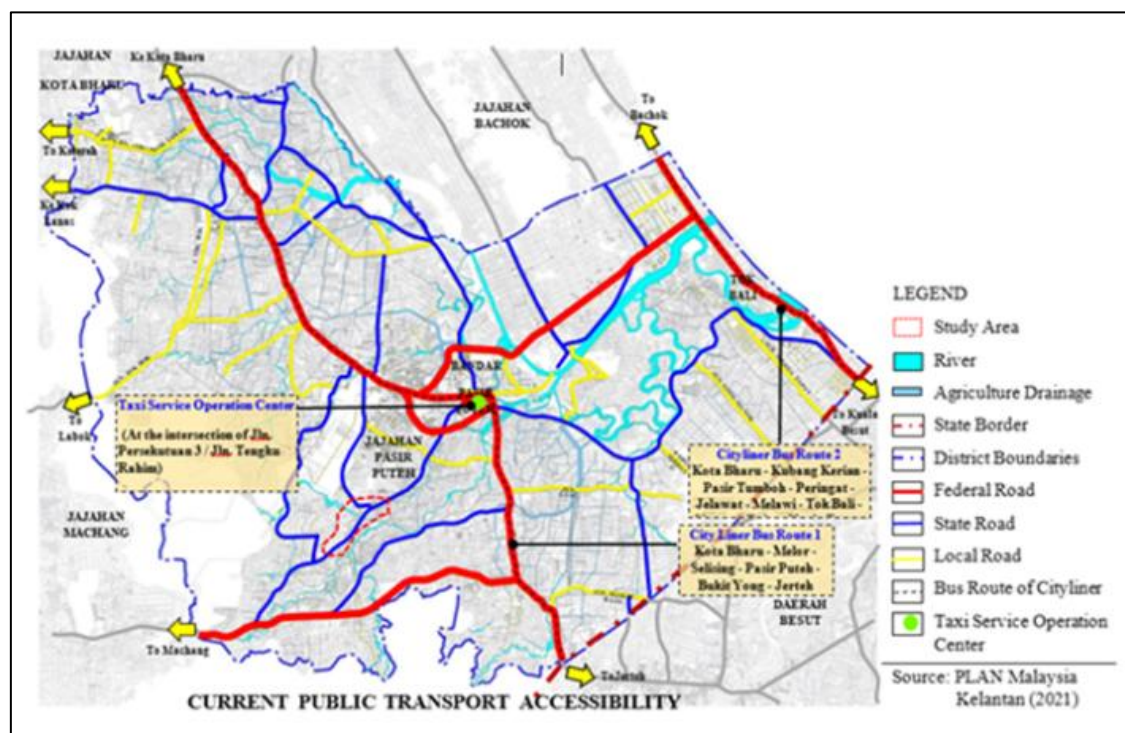


Fig. 1. Public Transport Accessibility

Source: Jabatan Perancangan Bandar dan Desa Negeri Kelantan (2012)

A survey comprising one hundred seventy-eight (178) questionnaires was disseminated to the study area for data collection regarding accessibility planning for rural public transportation at Kampung Jeram. The selected sample was calculated based on the total population, which is about 8552 residents, with a 90% degree of confidence, and 6% of margin of error. The study was undertaken to assess a variety of topics, including the current accessibility of public transportation, existing routes, public transport travel schedules, and nearest bus stop location at Kampung Jeram. The questionnaire is divided into four (4) sections: the first section was the respondent's demographic information; the second section aims to gauge the accessibility between rural settlement of Kampung Jeram to community facilities and Town Centre; the third section examines the residents' opinion about access to public transportation; and the fourth section highlights the assessment on the impact of poor public transport to residents' quality of life.

Accessibility Between Rural Settlement of Kampung Jeram to Community Facilities, Commercial Area and Town Centre

The education institutions in Kampung Jeram, including Tadika Kemas Sri Jeram, Sekolah Menengah Kebangsaan Jeram, and Sekolah Kebangsaan Jeram, are located about 2.9 kilometers away from the furthest rural community area, which takes approximately 34 minutes to reach on foot. Community facilities, such as clinics, are around 2.7 kilometers away, requiring up to a 32-minute walk from the settlement. The nearest commercial area is 1 kilometer away, taking about twelve (12) minutes to walk. However, reaching the town center, which is 6.3 kilometers away, requires residents to drive for about one (1) hour and eight (8) minutes. The considerable distance between the rural settlement and essential facilities, such as schools, healthcare services, and recreational parks in the town center, makes it difficult for villagers, especially students and the elderly without vehicles, to travel. Additionally, there is no bus service available. Table 3 presents the accessibility from the rural settlement of Kampung Jeram to community facilities, commercial areas, and the town center, while Figure 2 shows the radius from the rural settlement to these facilities and the town center.

Table 3. Accessibility Between Rural Settlement of Kampung Jeram to Community Facilities, Commercial, and Town Centre

Accessibility to the Facilities	Radius (km)	Walking Time Taken (Minute)
Rural Settlement to Community Facilities		
Rural Settlement to SMK Jeram	0.1-2.9km	1-34 mins
Rural Settlement to SK Jeram	0.1-2.9km	1-34 mins
Rural Settlement to Tadika Kemas Sri Jeram	0.1-2.5km	1-30 mins
Rural Settlement to Clinic	0.1-2.7km	1-32 mins
Rural Settlement to Masjid Mukim Jeram	0.1-2.5km	1-30 mins
Rural Settlement to Surau	0.1-2km	1-25 mins
Rural Settlement to Nearest Commercial		
Rural Settlement to Grocery Store	0.1-1km	1-12 mins
Rural Settlement to Restaurant	0.1-1km	1-12 mins
Rural Settlement to Town Centre		

Source: Authors (2024)

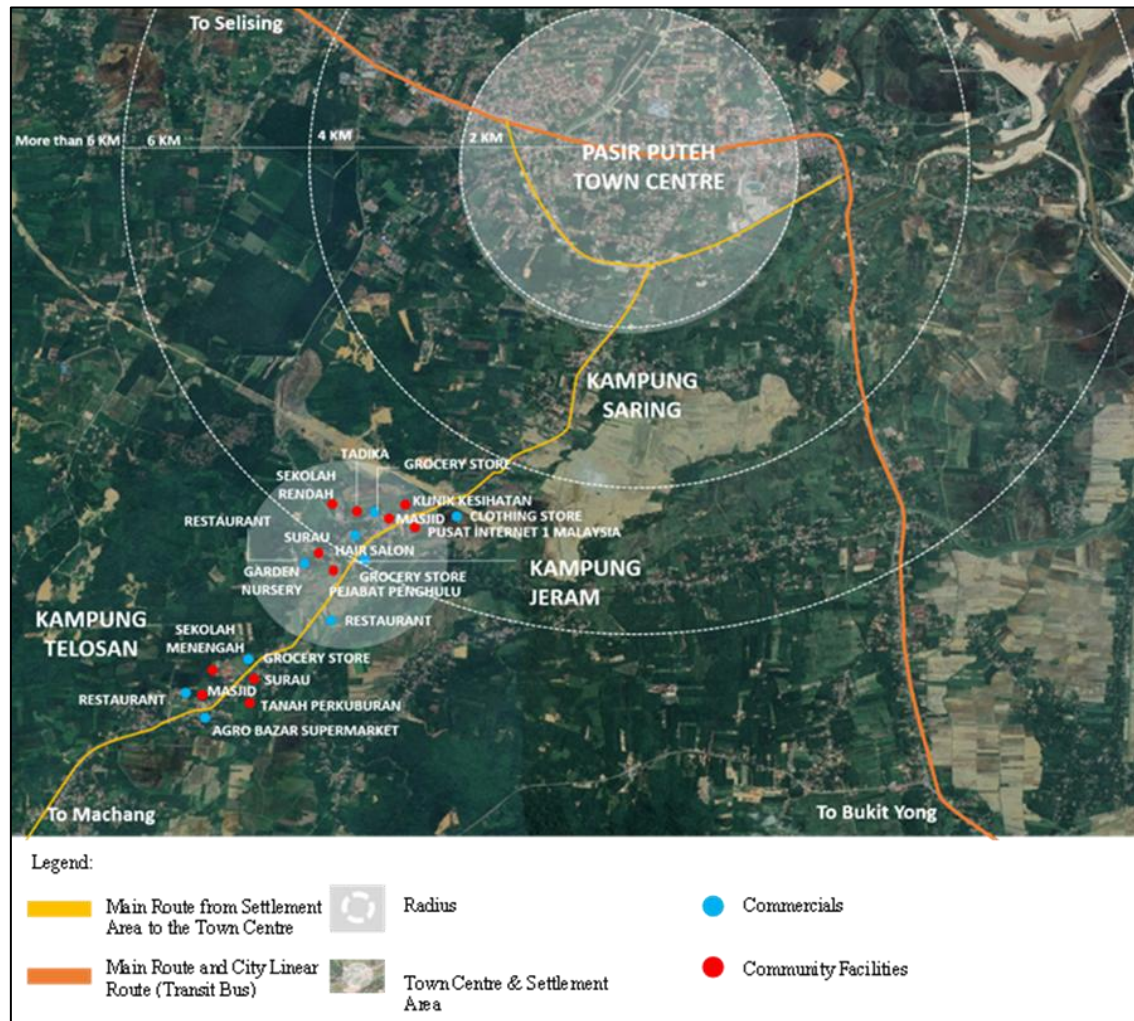


Fig. 2. Radius from Rural Settlement to Community Facilities, Commercial, and Town Centre

Source: Authors (2024)

Public transportation plays a vital role in urban economic development and enhancing population health, particularly in rural communities (Heaps et al., 2021). The economic conditions of rural Kelantan further exacerbate transport disadvantages. With many rural residents engaged in low-income agriculture, the cost of owning and maintaining private transport can be prohibitive (Manual et al., 2024). As a result, many residents may face financial barriers to accessing reliable transport, impacting their ability to participate in economic opportunities or access services.

In addition, the town centre offers many job opportunities due to the presence of private and government businesses, commercial, and other establishments compared to other locations. As such, many villagers find it difficult to find employment and are forced to move to other cities, such as Selangor, due to the absence of bus services in Pasir Puteh's town centre to the rural settlement. One (1) of the reasons

why people move from rural to urban areas is due to inadequate public transportation in rural areas (Tey, 2014).

The Assessment of Public Transport Accessibility

Table 4 indicates that most respondents expressed a negative opinion, selecting "Strongly Disagree" on the Likert scale when asked about the quality of public transport services in their area, with an average mean score of 1.46. This suggests that residents in isolated areas find it challenging to access public transport, as they often have to walk nearly 26 minutes to reach a public transport stop, such as for taxis or unlicensed taxis. According to Kaszczyszyn & Sypion-Dutkowska (2019), the acceptable maximum walking distance for pedestrians to reach public transportation, classified as Level of Service (LOS) C, is between five (5) to seven (7) minutes, after which the level of comfort quickly decreases.

Furthermore, 46% of respondents strongly disagreed that the bus stops in Pasir Puteh town are conveniently located near homes, businesses, and schools. This is likely because the bus network in Pasir Puteh is concentrated mainly in the city center, close to commercial and educational facilities, but not near the residential areas where people live.

Additionally, 65% of respondents strongly disagreed that public transportation, such as buses, arrives on time according to the schedule. This could be because taxis and unlicensed cabs frequently operate in the Mukim Jeram area, picking up passengers due to the infrequent use of public transport.

Lastly, most people with access to public transportation (specifically, the City-Liner buses) strongly disagreed that the frequency of bus services is adequate. This dissatisfaction is because only two (2) bus routes operate in Pasir Puteh: one (1) from Pasir Puteh to Kota Bharu, which takes about 42 minutes, and another from Pasir Puteh to Jerteh, which takes 20 minutes.

Table 4. Assessment of the Provision of Public Transport at Pasir Puteh, Jeram

Provision of Public Transport	Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree	Mean Score
Easy to get public transportation	63%	33%	4%	0	0	1.41
The location of Pasir Puteh town is close to residential, commercial, school and town centre	46%	34%	20%	0	0	1.74
Public buses always arrive according to schedule	65%	35%	0	0	0	1.35
I am satisfied with the frequency of the bus	64%	36%	0	0	0	1.36
Total Average Mean						1.46

Key (1-Strongly Disagree, 2-Disagree, 3-moderate, 4-Agree, 5-Strongly agree)

Source: Authors (2024)

The Impact of Poor Public Transport and No Transit Bus Network in Rural area

According to Table 5, 35% of respondents agreed that not having access to public transportation negatively affects their daily lives, especially for those without a vehicle, such as students, the unemployed,

and housewives, who are unable to fully participate in community activities. Additionally, 27% of respondents, which is the largest group, agreed that this lack of transport limits their ability to work. The availability of public transport in urban areas has become a key factor driving many people to migrate from rural areas in search of job opportunities. Lack of transportation options has been identified as a barrier to accessibility and social inclusion, particularly in rural and sparsely populated areas (McDonagh 2006; Farrington & Farrington, 2005). Furthermore, 49% of respondents believe that the absence of public transportation in rural areas restricts the activities of group members with mobility limitations. Residents of Kampung Jeram face challenges reaching public transportation stations due to the distance, which makes walking impractical. Moreover, 51% of respondents agreed that it is difficult to purchase necessities. This is because they must travel to Pasir Puteh Town's commercial areas to buy essential items like stationery, fresh groceries, and other necessities at reasonable prices, but they find it challenging to use the available public transport. This situation particularly affects low-income villagers and students without access to private transportation. The average mean score for all these factors is 3.50.

Table 5. The Impact of Poor Public Transport and No Transit Bus Network in Rural area

Impact	Strongly Disagree	Disagree	Moderately Agree	Agree	Strongly Agree	Mean Score
Unavailability of P.T has affected my daily activities	14	10	11	30	35	3.62
Due to u navailability of P.T I have to use my own trasnport	13	10	20	28	29	3.50
Unavailability of P.T has limited me/ my children to get education or training	16	14	27	22	21	3.22
Unavailability of P.T has limited my ability to work	10	21	20	27	22	3.31
Unavailability of P.T has limited my social life	12	14	40	24	10	3.06
Unavailability of P.T has limited the activities of people with disabilities	4	7	16	49	24	3.85
Unavailability of P.T make me difficult to buy essential necessities	10	9	6	24	51	3.97
Total Average Mean						3.50

Key (1-Strongly Disagree, 2-Disagree, 3-Moderate, 4-Agree, 5-Strongly Agree)

Source: Authors (2024)

Summary of Observation Finding

Observations made in the study area demonstrate several impact-related characteristics. At the conclusion of the observation, the researcher relates all the ideas and concludes based on both data gathering methodologies, as evidenced by the Table 6 below.

Table 6. Summary of Observation Finding

Aspect	Finding
Current network of City Liner bus routes (transit bus)	The current City Liner bus network is not connected to the rural settlement of Pasir Puteh Town, residential, commercial and health services, leisure, institutions, and community facilities.

Road Condition in Rural Settlement	Jalan Jeram B, Jalan Jeram A, and Jalan Lahoke have unpaved, congested roadways. Poor road conditions make it more difficult for taxis to transport users to the rural area.
Current Bus Stop in Kampung Jeram	Bus stops are not provided in the proper areas and are far from schools, commercial areas, and residential or rural settlements. Access to public transportation is challenging for people with disabilities since the bus stop is inconvenient and located too far.
Accessibility Between Residential of Rural Settlement to Community Facilities, Commercial and Town Centre	Residential settlements are too far from important facilities such as institutions, clinics, and commercial areas, making it difficult for villagers to travel—especially students, the elderly, and those without a vehicle—plus, there is no available bus service.
Employment Accessibility	Although there are numerous job prospects due to the existence of private and public businesses, commercial, and other establishments in the town centre of Pasir Puteh, many villagers find it challenging to obtain employment if the bus service is not connected.

Source: Authors (2024)



Fig. 3. Bus Stops are Not Provided and Residential Settlements are Too Far from Facilities

Source: Authors (2024)

CONCLUSION

The findings of this study provide valuable insights for key stakeholders, including the State government, PLAN Malaysia Kelantan, MDPP, and other relevant agencies, regarding the current state of accessibility in rural public transportation. It is evident that underdeveloped public transportation systems in rural areas can lead to a range of issues, adversely affecting the quality of life for residents. Urban and transport planners, especially those involved with local authorities, should leverage these findings to enhance and modernise transportation services to be more effective and user-friendly.

The research underscores the importance of recognising public transit such as buses, as essential modes of transportation for all demographic groups. By improving the timeliness, affordability, and reliability of these services, it is possible to reduce travel costs and encourage greater use of public transportation over personal vehicles. Expanding the public transportation network, particularly in remote areas, not only benefits individuals but also has broader positive impacts on the community, economy, and environment. Efficient public transport systems can elevate living standards and support sustainable urban and rural economic development.

Additionally, there is a pressing need to introduce more transportation options that accommodate the elderly in rural area, who often face mobility challenges due to limited public transit routes and services. Solutions such as private chauffeuring and companionship services can address these needs, allowing senior travellers to move safely and comfortably according to their individual requirements. Enhancing the accessibility, affordability, and safety of these services will significantly improve the well-being of older residents and provide a sustainable and efficient approach to meeting their transportation needs.

Future research could involve a comparative analysis of public transportation accessibility between rural and urban areas in Malaysia. This study would aim to identify the disparities in public transport services, understand the underlying factors contributing to these differences, and propose strategies to enhance transportation equity. Such research could provide valuable insights for policymakers to develop targeted interventions that address the unique challenges faced by rural communities, thereby improving their access to essential services and opportunities.

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CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

AUTHORS' CONTRIBUTIONS

Na'asah Nasrudin conducted the research and was responsible for writing and revising the article. Raja Norashekin Raja Othman led the questionnaire site survey. Yusfida Ayu Abdullah and Marlyana Azzyati Marzukhi conceptualised the core research idea and provided the theoretical framework. Ishak Che Abdullah and Baizura Jamaluddin were responsible for data collection and GIS land-use map analysis.

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