

Walking Suitability Assessment at Kampung Morten, Melaka

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Abstract

Active transportation, including walking and cycling, is a sustainable alternative to motorized travel, offering environmental and health benefits. This study evaluates the walkability and transportation preferences of Kampung Morten, a historic area in Malaysia, to enhance pedestrian infrastructure and promote active transport. The objectives include assessing residents' transportation modes, conducting a walkability analysis using the WABSA guideline, and proposing improvements to pedestrian pathways. A mixed-method approach was employed, including a survey of 91 residents and on-site assessments. Results indicate that while most residents rely on motorized vehicles due to distant workplaces and public transport stations, walking is common for shorter trips. The WABSA evaluation identified deficiencies, such as inadequate sidewalks, poor lighting, and a lack of curb ramps, contributing to suboptimal pedestrian conditions. Proposed recommendations include widening pedestrian pathways, separating cycle and pedestrian lanes, and adopting traffic-calming measures. Additionally, implementing urban planning concepts like superblocks could enhance walkability. By addressing these infrastructure gaps, the study aims to foster a healthier, safer, and more sustainable community, aligning with Kampung Morten's status as a UNESCO World Heritage Site and supporting its cultural preservation goals.

1. Introduction

Active transportation, including walking, cycling, and skating, is a sustainable alternative to motorized vehicles, reducing environmental impact and fuel consumption. Roads and pedestrian pathways act as critical links between locations, irrespective of their distance. Walking, the simplest and most natural form of transportation, has been overshadowed by the rise of motorized vehicles. However, growing awareness of the importance of healthy lifestyles has sparked renewed interest in walking. Pedestrian pathways are designed to facilitate safe, congestion-free movement, providing numerous benefits such as physical exercise, fresh air, and an opportunity to appreciate natural surroundings [1]. Walking is an eco-friendly mode of transportation that supports the well-being of humans, plants, and animals alike. Communities can promote walking by developing walkable neighborhoods, enhancing pedestrian infrastructure, ensuring safe routes to schools and workplaces, and raising awareness through education and outreach campaigns.

This study examines travel mode choices and evaluates the walkability of Kampung Morten as shown in Fig. 1, a pedestrian-friendly area connected to essential public facilities such as mosques, schools, and hospitals. Kampung Morten, part of Malaysia's UNESCO-designated World Heritage Sites, is a park offering easy access to public spaces within walking distance. While many respondents report access to key facilities, a limited number have access to public services within a 1-kilometre radius. Kampung Morten also provides pathways enabling residents to reach desired public locations within this radius.

This report evaluates the suitability of walking as a mode of transportation within the Kampung Morten area, guided by three primary objectives. First, it seeks to identify the preferred modes of transportation among local residents, emphasizing the prevalence and practice of active transport, such as walking and cycling. Second, it conducts a comprehensive walkability assessment using a methodology developed by the University of North Carolina [2], which provides a robust framework for evaluating the walkability of a specific area. Finally, the study aims to propose a series of feasible improvements to pedestrian pathways, drawing from best practices observed in successful pedestrian-friendly environments. These objectives are pursued through a combination of survey questionnaires and on-site evaluations, with the findings and recommendations intended to offer valuable insights for local authorities and urban planners. The goal is to enhance walking infrastructure, encourage active transport among Kampung Morten residents, and contribute to this historic district's overall livability and sustainability.



Fig. 1 Morten Village, Malacca [3]

2. Literature Study

2.1 World Heritage Site

The increase in the number of tourists in the World Heritage Sites in Melaka has negatively impacted their historic environments, primarily due to a surge in tourist arrivals [4]. A study involving 384 independent travellers revealed that international tourists tend to spend more time at major attractions but allocate higher expenditures at less popular sites. A multi-method quantitative research approach analyzed the sensory experiences of 268 foreign tourists, concluding that walking and cycling significantly influence sensory experiences. These active transportation modes enhance the perceived cultural heritage value of sensory experiences relative to general satisfaction. Moreover, tourists were found to form emotional bonds with the sites, and overall sensory experiences positively affected their responses to attractions [4].

2.2 Active Transportation

Active transportation, including walking, cycling, and skateboarding, provides numerous benefits to health, the environment, and children's development. During the COVID-19 pandemic, limitations on public transport led to a marked increase in the use of non-motorized modes of travel. Bicycle sales, for instance, surged by 20% as cities globally encouraged walking and cycling to mitigate COVID-19 risks and enhance public welfare services [5]. Active transportation not only supports public health but also generates income and improves overall quality of life. Studies suggest that prioritizing active transport infrastructure in schools, educational institutions, and recreational areas can motivate individuals to adopt these modes for both recreation and health purposes. Furthermore, research has explored consumer behaviour during temporary closures of bridges and active transportation lanes, as well as the effects of fluctuating gasoline prices on travel patterns. Port and

transportation planning can further promote active transportation, while concerns about safety from crime often discourage walking among residents.

2.3 Walking Suitability Assessment

Pedestrians are defined as individuals who navigate public spaces via footpaths, crosswalks, and other designated walkways. Evaluators of pedestrian pathways assess the effectiveness of these areas by considering factors such as safety, comfort, and convenience. Poorly designed infrastructure or the misuse of footpaths can result in pedestrian injuries and fatalities. To prevent accidents, pedestrians should use designated sidewalks and prioritize their safety, particularly when walking to school [6].

2.4 Best Practices to Promote Active Transportation

Research has demonstrated that active transportation can improve the health of road users while reducing air pollution. Green transportation options, such as bicycles, electric cars, and electric trains, are critical in reducing greenhouse gas emissions. Governments worldwide are working toward adopting electric transport systems by 2030 [7]. Creating inviting walking and cycling spaces can further encourage active transportation. Education campaigns and public events have also proven effective in changing cultural attitudes and promoting walking and cycling. Incorporating active transportation initiatives into physical activity guidelines can significantly improve public health while supporting the preservation and enhancement of cultural and natural heritage sites.

3. Methodology

The study conducted a literature review and used a questionnaire survey and the Walking and Biking Suitability Assessment (WABSA) manual for data analysis. The findings are discussed and concluded with a conclusion. The flow chart of the overall methodology is shown in Fig. 2.

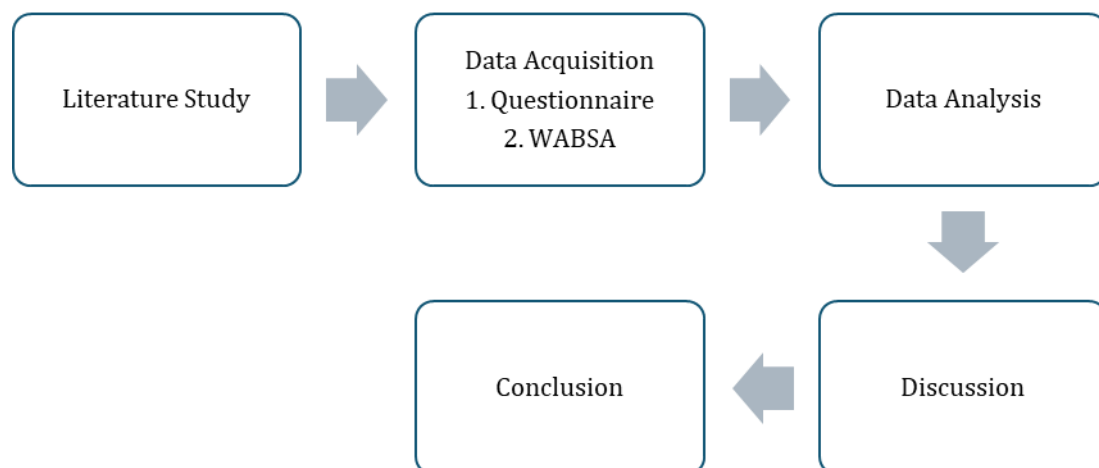


Fig. 2 Flow Chart of Overall Methodology

3.1 Data Acquisition

This study employed a questionnaire survey and an on-site walking inspection to collect data from the residents of Kampung Morten. The questionnaire design replicated the approach used in Yuen's 2020 study, ensuring methodological consistency. A total of 91 respondents participated in the survey, drawn from a population of 750 residents [8]. This approach aimed to provide a comprehensive understanding of the population's walking behaviour and transportation preferences.

3.2 WABSA

The walking suitability assessment evaluates the safety and effectiveness of walking as a mode of transportation within a specified area. This process involves analyzing 17 factors that influence pedestrian comfort and safety, including obstacles that may hinder walkability. The scope of such assessments varies, encompassing evaluations of individual walking capabilities, exercise potential, or accessibility. Insights gained from these assessments are critical for decision-making in transportation infrastructure, land use planning, and public health initiatives. Notably, the evaluation focuses on formalized footpaths rather than informal or unplanned trails.

An on-foot investigation was carried out to assess walking suitability. The assessed characteristics are AADT, posted speed limit, number of through lanes for both directions, presence of a sidewalk, sidewalk material, sidewalk surface condition, sidewalk width, buffer width, curb ramps, street lighting, isolated problem spots, and intersections [2]. Each character has its score for a certain value or quality; for example, for sidewalk surface conditions, the scores for good, fair, and poor are 0, 1, and 4, respectively. The total score was used to determine the walking suitability level of assessed road segments. Table 1 shows the walking suitability level and colour representative based on scores [2].

Table 1 Walking suitability level with scores [2]

Scores	Walking suitability level	Colour
< 3.0	Very Good	Blue
3.0 – 5.9	Good	Green
6.0 – 8.9	Fair	Yellow
9.0 – 26.0	Poor	Orange
99.0	(No sidewalk on quiet street)	Pink
> 99.0	(No sidewalk on a busy street)	Red

3.3 Data Analysis

Descriptive analysis is a statistical method used to summarize and present data comprehensively. It provides a clear overview of patterns and key trends within the dataset. Techniques employed include measures of central tendency, dispersion, frequency distributions, percentages, cross-tabulations, skewness, and graphical representations. These tools collectively enable a detailed examination of walking suitability, with results categorized and graded using the WABSA framework. Road sectors were immediately assigned grades and colors, providing a clear visual representation of their suitability for pedestrian use.

4. Results and Discussion

4.1 Questionnaire

The study found that the majority of Kampung Morten residents primarily rely on motor vehicles for transportation rather than walking. Among the 91 respondents surveyed, 64 owned motor vehicles. The proximity of neighborhood facilities and schools emerged as a key factor, with 41 respondents reporting these as the nearest locations. However, workplaces and public transport stations were located further away, exceeding 2 km and 1 km respectively, discouraging walking, as shown in Fig. 3.

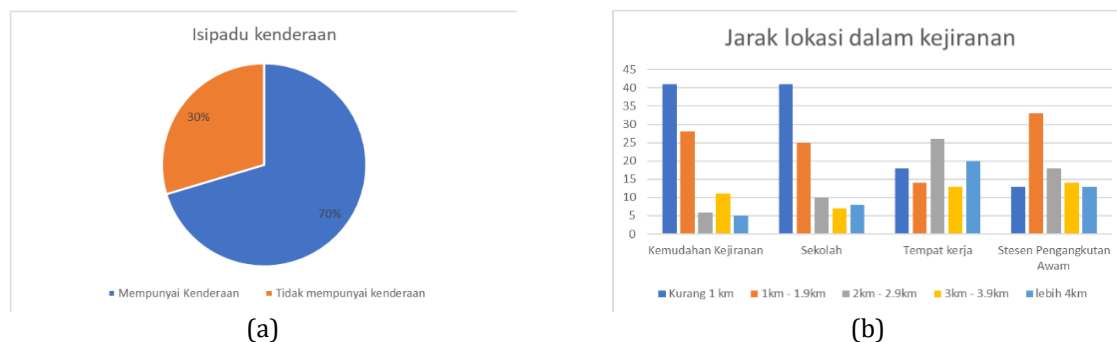


Fig. 3 (a) Volume of motor vehicles; (b) Location distance in the neighborhood of Kampung Morten

The data also showed that respondents frequently walked during the day, with 50 individuals reporting walking more than nine times daily. Regarding walking duration, 50 respondents noted that they walked for over 30 minutes daily, the highest reported duration. Other durations, ranging from 5 to 30 minutes, were more evenly distributed, with a peak of 11 individuals walking for 20 minutes. Additionally, nearly half of the respondents used cars for trips over 4 km, with motorbikes and public transport usage reported by 46 and 54 respondents, respectively. Conversely, cycling and walking were preferred for shorter trips. Fig. 4 shows respondents' frequency of walking, duration of walking and choice of transport mode based on distance.

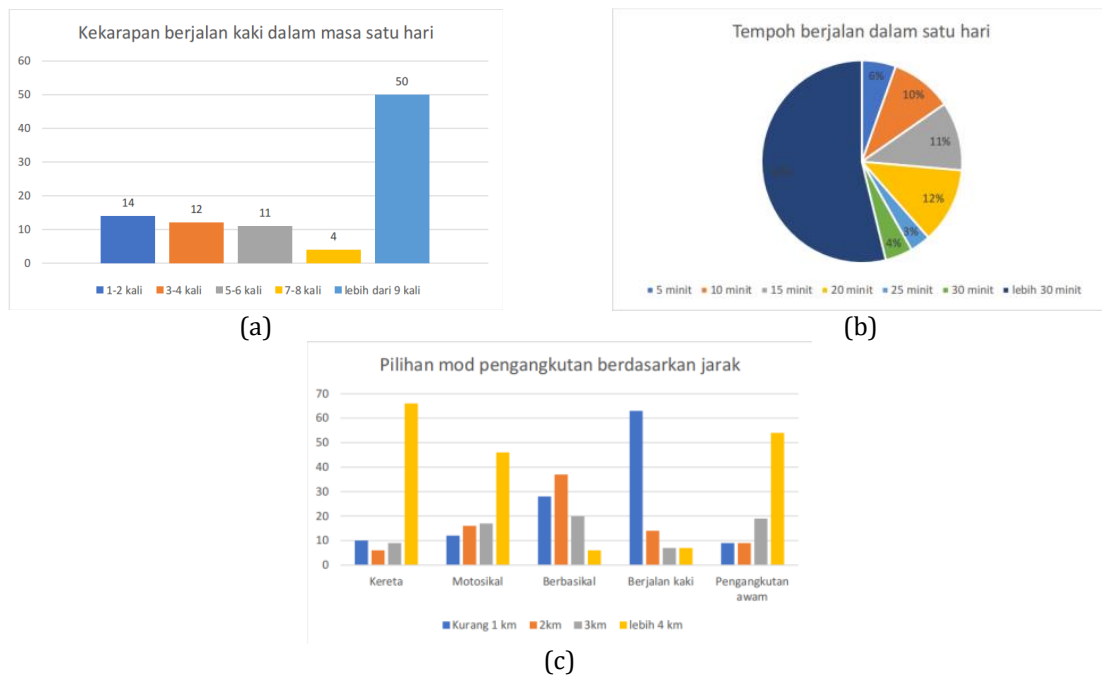


Fig. 4 (a) Frequency of walking; (b) Duration of walking; (c) Choice of transport mode based on distance

4.2 WABSA

WABSA was conducted on individual road segments to ensure precise data collection. This study was carried out on Friday, May 17, 2024, from 11:00 AM to 4:00 PM. The WABSA results revealed varied conditions:

- The route from the Kota Laksamana Japerun Complex to UITM Melaka City Campus scored poorly (105.5), reflecting the absence of sidewalks.
- The second road segment scored significantly better, with a “Good” rating and a WABSA score of 4.5.
- Subsequent segments scored poorly, with WABSA scores of 13 and 10.5, indicating suboptimal pedestrian conditions.

The route from the Kota Laksamana Japerun Complex to Surau Al Abidin displayed similar challenges. The first section scored poorly (WABSA score = 11) due to a lack of sidewalks on one side. The second section, despite its “Good” rating (WABSA score = 4.75), lacked curb ramps, limiting accessibility. The final analyzed route, from Kota Laksamana Japerun Complex to Putra Specialist Hospital, highlighted areas for improvement:

- The first section scored “Fair” (WABSA score = 8), requiring infrastructural enhancements.
- The second section achieved a “Good” rating (WABSA score = 4) but needs curb ramps to lower the score further.

The last section’s high WABSA score (indicating “Fair”) was impacted by an AADT (Average Annual Daily Traffic) of 38,592, which poses safety concerns for pedestrians. The overall result of WABSA along all sections, depicted by colour, is as shown in Fig. 5.



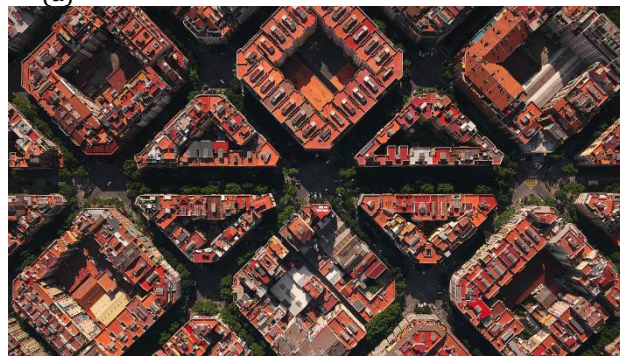
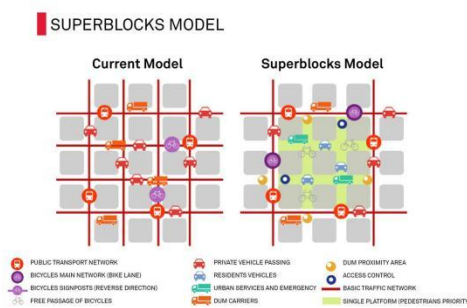
Fig. 5 The overall result of WABSA along all sections

4.3 Improvements

Recommendations for improvement include widening pedestrian areas to at least 1.5–2.0 meters, especially in constrained road sections, and providing well-designed infrastructure for pedestrian paths. Separating pedestrian walkways and cycle paths is crucial to ensure safety, particularly in areas with high motor traffic speeds. Implementing traffic-calming measures is also advised to reduce vehicle speed and volume, as shown in Fig. 6 (a). To encourage active transportation, the adoption of superblock concepts as shown in Fig. 6(b), like those implemented in Barcelona, Spain, is recommended. Superblocks restrict vehicular traffic to specific zones, creating more pedestrian-friendly urban spaces. This approach can promote physical activity, particularly benefiting the elderly and youth.



(a)



(b)

Fig. 6 (a) Shared bike path and pedestrian path [9], and (b) Superblocks Barcelona, Spain [10]

5. Conclusion

In conclusion, most Kampung Morten residents prefer motorized transport due to the long distances to workplaces and public transport stations. Although nearby schools and neighborhood facilities encourage some walking, the overall pedestrian infrastructure remains inadequate. The WABSA study identified deficiencies such as poor sidewalks, inadequate lighting, and the absence of curb ramps. Improvements, including the separation of pedestrian and cycle paths, can enhance safety and comfort. By implementing these recommendations, residents can experience safer and more convenient walking conditions, fostering a healthier and more sustainable community.

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Author Contribution

The authors confirm their contribution to the paper as follows: **study conception and design:** Mohd Erwan Sanik; **data collection:** Muhammad Naim Che Hussein, Irfan Syahir Ismarhadi, Muhammad Hasif Ariff; **analysis and interpretation of results:** Muhammad Naim Che Hussein, Irfan Syahir Ismarhadi, Muhammad Hasif Ariff; **draft manuscript preparation:** Muhammad Naim Che Hussein. All authors reviewed the results and approved the final version of the manuscript.

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