EXPLORING WALKABILITY IN CIVIC HERITAGE SPACES: A PILOT STUDY OF USER PERCEPTIONS IN PADANG KOTA LAMA, GEORGETOWN

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Abstract
This pilot study explores user perceptions of walkability in Padang Kota Lama, George Town, a civic heritage space facing growing mobility and inclusivity pressures. The objective was to examine how users perceive comfort, safety, and connectivity within the pedestrian environment and to assess the feasibility of a mixed-method framework for evaluating walkability in tropical heritage contexts. A structured survey of 42 respondents, complemented by open-ended feedback, was conducted. Reliability analysis indicated acceptable internal consistency, with Cronbach's Alpha values exceeding 0.70 across all constructs. Preliminary findings suggest widespread dissatisfaction with key dimensions of walkability. More than 60% of participants rated sidewalks as uneven or damaged, and 78.6% reported thermal discomfort due to limited shading. Fewer than one-third perceived pedestrian crossings as safe, while nearly half judged them inadequate. Connectivity was frequently described as fragmented, with routes ending abruptly or lacking signage. Qualitative feedback emphasised the need for shaded routes, covered walkways, barrier-free access, safer crossings, and clearer wayfinding. Interpreted through the Theory of Planned Behaviour, these perceptions reveal how inadequate infrastructure, poor thermal comfort, and safety concerns erode walking confidence and perceived behavioural control. The study provides initial empirical and methodological insights to guide future large-scale investigations. It concludes that improving walkability in civic heritage environments such as Padang Kota Lama requires climate-responsive, user-centred, and inclusive urban design interventions that enhance accessibility, social equity, and sustainable mobility.

Keywords: connectivity, heritage, pedestrian, pilot, walkability

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INTRODUCTION

Walkability has emerged as a central concern in contemporary urban discourse, particularly as cities worldwide seek to promote sustainable, inclusive, and people-centred development strategies (Southworth, 2005). A walkable environment is increasingly recognised for its wide-ranging benefits, including improved public health, reduced dependency on private vehicles, enhanced social equity, and stronger community cohesion (Baobeid et al., 2021). In heritage cities, these benefits assume even greater importance as walkability not only supports everyday mobility but also reinforces place identity, mediates tourism experiences, and contributes to the conservation of cultural landscapes.

In the Malaysian context, George Town, Penang, designated as a UNESCO World Heritage Site, represents this dual challenge of conserving historical urban fabric while accommodating contemporary demands for accessibility and inclusivity. While pedestrian-oriented initiatives in George Town have focused on narrow heritage streets, cultural trails, and tourism corridors, comparatively little attention has been directed toward civic open spaces. Among these, Padang Kota Lama stands out as a key civic landmark that merges historical symbolism with contemporary social functions yet remains under-examined in terms of pedestrian experience and spatial legibility. Despite its symbolic and functional role, Padang Kota Lama continues to face structural and environmental barriers that restrict its pedestrian accessibility (Yahya & Samat, 2020).

Existing studies in Malaysia have shown that damaged sidewalks, unsafe or unclear pedestrian crossings, and limited barrier-free access are common issues in urban spaces (Rashid et al., 2018; Hasan & Napiah, 2018). These infrastructural shortcomings are compounded in tropical climates, where high temperatures and direct solar exposure significantly discourage walking, especially among vulnerable groups such as the elderly, children, and people with disabilities (Ayob & Amir, 2024; Xie et al., 2022). Shade provision has been found to be a critical determinant of pedestrian activity in hot and humid cities (Lee et al., 2019; Mohite & Surawar, 2024), yet large civic spaces often remain thermally unprotected. These challenges highlight the broader neglect of pedestrian comfort and safety in civic heritage settings, despite their frequent use by both residents and visitors.

Research on walkability in heritage cities has largely centred on tourism-related pedestrian routes or commercial corridors (Ewing & Handy, 2009; Zumelzu et al., 2022), with less focus on civic open spaces that are central to everyday inclusivity and community life. Connectivity remains underexplored, even though a well-linked pedestrian network is integral to ensuring that users can move seamlessly between destinations (Yang et al., 2023; Valverde et al., 2024). In George Town, fragmented walkways, abrupt terminations, and insufficient signage have been observed as obstacles to both tourists and local residents (Fan et al., 2024). Such shortcomings undermine the principles of Universal Design, which emphasise accessibility and inclusivity across demographic groups (Zulpiani & Rusyani, 2023; Pavlenko et al., 2024).

Beyond physical design, walking is also a behavioural act shaped by perceptions, motivations, and social expectations. The Theory of Planned Behaviour (Ajzen, 1991) provides a robust framework to explain these dynamics, positing that intention to walk is influenced by attitudes, subjective norms, and perceived behavioural control. Studies have shown that perceptions of risk, comfort, and safety often outweigh the actual presence of facilities in determining walking choices (Jacobsen et al., 2009; Basu et al., 2024). In tropical heritage cities such as George Town, perceived thermal discomfort, safety concerns at crossings, and poor connectivity may therefore have a stronger influence on user behaviour than infrastructure alone.

Taken together, the literature suggests that civic heritage spaces are both symbolically important and functionally vulnerable. Despite their central role in fostering community interaction, recreation, and cultural continuity, they remain under-researched in walkability scholarship, particularly in tropical contexts. To address this gap, a preliminary investigation is essential to assess both methodological feasibility and thematic direction before scaling up to a comprehensive study.

Accordingly, this pilot study explores user perceptions of walkability in Padang Kota Lama, George Town, focusing on comfort, safety, and connectivity. Guided by the Theory of Planned Behaviour, it integrates user perceptions with spatial and environmental observations to test an integrated analytical framework suitable for heritage civic settings. By adopting a small-scale, exploratory design, this study aims to validate its methodological approach, generate indicative findings, and identify key parameters for future large-scale research. Its significance lies in advancing a context-sensitive understanding of walkability within civic heritage spaces, thereby informing inclusive, climate-responsive, and user-centred urban design in tropical heritage cities.

LITERATURE REVIEW

Walkability in Heritage Public Spaces

Walkability has become a critical concern in contemporary urbanism, offering wide-ranging benefits that include healthier lifestyles, reduced car dependency, improved social equity, and stronger community bonds (Southworth, 2005). A walkable environment goes beyond functional mobility as it enables comfort, safety, and inclusivity for diverse users such as children, older adults, and persons with disabilities (Kadja et al., 2025; Rao et al., 2025).

In heritage contexts, walkability also supports place identity and tourism by encouraging pedestrian exploration of historic districts (Ewing & Handy, 2009). However, tropical climatic conditions introduce additional challenges, as exposure to heat and sunlight discourages sustained walking, especially in open civic spaces (Jia et al., 2022; Kim & Brown, 2022). This is particularly relevant to Padang Kota Lama, where users are frequently exposed to harsh thermal conditions that reduce both comfort and accessibility.

Pedestrian Connectivity and Inclusive Design

Connectivity is integral to walkability, as it ensures that pedestrians can move seamlessly and directly between destinations without disruption (Yang et al., 2023; Hajrasouliha et al., 2015). Well-connected pedestrian networks improve convenience, reduce travel effort, and enhance inclusivity. In heritage cities, connectivity plays a dual role, facilitating access to landmarks while reinforcing cultural and spatial identity (Valverde et al., 2024).

In the Malaysian context, frameworks such as MURNInets recognise pedestrian connectivity as a benchmark of sustainable urban mobility (Sonone & Balamohan, 2023; Mohamad et al., 2023; Fan et al., 2024). Nonetheless, studies highlight ongoing issues including discontinuous sidewalks, obstructed footpaths, and poorly designed crossings that discourage walking (Rashid et al., 2018; Hasan & Napiah, 2018; Azizan et al., 2024). Universal Design principles offer a response to these challenges by ensuring that public spaces remain inclusive and accessible to all (Zulpiani & Rusyani, 2023; Pavlenko et al., 2024; Liu et al., 2022), a particularly relevant consideration in civic spaces like Padang Kota Lama where diverse users converge.

Behavioural Perspectives: Guided by the Theory of Planned Behaviour

Physical design alone cannot explain walking decisions. Walking is fundamentally a behavioural act shaped by perception, motivation, and social influence. The Theory of Planned Behaviour (TPB) (Ajzen, 1991) offers a robust framework for understanding this dynamic. It posits that intention the strongest predictor of behaviour is shaped by attitudes (beliefs about walking), subjective norms (social expectations), and perceived behavioural control (confidence in one's ability to walk safely and comfortably).

Recent studies show that perceptions often outweigh actual infrastructure conditions in shaping walking choices. For instance, perceived risks from traffic or discomfort from heat may discourage walking even where facilities exist (Basu et al., 2024; Jacobsen et al., 2009). In heritage tropical contexts such as George Town, perceived safety, comfort, and inclusivity are particularly critical in mediating the link between environmental conditions and actual walking behaviour. This study therefore adopts TPB as its guiding framework, enabling an integrated understanding of how environmental quality and user perception interact in shaping walkability outcomes.

Conceptual Framework

Building on the literature, this study develops a conceptual framework that integrates TPB with insights from Universal Design, Public Space Theory, and Crime Prevention Through Environmental Design (CPTED). The framework illustrates how user perception, environmental quality, and infrastructure conditions jointly influence walking intention and behaviour in Padang Kota Lama (refer to Figure 1). The framework consists of six interconnected components:

i. Attitude Toward Walking: Users' beliefs and emotional evaluations about walking, shaped by health, leisure, and convenience benefits (Ajzen, 1991).
ii. Subjective Norms: The perceived social expectations of walking, reinforced by the presence of families, tourists, and community activities in civic spaces (Ajzen, 1991; Harun et al., 2020).
iii. Perceived Walking Control: Users' perception of their ability to walk safely and comfortably, influenced by sidewalks, crossings, shaded walkways, and accessibility for vulnerable groups (De Vos et al., 2022; Fonseca et al., 2022; Jaiswal & Lobo, 2024).
iv. Connectivity and Accessibility: The degree to which the area links seamlessly to surrounding landmarks and amenities through barrier-free, continuous pathways (Yang et al., 2023; Li et al., 2023).
v. Perceived Safety and Comfort: Users' feelings of personal and traffic safety, alongside thermal comfort in a tropical climate, which shape their willingness to walk (Bornioli et al., 2019; Distefano et al., 2023; Mohite & Surawar, 2004; Zacharias, 2024).
vi. Walking Intention and Behaviour: The outcome variable, where attitudes, norms, and perceptions translate into behavioural intention and actual pedestrian activity (Ajzen, 1991).

By combining behavioural constructs with spatial and design principles, the framework positions user perception at the centre of walkability analysis. It acknowledges that improving civic heritage spaces requires not only upgrading infrastructure but also addressing how users interpret, experience, and respond to their environment. This dual lens provides the foundation for the present study, which evaluates the pedestrian environment of Padang Kota Lama through both physical and behavioural dimensions.

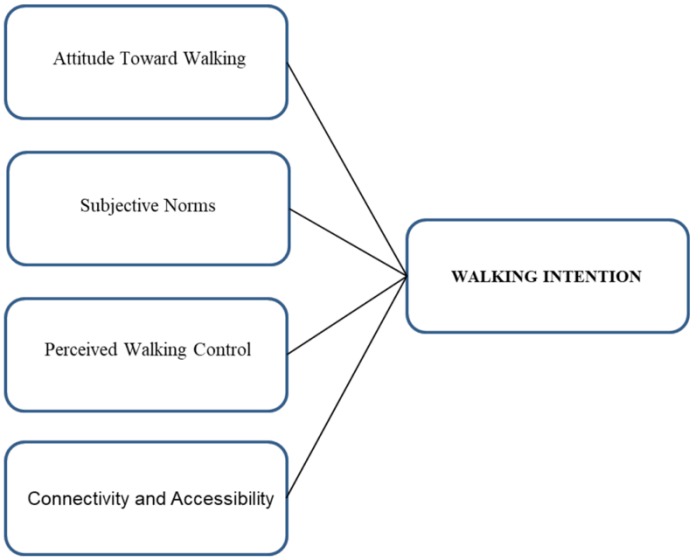

Figure 1: Conceptual Framework

RESEARCH METHODOLOGY

This study employed a pilot case study design to investigate walkability in Padang Kota Lama, George Town. A pilot approach was chosen to provide exploratory insights while also testing the feasibility of survey instruments, sampling strategies, and analytical frameworks for larger-scale research. A case study approach is appropriate as it allows in-depth investigation of a bounded civic space while situating findings within its socio-cultural and climatic context (Crowe et al., 2011). The design is guided by the Theory of Planned Behaviour (Ajzen, 1991), which frames walking as an intentional behaviour shaped by attitudes, subjective norms, and perceived behavioural control. Integrating TPB with assessments of infrastructure ensures that both tangible features (sidewalks, shading, crossings) and intangible perceptions (comfort, safety, inclusivity) are addressed. This alignment strengthens the study's capacity to generate evidence-based insights for improving walkability in heritage urban environments.

Study Area

Padang Kota Lama is a civic open space located within the UNESCO World Heritage buffer zone of George Town, Penang. Surrounded by landmarks such as Fort Cornwallis, Penang City Hall, and the Esplanade, it is both symbolically significant and actively used for recreation, tourism, and community events. Despite past improvements, the area continues to face challenges including discontinuous pedestrian routes, limited shaded walkways, poor barrier-free access, and unsafe crossings. These deficiencies, coupled with the tropical climate, make it a critical site for studying the intersection of infrastructure, perception, and pedestrian behaviour. The site's compact boundaries and mixed user population also make it methodologically suitable for a focused walkability case study.

Figure 2 : Study Area at Padang Kota Lama

Sampling and Respondents

The target population consisted of individuals actively engaging with Padang Kota Lama's pedestrian environment, including local residents, tourists, families, and elderly users. A purposive sampling strategy was adopted to ensure that only those with direct pedestrian experience of the site participated, consistent with best practice in perception-based urban studies (Campbell et al., 2020).

A total of 42 valid responses were collected. While modest, this sample size is defensible for pilot-scale studies where bounded research sites naturally limit the accessible population (Lakens, 2021; Vergara et al., 2024). Prior research on walkability in heritage and civic contexts has successfully employed similar sample sizes (10-50 respondents), yielding robust insights into pedestrian perception (Nirjhar et al., 2023; Vo & Kim, 2024; Yahya & Samat, 2020; Zumelzu et al., 2022;). The pilot scope of this research emphasises methodological testing and exploratory trend identification, rather than generalisation to the wider population.

Data Collection

Data were collected through a structured questionnaire comprising three sections: Demographics (age, gender, user category, visit frequency); Perceptions of Walkability and Connectivity (six items measured on a five-point Likert scale, covering sidewalk condition, connectivity, crossings, shading, safety, and overall comfort); and Open-ended Questions (two items capturing user concerns and suggestions).

Questionnaire items were adapted from established walkability measures and aligned with TPB constructs, particularly perceived behavioural control. A pilot test with five participants confirmed clarity and reliability, achieving a Cronbach's Alpha above 0.7, indicating good internal consistency (Tavakol & Dennick, 2011). To supplement the survey, systematic on-site observations were undertaken to document pedestrian flows, informal desire lines, and areas of infrastructural discontinuity. This triangulated approach strengthens validity by integrating reported perceptions with observed behaviours (Noble & Heale, 2019).

Data were collected directly at Padang Kota Lama over multiple days, ensuring coverage of both weekday and weekend usage. Respondents were approached in high pedestrian activity zones (e.g., Esplanade walkway, Fort Cornwallis entrance, Medan Renong) and invited to complete the survey voluntarily and anonymously. This field-based collection strategy ensured ecological validity, as participants reported on their experiences in situ rather than retrospectively (Degroote et al., 2020).

Data Analysis

Data analysis employed both quantitative and qualitative techniques. Survey data were coded and analysed using SPSS v.28. Descriptive statistics (frequencies, means, and standard deviations) were used to summarise user demographics and perceptions of walkability indicators. This approach is appropriate for small-scale exploratory studies, where the aim is to describe trends rather than establish causal relationships (Vetter, 2017).

Open-ended responses were subjected to thematic analysis (Naeem et al., 2023), identifying recurring concerns and suggestions regarding walkability. These qualitative insights contextualised the statistical findings and provided richer explanatory depth. The combination of descriptive statistics and thematic interpretation ensured methodological rigour while remaining proportionate to the study's scope and sample size.

This mixed but survey-dominant approach is particularly suited to assessing walkability in a bounded civic heritage context. By combining structured perception data with qualitative insights and on-site observations, the study addresses both physical and behavioural dimensions of walkability, as advocated in recent urban mobility research (Yildirim et al., 2024). The methodology ensures that findings are empirically grounded, contextually sensitive, and capable of informing practical design interventions for inclusive and climate-responsive public spaces.

Pilot Study Considerations

As a pilot study, the methodology was designed to achieve two objectives:

- To generate exploratory findings on the state of walkability in Padang Kota Lama.
- To test the feasibility and reliability of instruments, sampling strategy, and analytical approach for scaling up future research.

The insights derived from this pilot therefore provide both empirical and methodological contributions, laying the groundwork for more extensive studies on civic heritage walkability in Malaysia and beyond.

FINDINGS

The preliminary analysis from this pilot study highlights several physical and design barriers that undermine walkability in Padang Kota Lama. Although the sample size was modest, the responses provide indicative insights into user experiences and perceptions.

Sidewalk conditions were rated poorly by most respondents. As shown in Table 1, approximately 62% reported sidewalks as uneven or damaged, while only 14.3% rated them as “very good.” Open-ended responses highlighted difficulties for the elderly, wheelchair users, and parents with strollers, particularly around Fort Cornwallis and City Hall. These observations point to accessibility issues that warrant more detailed spatial and behavioural assessment in future phases.

Thermal comfort was identified as the most pressing concern. Table 1 indicates that 78.6% of respondents reported feeling uncomfortable or very uncomfortable when walking without shade, especially across the central field and Esplanade corridors. Several respondents specifically suggested tree planting and the addition of covered walkways to mitigate discomfort. This preliminary finding underscores the influence of microclimatic factors on pedestrian experience in tropical civic settings, suggesting a need for integrated environmental and behavioural measurement in subsequent studies.

Perceptions of pedestrian safety were consistently low. Table 1 shows that only 28.6% of respondents considered zebra crossings to be safe and clearly marked, while nearly half (47.6%) judged them inadequate. Qualitative feedback reinforced these concerns, citing inadequate lighting, poor visibility at night, and walkways obstructed by bollards and parked vehicles. While these responses reflect user sentiment rather than quantitative risk assessment, they offer valuable direction for refining future survey instruments to capture the relationship between perceived and actual safety.

Connectivity was another recurrent issue. Nearly half (47.6%) of respondents viewed pedestrian routes as only “partially connected,” while 19.1% described them as disconnected. Several respondents also pointed to abrupt walkway terminations and insufficient signage, which limited navigation, particularly for first-time visitors. These early insights reveal potential spatial fragmentation within the pedestrian network, warranting further GIS-based mapping and movement-tracking analysis in future research.

Respondents proposed a range of improvements. The most frequent priorities were planting additional trees and shaded canopies (23.8%), installing covered walkways (21.4%), barrier-free features such as ramps and wider paths (16.7%), safer and better-marked crossings (14.3%), shaded rest areas (14.3%), and clearer signage (11.9%). As a pilot effort, these findings demonstrate the effectiveness of combining quantitative and qualitative perception data to inform design priorities, while also revealing areas where the current survey instrument and spatial observation methods can be refined for larger-scale application.

Figure 3 :Damaged pedestrian pathway

Figure 4 : Obstructed pedestrian pathway

Table 1: Summary of User Perceptions of Walkability in Padang Kota Lama (N = 42)

Walkability Dimension	Key findings	% of respondents
Sidewalk condition	Rated sidewalks as uneven/damaged	62.0
	Rated sidewalks as “very good”	14.3
Shading & comfort	Reported discomfort/very uncomfortable without shade	78.6
Pedestrian safety	Considered crossings safe & clearly marked	28.6
	Judged crossings as inadequate/poorly located	47.6
Connectivity	Perceived walkways as only “partially connected”	47.6
	Perceived walkways as “disconnected”	19.1
User priorities	Shade trees/canopies	23.8
	Covered walkways	21.4
	Barrier-free features (ramps, wider paths)	16.7
	Safer, better-marked crossings	14.3
	Shaded benches/rest areas	14.3
	Clearer way in finding signage	11.9

DISCUSSION

The preliminary findings from this pilot study highlight systemic barriers to walkability in Padang Kota Lama, with weaknesses spanning infrastructure, thermal comfort, safety, and connectivity. Taken together, they demonstrate that the pedestrian environment is not merely constrained by isolated deficiencies but reflects a broader structural neglect of inclusive, climate-responsive, and people-centred planning. Although the scope of this study is exploratory, the results provide early evidence that walkability in civic heritage environments remains constrained by both physical and behavioural dimensions.

The poor condition of sidewalks and the widespread absence of shading reinforce earlier studies that identify infrastructure quality and thermal comfort as foundational to walkability (Jia & Wang, 2021; Labdaoui et al., 2021; Taher et al., 2024). Inadequate pavement maintenance and frequent obstructions, such as bollards and street furniture, compromise accessibility for vulnerable groups, contradicting the principles of Universal Design, which emphasise equity and usability across all demographics. Within the context of this pilot, these observations validate the relevance of the selected assessment framework and confirm that physical design variables remain the most visible constraints to inclusive mobility.

The prominence of shading in user responses underscores its role as a determinant of walking behaviour in tropical cities. As Lee et al. (2019) argue, shade is not an optional amenity but a prerequisite for sustaining pedestrian activity in hot and humid environments. Interpreted through the Theory of Planned Behaviour (Ajzen, 1991), the pilot results illustrate how perceived thermal discomfort directly weakens both attitudes and perceived behavioural control, thereby diminishing walking intention. This provides preliminary behavioural evidence that environmental design elements, such as shading and surface quality, influence psychological factors underpinning mobility choice, a relationship that warrants quantitative validation in subsequent, large-scale investigations.

The findings also reveal deep concerns with pedestrian safety, particularly at crossings and high-traffic intersections. Inadequate lighting, poor visibility, and blocked walkways reflect a failure to incorporate Crime Prevention Through Environmental Design (CPTED) principles (Kim & Park, 2017), which emphasise sightlines, natural surveillance, and legibility as fundamental to pedestrian confidence. As Pendlebury et al., (2004) observes, heritage areas often privilege visual conservation over functional safety, producing environments that are aesthetically preserved but socially

exclusionary. This pilot reinforces that pattern in Padang Kota Lama, conservation-driven design appears to have overlooked basic safety and inclusivity principles, highlighting a potential policy-level disconnect between heritage preservation and active mobility planning.

Fragmented connectivity represents another structural weakness. The discontinuity of walkways, abrupt terminations, and insufficient wayfinding signage confirm Sonone and Balamohan's (2023) assertion that direct, continuous pedestrian networks are essential to walkability and sustainable urban mobility. From a methodological standpoint, the pilot's integration of spatial observation and perception mapping proved effective in revealing these discontinuities, suggesting its applicability for future comparative studies across heritage sites. Beyond local accessibility, poor connectivity in heritage districts undermines the cultural and economic vitality of place. As Tchetchik et al. (2023) and Jaiswal and Lobo (2024) note, weak linkages between attractions reduce exploration and shorten visitor dwell time, thereby limiting tourism's contribution to urban resilience and heritage preservation. In Padang Kota Lama, this failure undermines both daily usability for residents and its wider role as a civic and tourism destination.

Encouragingly, respondents articulated practical and consistent priorities shade provision, covered walkways, barrier-free features, safer crossings, rest areas, and signage that align closely with global best practices. Their emphasis echoes UN-Habitat's (2020) call for participatory, people-centred planning and demonstrates the intuitive capacity of users to identify features that constitute a walkable environment (Davis et al., 2025). For a pilot study, this convergence between user perceptions and international frameworks is particularly meaningful, as it indicates that even small-scale participatory assessments can yield actionable, policy-relevant insights. It also validates the feasibility of combining behavioural and spatial indicators to evaluate walkability in civic heritage contexts.

While the findings are limited by the study's small sample size and site specificity, they provide a strong empirical and methodological foundation for scaling up future research. The results suggest key thematic and analytical directions, thermal comfort metrics, behavioural intention modelling, and spatial network continuity that warrant further investigation through larger, longitudinal, and mixed-method designs. Ultimately, this pilot demonstrates the value of integrating user perceptions into walkability analysis within heritage environments, bridging the gap between experiential knowledge and evidence-based urban design.

CONCLUSIONS

This pilot study provides preliminary evidence that deficiencies in infrastructure, shading, safety, and connectivity collectively undermine attitudes toward walking, erode perceived behavioural control, and disproportionately exclude vulnerable groups. By combining perception-based data with spatial observations, the study demonstrates the feasibility of a mixed-method approach for assessing walkability in civic heritage settings.

The convergence of quantitative results and user-led suggestions highlights that these shortcomings are not isolated but systemic, requiring integrated solutions that balance heritage conservation with contemporary urban design. Importantly, users themselves articulated priorities such as shaded routes, barrier-free access, and safer crossings recommendations that align closely with global best practices. This correspondence between local perceptions and international frameworks validates the methodological direction of this pilot and underscores the importance of participatory inputs in refining future large-scale studies.

While limited in scope and sample size, the study establishes a foundation for subsequent research that can incorporate longitudinal climatic data, behavioural modelling, and spatial analytics across multiple heritage sites. For policy, these findings advocate embedding walkability assessments within heritage management strategies, ensuring that public space revitalisation addresses both cultural identity and accessibility. Ultimately, this pilot reinforces that people-centred and climate-responsive design are not only compatible with heritage preservation but essential to sustaining civic vitality in tropical urban environments.

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