ISSN: 2977-814X
ISSUE DOI: https://doi.org/10.51596/sijocp.v1i2
Volume 1 Issue 2
journal.spacestudies.co.uk

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To cite this article:

Almajadiah, A., & Townshend, T. (2021). Understanding Walkability in Central Makkah City from the Pedestrian Perception and Behavior in the Context of Comfort. SPACE International Journal of Conference Proceedings , 1(2), 20–27. https://doi.org/10.51596/sijocp.v1i2.23

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Understanding Walkability in Central Makkah City from the Pedestrian Perception and Behavior in the Context of Comfort

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Article History:
Received March 28, 2021
Accepted May 26, 2021
Published Online December 26, 2021

https://doi.org/10.51596/sijocp.v1i2.23

Abstract

Walkability is a concept widely used in walking behaviour studies to describe how equipped an environment is to accommodate walking. The term has had widescale acceptance in Western academic literature. In many rapidly developing countries, however, the term is little recognised, and the contemporary value of walking is still fully recognised. Moreover, there is a dearth of data on this critical mode of transportation exists. This research investigates the notion of walkability in the context of one of the holiest places in the Islamic world. Many scholars have examined walkability at the micro-scale level of city centres; however, a Western-centric perspective dominates. Too few studies have explored walkability in regions with hot climates, and no specific examination has been made to study walkability issues associated with hot, arid weather during a religious event on the scale of Hajj and Umrah. To understand walkability, it is essential to examine the issue at the micro-scale of the street. This article examines the pedestrian perception of walking and the walking behaviour of pilgrims and residents in the central area of Makkah. The data of this study were collected using both qualitative and quantitative approaches. The current condition of the study area is examined through observations, interviews, and face-to-face questionnaires. The findings show 'comfort' attributes, in particular, influence walking choices for the visitors where certain experiences and behaviours occur in response to the physical environment in the central Makkah area. Therefore, it seems that those attributes associated with comfort should dominate the concept of walkability in hot, arid climates, and this emphasis should guide urban planners in their decision-making.

Keywords: walkability, perception, behaviour, comfort

1. Introduction

Walking has always been the primary mode of human transportation (Amato, 2004) and has been defined by many sources in different disciplines. The word walkability is described by Southworth (2005) as '...the extent to which the built environment supports and encourages walking by providing for pedestrian comfort and safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network'. The word 'walkable' can have many definitions, including a walkable environment

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which promotes physical activity and, involves a short distance to a destination, and is barrier-free, traversable, without significant barriers, safety, in terms of potential crime or perceived traffic, with a range of pedestrian facilities and locations, as well as the pedestrian environment being friendly for upper-middle-class professionals who have other options for moving around (Forsyth & Southworth, 2008).

Walkability represents a holistic solution to urban improvement due to its contribution to the creation of slow-paced, healthier and generally happier environments that are welcoming and provide pedestrian comfort (Forsyth, 2015; Southworth, 2005). The Western and Middle Eastern regions of the globe have many similar issues with sustainability in transportation and health, such as high and increasing traffic volumes, congestion and pollution on one hand and sedentary lifestyles, lack of physical activity and increased obesity rates on the other.

Providing what is stated above may encourage visitors to enjoy and ease the experience of walking through the city. However, creating a comfortable environment for pedestrians to walk in the city centre is challenging due to the congestion that the city is known about and the hot, arid climate. This paper aims to explore and understand the walkability of Central Makkah in the context of comfort.

2. Literature Review

2.1. Walkability

Walkability is a concept that has been used in Western literature for around two decades. Walkability is where the built environment supports walking by connecting people safely, quickly, comfortably, and enjoyably to their daily destinations. In a Western context, this often means, for example, the provision of suitable sidewalks, highly connected routeways and integration of greenspaces, such as parks.

The walkability index is a commonly used urban area consistency index. A street must be walkable, linking buildings and activities around it (Carmona et al., 2010). Studies have indicated that many factors, such as safety, building density, street accessibility and connectivity, land-use balance, and aesthetics, may define walkability. As Jan Gehl describes, there are necessary activities that take place under all conditions, including going to school, working, and shopping, with most of those activities related to walking in one way or another (Gehl, 2011).

Research on walkability has gained significant attention in developed countries, but scant research has been done in developing countries, and of importance to this study, few scholarly studies can be identified in the context of Saudi Arabia. The situation is unique in Saudi Arabia due to the very hot and arid climate, with temperatures often falling between 30-50 degrees during summer, making walking an unappealing prospect. The central part of Makkah has been the focal point of Muslims worldwide for over 1,400 years (since the 6th century AD). Hajj and Umrah are two important and large-scale Islamic pilgrimages that take place in Makkah.

2.2. The Comfort of Walking

Comfort, in terms of walking, refers to the degree to which streets enable individuals to visit places of their choice. Comfortable streets are calm, inviting and pedestrian-friendly (Glanz et al., 2012). Speck defines comfortable walking as "buildings and landscape shape urban streets into "outdoor living rooms," in contrast to wide-open spaces, which usually fail to attract pedestrians" (Speck, 2013, p. 10). Carmona et al. define and explain the meaning of comfort in space: if people can see into an area before they enter it, they can judge whether they would experience comfort, welcome, and protection there. Comfort is a prerequisite for profitable public spaces. The length of time people remain in an open space is a feature and an indication of its comfort (Carmona et al., 2010).

In the case of urban streets, being comfortable requires being able to travel from one location to another without becoming mentally and physically discomfited. Comfortable streets are streets that are quiet, accommodating, and pedestrianised and have appropriate facilities and services (Burton & Mitchell, 2006).

Streets and pavements should be designed to make walking easy and comfortable for pedestrians. Carmona et al. explain the kind of features that succeed in ensuring comfort if spaces are going to be used. Levels of sunlight, shade, temperature, humidity, rain, snow, wind, and noise define our experience and use of city environments. A quantity of design procedures can help to make walking conditions acceptable, such as the use of buildings, walls, trees, canopies and arcades for shade and shelter. Southworth (2005) also states that pedestrian ways should be continuous, without gaps, and have a moderately smooth surface devoid of holes, bumps, or other inconsistencies that might make walking and wheelchair access troublesome or unsafe.

Temperature plays a fundamental role in pedestrian comfort and is one of the factors people consider in deciding if an environment is walking-friendly. One study explored the combined effects of neighbourhood walkability, temperature and rain on walking time among seniors living in Barcelona, Spain, in which the data was extracted from a project on the related topic and official governmental weather data (Delclòs-Alió et al., 2020). The results of their study revealed a positive association between walking and low temperatures for residents living in areas with low walkability rates. The result from the study showed a positive association between low walking activity associated with low temperature for residents who live in low-walkable areas and a negative association with walking time in the presence of rain in high-walkable neighbourhoods. Without relying on secondary data to understand the concept of walking, one study examined the characteristics and attributes that could promote walking by people's perceptions (Ariffin & Zahari, 2013). They used a survey questionnaire and walkability audit to measure the perception of urban walking environments in Kuala Lumpur and Putrajaya. Based on the questionnaire responses, the findings from this study claimed that weather conditions were the main factor that people considered, with the hot climate acting as a limiting factor that discouraged people. Another study examined residents' perceptions of neighbourhood walkability, physical activity opportunities, food choices, and what factors influence the choice of neighbourhood (Montemurro et al., 2011). The scholars used a focus group to examine the perceptions of participants as to the definition of walkability and what their neighbourhood did to support it. The study confirmed that weather negatively influenced behaviour related to physical activity, confirming that the weather is a major factor and can have a positive or negative influence on pedestrianism.

Many scholars have examined walkability at the macro-scale level of city centres; however, as noted, a Western-centric perspective dominates. In Arabian Gulf countries, the climate is described as subtropical, dry, hot desert, which plays an important factor in considerations of walkability. However, few studies have explored the association between walkability and weather in this region. One study used logistical regression to investigate the effects of the season on walking behaviour based on the type of walker (family, single, varied, couples) and time of day (Shaaban et al., 2018). The model was developed to predict the probability of pedestrians walking at a particular time. Based on observational surveys in a high-density mixed-use neighbourhood area in Qatar city centre, the study's results suggested that more people walked longer distances in winter on weekdays, preferably during evening times and in the morning. However, the purpose of walking and transport mode was not among the variables considered in this study, but doing so would have generated more insights into the topic (Shaaban et al., 2018). No study has been conducted on walkability in hot, arid environments during large-scale religious events such as Hajj and Umrah. To fill this gap, this study examines pedestrian perceptions and behaviour when walking in the centre of the Saudi Arabian city of Makkah, one of the holiest places in the Islamic world.

The previous discussion has shown that, in addition to the climate, the quality of the environment and the physical arrangement of urban features have a significant impact on the comfort of pedestrians. Physical features and conditions are thus considered in this study, together with weather, in order to understand the influence of walkability features on pedestrian comfort while walking.

3. Methodology

Pedestrian experience and walking behaviour in the study area are examined using observations, interviews, and face-to-face questionnaires. The study employs a mixed-methods approach

with both qualitative and quantitative data collection. A qualitative method – direct on-site observations - was used to collect data related to walking behaviour and the physical dimension of the space. This method is mostly used in built environments and behaviour studies. Maps and photo documentation were also used to identify the relationship between behaviour and the physical characteristics of the space. Together with the field notes, photos were used to record information.

A questionnaire survey with a sample size of 400 was used on randomly selected visitors and residents. The questionnaires were used to identify pedestrians' needs and their evaluation of the built environment. The sample comprised both residents of Makkah and pilgrims visiting the city for religious purposes. The respondents had different demographic backgrounds, allowing the study to identify the extent to which visitors and residents may perceive the factors contributing to exploring walkability in Central Makkah. Note that the findings presented in the following section are necessarily a selection from a much larger data set.

Figure 1. The study area – central Makkah (Source: Google Earth)

4. Findings

Central Makkah's high-density development and congested streets make it almost impossible to have a pleasant walking experience. As it is a central and important site, this area should be one that facilitates and supports pedestrian comfort. In the current study, the respondents' satisfaction levels on comfort were calculated to determine the current state of this pedestrian environment. Attributes associated with comfort that play significant roles in supporting walkable streets are covered ways, pavement width, and places to sit and relax.

Figure 2 shows that most respondents (304) answered that 'trees' would make their walking experience more attractive, enjoyable and comfortable. Given the hot and sunny climate, this shows how shade is necessary to incentivise people to walk. Currently, central Makkah's streets and pavements lack trees. 'Canopies' were the second factor mentioned for providing shade, chosen by 276 respondents. 'Places to sit and relax' was the third most mentioned factor that affects people's perceptions of walking on central Makkah's streets, again likely due to the effect of the high temperatures on physical activity. 'Pavement width' was the fourth factor that the participants cited to make the pedestrian experience more comfortable. 'Fountains' was the least recorded factor chosen to make the walking experience more attractive, enjoyable and comfortable.

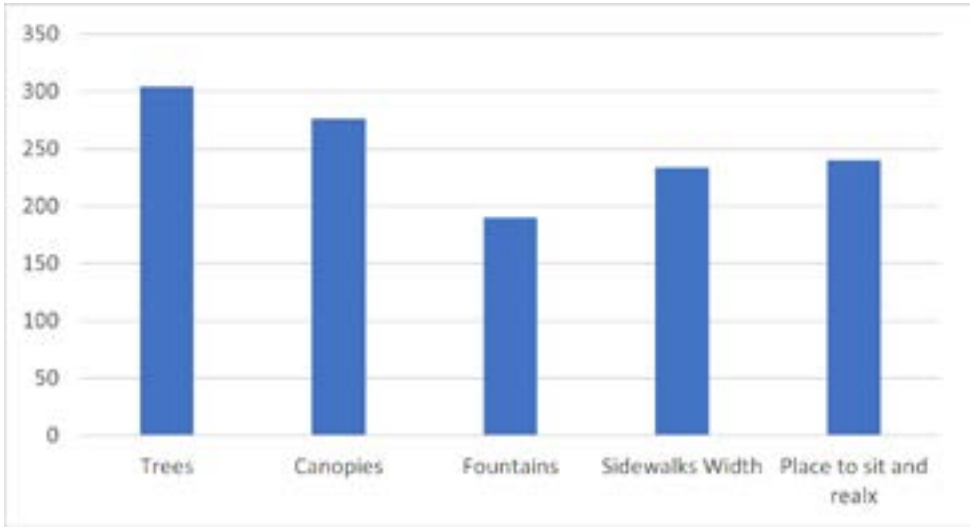

Figure 2. Users' perceptions of the attributes that contribute to comfortable walking

4.1. Covered Ways, Shade and Other Protection from the Sun

Sheltered pedestrian walkways can be split into two categories – trees which provide shade and covered walkways. In the case of central Makkah, there are only two streets that are covered walkways. Similarly, the number of streets that offer tree protection from the sun is also limited to two places, neither of which, in the eyes of the respondents, provide sufficient shelter from the weather. Clearly, there is an urgent need for more sheltered spaces and streets where people can walk without being concerned about the weather.

Based on the interviews, it is clear that the existence of trees/greenery has a positive influence on the environment in terms of changing the microclimatic effect, providing shade from the sun and also serving as dividers between pedestrian walkways and the flow of traffic. This finding is supported by observations in central Makkah, where more pedestrian-friendly activities can be observed in places with palm trees planted.

Figure 3. Pedestrians protect themselves from the sun by using their belongings (Source: Author)

4.2. Pavement Width

The width of walkways additionally influences pedestrians' sense of comfort. Based on the observations, central Makkah's streets have narrow sidewalks that may be dangerous for walkers and make them less attractive (see Figure 5).

According to the survey, pedestrians' satisfaction with pavement width was low, and the pavements were deemed not to meet the comfort needs of pedestrians in the Masjid Al Haram area. The result shows that 60% of the responses expressed dissatisfaction with pavement

width, 19% had a neutral view, and 21% were satisfied.

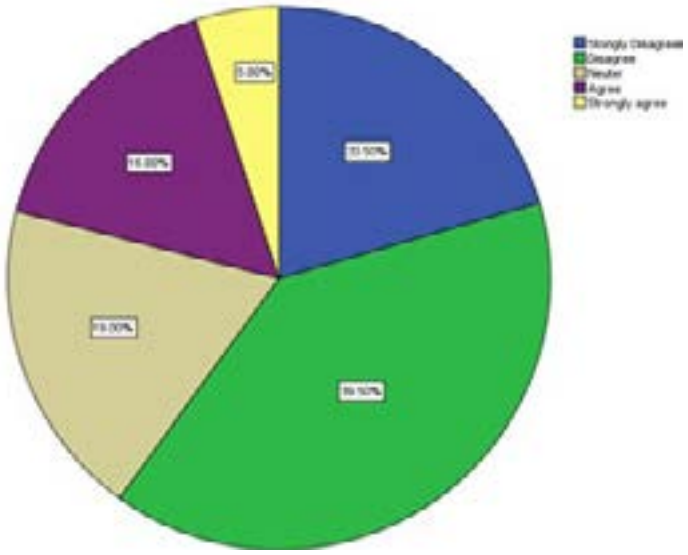

Figure 4. Users' satisfaction with pavement width on central Makkah's streets

In the case of central Makkah, people feel that they are being pushed to walk on the streets, at risk of coming into contact with vehicles, as the walking infrastructure is insufficient for them to walk. Another effect of inadequate pavement width is that if no alternative is available to walk on, people may resort to pushing and jostling (Risser & Šucha, 2020).

Figure 5. Central Makkah's narrow pavements (Source: Author)

4.3. Places to Sit and Relax

Most of the respondents felt that central Makkah's pavements were not designed in a way to encourage walking for social interaction. First and foremost, the pavements lacked seating where people could relax and interact with other pedestrians. Finally, there was a lack of social activities to bring people together and enhance interaction. In the interviews, most respondents mentioned the need for places where people could sit and rest, such as chairs or benches.

The observations confirmed this finding, revealing that most participants believed that pavements were not designed in a way that invites pedestrians to socialise. The lack of seats where pedestrians can relax and interact with each other was noted. People tended to sit on stairs and even on the curb to catch their breath or relax, often without paying attention to other walkers or vehicles, raising the issue of danger.

Although pilgrims' journeys from their residences/hotels to their destinations differed from person to person, according to the survey results (see Figure 6), pedestrians' satisfaction with public facilities, such as seating/rest areas, was low, at 72.5%, in and around the Masjid Al Haram

area, including about places to sit and relax.

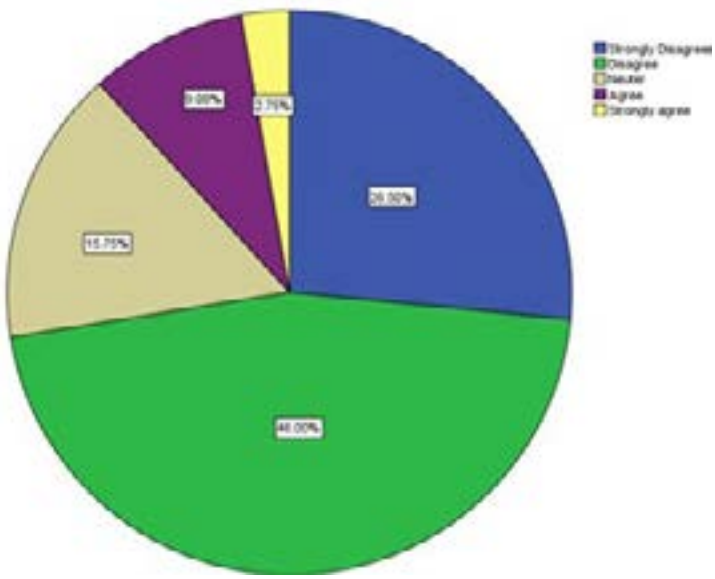

Figure 6. Users' satisfaction with pavement width on central Makkah's streets

5. Conclusion

This study's findings reveal similar results in terms of user needs for walkable urban streets in Saudi Arabia to the needs of people in urban public places in other countries. However, in terms of the level of importance of the factors that make for walkable streets, the findings of this study differ from those of previous studies. Comfort attributes influence walking choices for visitors, where certain experiences and behaviours occur in response to the physical environment in the central Makkah area. This may relate to the environment, the climate, or the culture of the place. It was found that, in the case of central Makkah's streets, issues relating to street design, especially the width of pavements and vendors on most sidewalks and a lack of covered pathways (trees/canopies) are serious. These factors contribute to the crowdedness of streets, making them uncomfortable for walking and even leading to feelings of stress. Pleasant environments for walking may encourage visitors to walk and experience the centre of Makkah with ease and comfort. The city's urban designers should consider what is going on in the minds of its residents and visitors, considering the criteria that motivate them to want to walk but which still prevent them from doing so: the climate, personal safety, and comfort.

Conflict of Interests

The author declares no potential conflict of interest was reported by the author.

Endnotes

This paper has been presented at the SPACE International Conference 2021 on City Planning and Urban Design.

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