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Walkable Environment: Building resilient and healthy cities post-pandemic

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Abstract

This paper explores the urban population's walking behaviour and mobility pattern within a walkable environment in response to the COVID-19 pandemic in the selected neighbourhood in Klang Valley, Malaysia. Data was collected through an online questionnaire survey. The key findings revealed that the pandemic limits pedestrian movement and changes their travelling methods due to the Malaysian Movement Control Order (MCO). As a result, walking and public transportation usage have declined due to the fear of proximity to public areas. Hence, further recommendations are required to ensure walking sustainability for daily routines whilst promoting resilient and healthy cities.

Keywords: Walkable environment, resilient, healthy city, COVID-19 pandemic

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1.0 Introduction

The Coronavirus disease (Covid-19) has affected almost all aspects of our lives; economically, socially, and environmentally. The Covid-19 pandemic has significantly changed the way of living and our cause for social interaction. It has forced the world to take precautionary measures to reduce the spread of the virus by limiting social contact and complying with the three C's: crowded places, closed spaces, and close-contact settings. In supporting public health measures and reducing the risk of infections, we need to build resilience in building better cities post Covid-19. For example, in Malaysia, the activation of the movement control order (MCO) has forced the nation to limit physical movements and interactions that have led to the change in the way people use urban spaces, including pedestrians, walkways, and open areas.

A walkable environment refers to pedestrian-friendly neighbourhoods with easy access to local amenities and well-designed public open spaces. Fostering a walkable environment to build better cities Post Covid-19 pandemic is timely and highly supported by The World Health

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Organization (WHO). WHO provides guidelines on mobility during the COVID-19 outbreak by encouraging the building of more spaces for cyclists and pedestrians, especially in densely populated urban areas, to avoid the overloading of public transport and the use of private vehicles. Therefore, this paper aimed to explore the walking behaviour and the mobility pattern of urban populations in response to the COVID-19 pandemic. The study also aimed to understand how the pandemic has changed the mobility pattern by focusing on the urban population's walking behaviour. Hence, the paper's objectives are (i) to explore the walking behaviour and the mobility pattern of urban populations in response to the COVID-19 pandemic and (ii) to assess how walkable environments have contributed to the compliance of the three C's in our daily lives. The focus of the study is the urban neighbourhood in Klang Valley, Malaysia. The study also highlights the walkable environment and the aspects of a healthy city in Indonesia during pandemics.

2.0 Relationship between Walkable Environment and Healthy City

Walking is the primary mode of transportation, and it has proven to have environmental, health, and mental benefits. Previous studies have explored the relationship between a walkable environment and aspects of health to capture the implications to establish healthy cities (Pakoz and Isik, 2022; Hao Zhouet al., 2019; Silveria and Motl, 2019; Nasrudin et al., 2018). In Malaysia, the concept of a healthy city has been acknowledged to enhance the quality of life and improve the community's well-being. Boabeid et al. (2021) highlighted the significant potential of walking towards creating a healthier community due to its low-intensity physical activity suitable for all age groups (Pandit et al., 2020). The study further assessed the relationship of walkability with sustainability and livability as an indicator of quality of life (Boabeid et al., 2021; Roe and Aspinall, 2011). A walkable environment is associated with a higher likelihood to spend time outdoors, which is very important to achieving a better quality of life, particularly during the pandemic era (Pandit et al., 2020; Sanusi et al., 2021). The implementation of Healthy Cities in Indonesia is referred to the Minister of Home Affairs and the Minister of Health regulation (Ministry of Home Affairs and Ministry of Health, 2005). It is defined as consolidating all-related actors to enhance community welfare by providing a clean, comfortable, safe, and healthy environment. However, realising a healthy city in Indonesia is challenging, particularly in big cities experiencing urbanisation, increasing the population, affecting land availability, thus hampering the provision of basic urban infrastructures (Darmajanti, Tampi, & Fitritita, 2021).

Furthermore, walkability is one of the livable city indicators that indicate the community actively moves to avoid diseases such as obesity and other degenerative disorders (Wimbardana, Tarigan, & Sagala, 2018). Therefore, a good street design and pedestrian facilities are necessary to actualise walkability and meet a healthy city framework. Later, these built environment interventions will change community behaviour as land use, connectivity between areas (accessibility), and the availability of supporting infrastructures determines the walkability in livable cities (Kato & Matsushita, 2021; Louro et al., 2019).

The challenges toward healthy cities are becoming more prominent today, where exposures from the COVID-19 pandemic disrupt community's lives. For example, the pandemic has changed the community's daily habits by wearing masks, maintaining distance, and reducing mobility. Likewise, "stay at home," as a tagline often called for, affects the spatial connection and increases local movement intensity, revealed by increased walking and cycling, reducing car dependency (Kato & Matsushita, 2021; Louro, Costa, & da Costa, 2019). Nonetheless, restriction on physical activities due to pandemics has a positive impact, such as lowering air pollution and improving air quality (Anugerah, Muttaqin, & Purnama, 2021). However, the air quality improvement in major cities in Indonesia is temporary; after the government revokes the restrictions, the situation gets back to the previous condition before the pandemic (Anugerah et al., 2021). This situation is similar in Malaysia when the environmental quality was reported to improve significantly during the early phases of MCO (mainly between the first quarter of 2020 and the second quarter of 2021). Changes in the travel pattern were also noticeable, with a significant reduction in private vehicle usage and increased local travel, mainly for grocery shopping. In addition, the use of pedestrian paths, public open spaces, and other amenities within local neighbourhood areas recorded a drastic increase in usage (Villani et al., 2021). Furthermore, the travel restrictions during the pandemic have resulted in changes in travel behaviour. People perceived high risk for all types of trips and avoided travelling to medium to high-risk places (Abdullah et al., 2020).

3.0 Methodology

To achieve research objectives, this study adopted a quantitative method. According to Lupton (2021), isolation measures to curb the spread of COVID-19 mean social researchers should consider ways to avoid personal interaction or face-to-face by using an intermediate form (digital or non-digital) that will achieve the research objectives. Therefore, the data were collected via an online questionnaire survey form and distributed among urban populations in the Klang Valley region, Malaysia. The survey distribution occurred between June and September 2021, during the third phase of Malaysia's Movement Control Order (MCO). During this time, movement restrictions have been relieved as the COVID-19 vaccination rates increases allowing more travelling.

This research adopted probabilistic sampling involving randomly chosen samples with a particular characteristic to represent a large population (Creswell, 2008). Besides, the National Survey of Pedestrians (2002) used this technique. It is noted that the random approach can also reduce any biases from researchers. This study also has to consider the limitations in obtaining qualitative data from field observation (due to MCO restrictions) to investigate the phenomena in the study area and to support the quantitative data. Therefore, this study only adopted a quantitative method approach through an online questionnaire survey. However, to get a profound finding, Chi-Square Test was employed to test the significance level and Cramer V or Spearman R to test the degree of the relationship for the analysis of the questionnaire.

The online questionnaire survey aimed to understand the impacts of the COVID-19 pandemic on the walkable environment and active living among urban populations. In addition, the survey also aimed at exploring travel behaviour and the changes before and during the COVID-19 pandemic. The questionnaire survey using the Google Forms platform was utilised (Lupton, 2021) and was divided into five sections as follows: 1. Socio-demographic profile, 2. Health status, 3. Travel behaviour before and during the COVID-19 pandemic, 4. Perception of a walkable environment amidst the pandemic and, 5. Aspiration for better walking environment post-pandemic for better active living.

4.0 Findings & Discussions

4.1 Socio-demographic Profile and Health Status

Table 1 summarises the respondents' socio-demographic profiles who participated in the online questionnaire survey conducted between June and September 2021. Within the three months, 60 respondents responded to the online survey, distributed via email and text messages. Respondents reside within urban residential areas within the Klang Valley, Malaysia. In addition, 60 respondents, 55% were male, and 45% were female. In terms of age group, most of the respondents fall between 21 to 44 years accounting for 81.6%.

Table 1: Socio-demographic Profile of the Respondents

Variables	N=60	Percentage
Gender		
Female	27	45.0
Male	33	55.0
Age Group		
20 to 34	24	40.0
35 to 44	26	43.3
45 to 54	7	11.7
55 to 65	2	3.3
Household Size		
1 person household	6	10.0
2-person household	6	10.0
3-to-5-person household	26	43.3
More than 5-person household	22	36.7
Residential Location		
Urban	30	50.0
Semi-urban	25	41.7
Rural	5	8.3
Employment Status		
Essential worker	17	28.3
Non-essential worker	31	51.7
Still studying	10	16.7
Not working/ Retired/ Unemployed	2	3.3
Household Income		
Less than RM2500	8	13.3
RM2500 -RM5000	18	30.0
RM5000 - RM10000	21	35.0
RM10000 and above	13	21.7

Table 2 presents the health status of the respondents. Only a small percentage of 15% of the respondents were currently dealing with chronic diseases. The respondents reported experiencing an infrequent occurrence of sickness and chose walking as the primary physical activity to adopt a healthy lifestyle. This finding corresponds to previous studies on an optimistic assumption that walking can create a healthier community due to its low-intensity physical activity, which is suitable for all age groups (Boabeid et al., 2021).

Table 2: Health Status of the Respondents

Health Status (Dealing with Chronic Disease)	N	Percentage
Yes	9	15.0
No	51	85.0
Frequency of Getting Sick		
Very rare (2-4 times/year)	27	45.0

Rarely (2-4times/6 months)	24	40.0
Often (2-4 times/3 months)	7	11.7
Very Often (2-4 times/month)	2	3.3
Means of Adopting Healthy Lifestyle		
Walking	26	43.3
Exercising	19	30.0
Cycling	7	11.7
Others	8	13.3

4.2 Mobility Pattern

Table 3: Relationship between Mobility, Frequency and Purpose

	Work-related purposes		Shopping		Leisure and recreational		Visiting Family and Friends	
	Before Pandemic	During Pandemic	Before Pandemic	During Pandemic	Before Pandemic	During Pandemic	Before Pandemic	During Pandemic
More often	30	1	14	2	16	2	23	0
Often	20	10	33	10	31	6	30	6
Less often	6	38	13	38	12	29	7	30
None	4	11	0	10	1	23	0	24
Total	60	60	60	60	60	60	60	60

Table 3 reports the mobility pattern and the purpose of activities before and after the COVID-19 pandemic. The majority of respondents before the COVID-19 pandemic more often travel for work-related purposes (50%, N=30). Compared to during the COVID-19 pandemic, the results show a drastic decrease. There was only 2% (N=1) person travelled for work-related purposes. The pandemic has changed the community's daily habits from working at the office to working from home or "stay-at-home". It affects the spatial connection and increases local movement intensity, revealed by increased walking and cycling, reducing car dependency (Kato & Matsushita, 2021; Louro, Costa, & da Costa, 2019). However, during the COVID-19 pandemic, 63% (N=38) mobility pattern of respondents still choose to travel or less often travel for work-related and shopping purposes (see Figure 2). It shows that even though the government call for "stay-at-home", respondents are still willing to travel for work-related and to buy their needs of groceries by wearing masks, maintaining social distances, and reducing mobility.

4.3 Walking Behaviour

There are three (3) types of activities respondents choose to walk based on three (3) different conditions, which are before the COVID-19 pandemic, during the COVID-19 pandemic (Movement Control Order /MCO) and during the COVID-19 pandemic (Movement Control Order /MCO to Lockdown). Therefore, Table 4 shows walking behaviour patterns related to activities before the COVID-19 pandemic, during the Covid-19 pandemic (MCO) and during the Covid-19 pandemic (MCO to Lockdown).

Table 4. Relationship between Walking Behaviour Pattern and Purpose of Travelling

	Work-related purposes			Shopping			Leisure and recreational		
	Before Pandemic	MCO	MCO-Lockdown	Before Pandemic	MCO	MCO-Lockdown	Before Pandemic	MCO	MCO-Lockdown
Everyday	14 (23%)	5 (8%)	3 (5%)	2 (3%)	0 (0%)	0(0%)	6 (10%)	1 (2%)	1 (2%)
3-4 times per week	9 (15%)	9 (15%)	1 (2%)	17 (28%)	3 (5%)	5 (8%)	17 (28%)	6 (10%)	5 (8%)
2-3 times per week	13 (22%)	7(12%)	13 (22%)	21 (35%)	14 (23%)	8 (13%)	23 (38%)	12 (20%)	7 (12%)
1 time per week	10 (17%)	14 (23%)	11 (18%)	13 (22%)	25 (42%)	21 (35%)	7 (12%)	20 (33%)	16 (27%)
None	14 (23%)	25 (42%)	32 (53%)	7 (12%)	18 (30%)	26 (43%)	7 (12%)	21 (35%)	31 (52%)
N=	60	60	60	60	60	60	60	60	60

Before the COVID-19 pandemic, 23% of the respondents chose to walk every day and not for work-related purposes. It shows that respondents decide to walk because of the limited mode of transport option and walk because they have to choose to use a private vehicle (67%, N= 40), as shown in Figure 1. However, 42% (N=25) during the COVID-19 pandemic (MCO) and 53% (N=32) during the COVID-19 pandemic (MCO to Lockdown) respondents are slowly increasing not choosing to walk for work-related purposes.

In Table 4, walking behaviour patterns for shopping purposes actively happen 2-3 times per week 35%% (N= 21) before the COVID-19 pandemic and one time per week 42%% (N= 25) during the Covid-19 pandemic (MCO). The result shows shopping activity slowly inactive, which is 2-3 times per week to only one time per week. It shows that respondents comply with the Standard Operating Procedure (SOP) to do shopping activities. Indeed, 43% (N=26) of respondents choose not to walk during the Covid-19 pandemic (MCO to Lockdown). The result shows that respondents are more concerned with the infectious rate of COVID-19, and the government began to impose stricter movement control orders. The walking behaviour related to leisure and recreational purpose actively happened 2-3 times per week, 38% (N= 23) before the COVID-19 pandemic. The result shows that leisure and recreational activities were inactive during the Covid-19 pandemic (MCO) and the Covid-19 pandemic (MCO to Lockdown). Walking for shopping was reported to actively happen 2-3 times per week before the pandemic and has decreased to one time per week (42%) during the pandemic.

4.4 Walking Behaviour within the Neighbourhood Area during Pandemic COVID-19

Table 5. Walking Behaviour Pattern in Neighbourhood Area During Pandemic COVID-19

Walking Behaviour Pattern		
	Frequency	Percent (%)
Everyday	4	7
3-4 times per week	12	20
2-3 times per week	20	33
1 time per week	16	27
None	8	23
N	60	100

Table 5 shows walking behaviour patterns in neighbourhood areas during pandemic COVID-19. The majority of respondents choose at least one time per week to walk in neighbourhood areas during pandemic COVID-19 which are 33% (N=20) walk 2-3 times per week, 27% (N=27) walk one time per week, and 20% (N=20) walk 3-4 times per week. The finding shows that most respondents choose to walk within the neighbourhood area even during the pandemic COVID-19.

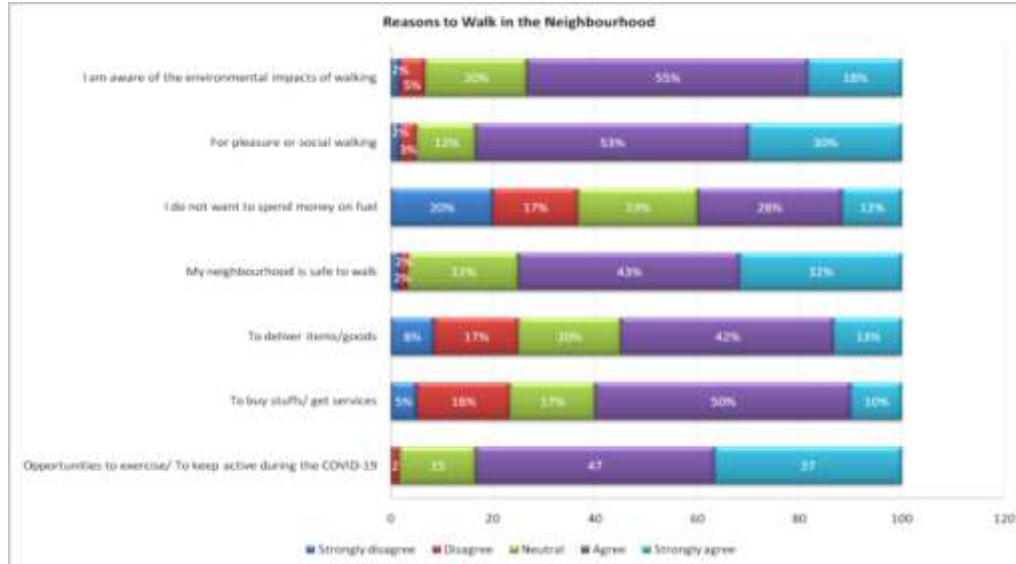


Fig.1: Reasons to walk in neighbourhood area

Figure 1 shows the walking behaviour pattern in neighbourhood areas during pandemic covid-19. Most respondents choose to walk in the neighbourhood area during the COVID-19 pandemic because of the awareness of the environmental impacts of walking (55%, N=33). On the other hand, there are 53% (N=32) chose to walk in the neighbourhood area during the COVID-19 pandemic for pleasure or social walking (50%, N=30), to keep active during the COVID-19 (47%, N=28), safe to walk (43%, N=26), to deliver items/ goods (42%, N=25) and do not want to spend money on fuel (28%, N=17). The result shows that respondents are aware and concerned about having a healthy lifestyle.

Figure 2 shows the places that can be reached by walking in the neighbourhood area. Most of the respondents agreed that the prominent place to have a walk is a recreational open space or playground (80%, N=48). Other land use activities were reported below 50% except for mosque or musolla or surau 78% (N=47). Therefore, the respondents are willing to walk to the recreational open space, playground and Muslim religious places.

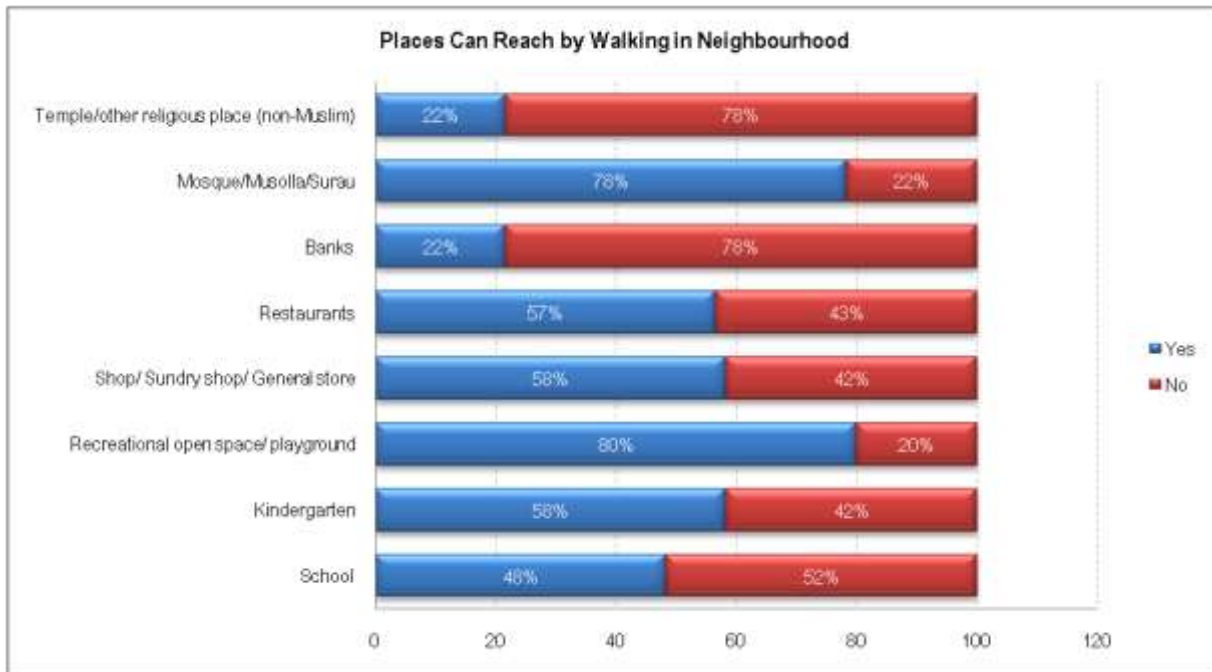


Fig. 2: Places that can reach by walking

4.5 Walkable Environments Have Contributed to the Compliance of the Three C's in Our Daily Lives

4.5.1 The Factors Encouraged Walking in Neighbourhood Area

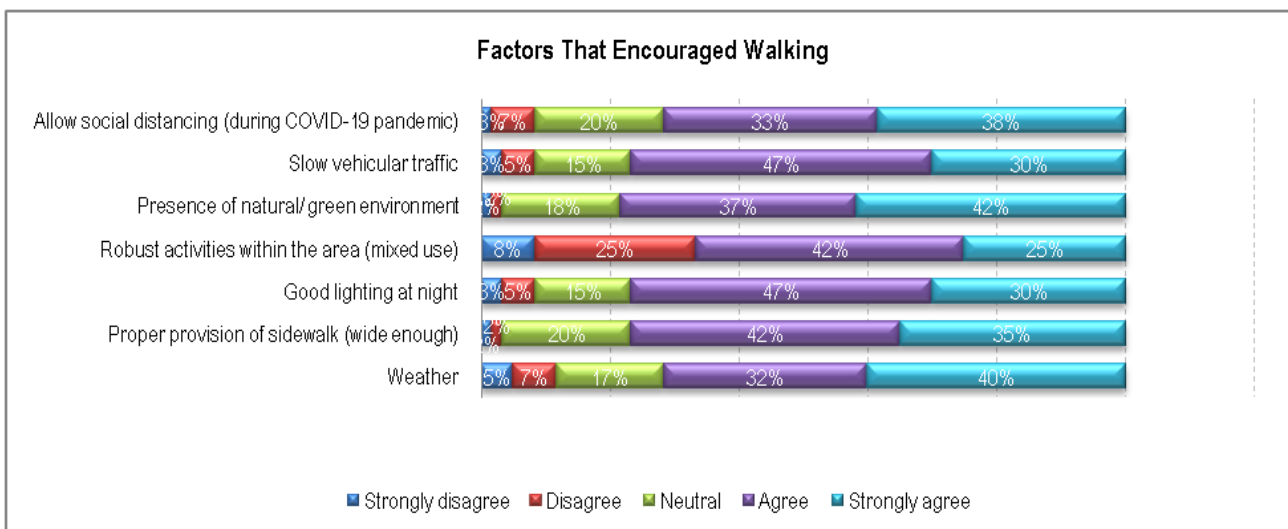


Fig. 3: Factors that encouraged walking

Figure 3 shows the factors that encourage walking is a green environment 42% (N=25), weather 40% (N=24), allowing social distancing 38% (N=23), proper provision of sidewalk 35% (N=21), slow vehicular traffic and good lighting at night 30% (N=18) and mix-use within the area 25% (N=15). Therefore, the respondents strongly agreed that the environment is vital in encouraging them to walk within the neighbourhood area.

4.5.2 The Factors Prevented Walking in Neighbourhood Area



Fig. 4: Factors that prevented walking

Figure 4 shows the factors that prevented walking failed to comply with social distancing 52% (N=31), weather too hot 48% (N=29), no proper provision of the sidewalk or improper sidewalks with car lanes 42% (N=25), high vehicular traffic 40% (N=24), poor lighting at night 37% (N=22), poor maintenance 33% (N=20) and shops/services are not accessible by walking 32% (N=19). The respondents strongly agreed that the setting in terms of comfort plays a vital role in encouraging them to walk within the neighbourhood area. Therefore, a Chi-Square Test was employed to test the significance level of the frequency of factors that prevented walking. The result of the significance level indicates a value of $p < .05$ ($p = .002$ to $p = 0.001$ for all aspects). Hence, it depicts a strong relationship ($r = .849$) between improper sidewalks with car lanes and high vehicular traffic.

4.5.3 The Aspiration for Better Walking Environment in Neighbourhood Area

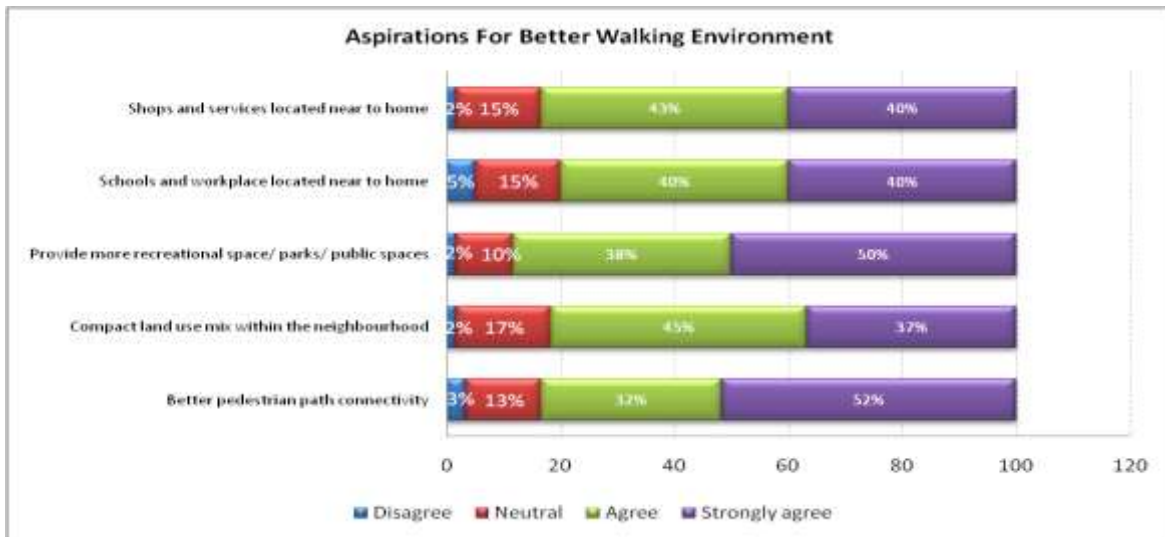


Fig. 5: Aspirations for Better Walking Environment

Figure 5 shows the aspirations for a better walking environment. The majority of the respondents agreed to aspire for better pedestrian path connectivity 52% (N=31). The respondents agreed to provide more recreational spaces by 50% (N=22). Below than 50% of respondents

agreed shops, schools, and workplaces are to be located near home (40%, N=24) and compact land use mix within the neighbourhood (37%, N=22). The finding shows that having a walkable environment with accessible recreational space is essential for a better quality neighbourhood, which corresponds to previous research conducted by Kato and Matsushita (2021), Sanusi et al. (2021) and Louro et al. (2019).

5.0 Discussion and Conclusions

The findings of this study have the potential to facilitate the process of designing and planning better cities post-pandemic to ensure the resilience of the urban spaces' walkable environment and to contribute to a better healthy city. This is crucial as we need to adapt to the new normal as we progress towards the endemic phase. Indefinitely, COVID-19 has impacted the mobility pattern of urban populations. During the MCO, most of the travelling and walking was for shopping and recreation. The drastic reduction was reported for working purposes as most people had the option to work from home during the pandemic.

Walking in the residential neighbourhood areas seemed to be well-practised by the respondents, with more than 70% were reported to do so at least once a week similar to the findings obtained by Villani et al., (2021). This corresponds to the potential of walking outdoors positively impacting health and mental well-being (Sanusi et al., 2021). Nonetheless, the study also reported that the two main destinations that can be reached within walking distance are the musolla (surau) and recreational areas such as the playground. The study also captured the respondents' aspirations for a better walking environment. Having more quality recreational spaces and parks and provide better pedestrian paths were among the factors that the respondents wished for. Hence, design and planning interventions to offer a better walkable environment and a pandemic-resilient city need to be taken more seriously by all stakeholders in planning for pandemic-resilient cities.

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Paper Contribution to Related Field of Study

The expected contribution of this study is to contribute to the existing body of knowledge on the planning and designing better cities post-pandemic particularly in relation to achieving a walkable, healthy and pandemic-resilient city.

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