



Urban Environment and Physical Activity of Petaling Jaya Residents

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Abstract: Physical activity and active lifestyle are imperative for good health. However, rapid urbanisation has prompted a significant decline in physical activity, particularly among those living in cities. Past studies have mainly focused on personal and social variables, built environment features, and green space features when examining how urban green spaces affect physical activity. Nevertheless, the statistical relationship between urban environment and physical activity remains unexplored, especially in the context of Malaysia. This study aims to address such gap by examining the relationship between urban environment and residents' physical activity in Petaling Jaya, Selangor. Urban environment was evaluated based on four (4) indicators, namely green areas, sports facilities, facilities convenience, as well as the safety and distance to access the facilities. The data were obtained through observation and mapping the radius between the green areas and sports facilities to the neighbourhood area. Whereas, physical activity was evaluated based on the frequency and duration of two types of physical activity, namely vigorous activity and moderate activity. The data were obtained through a questionnaire survey, which were later analysed using frequency and cross-tabulation via the IBM SPSS Statistics software. The results showed that sections with more green areas and sports facilities as well as convenient environment tend to have active respondents. Meanwhile, sections with no green areas nor sports facilities still produced active respondents as they were willing to travel to nearby sections with green areas and sports facilities. The findings of this study hope to assist stakeholders, especially city planners, in improving urban environment for a healthier community.

Keywords: Physical activity, urban environment

1. Introduction

Recent decades have witnessed a global acceleration of urbanisation with approximately 56.2% of the world's population currently reside in urban areas (UNDESA, 2020). Despite its advantages, urbanisation that occurs along high-density development will reduce the percentage of open land and vegetation areas (Mohd Azhar et al., 2017). Moreover, rapid modernisation has changed the lifestyle and practices of the global population, including Malaysia (Sook et al., 2019). The Malaysian National Health and Morbidity Survey (NHMS, 2015) reported an alarming rise of non-communicable diseases (NCDs) in the country, which is largely due to poor lifestyle choices like unhealthy food consumption behaviours as well as the lack of sleep, physical activities, and peace of mind. Such trend is worrying as

NCDs, such as diabetes, hypertension, and high cholesterol, are major risk factors for cardiovascular diseases (CVDs), which are the leading causes of death in Malaysia (NHMS, 2019).

According to Mansor and Harun (2014), living an active lifestyle is imperative in the effort to combat NCDs, particularly among urban residents, as it allows the upkeep of their physical and mental health and prevents them from chronic diseases. Past research denotes that physical activity plays an important role in maintaining physical and mental health (Buck et al., 2019) and that its insufficiency can be a main risk factor for developing NCDs (Boone-Heinonen et al., 2010). Additionally, the availability of facilities like parks, playgrounds, or vegetation in public and private places stands as a central component to promote an active lifestyle that can help to improve residents' health and well-being (WHO, 2017).

Many studies have investigated the association between neighbourhood-built environment attributes and the physical activity of residents, with evidence accumulating towards the health benefits of living in higher-density neighbourhoods with well-connected street networks and pedestrian access to various amenities (Mavoa et al., 2019). Previous studies on the influence of urban green spaces towards physical activity have mainly discussed factors such as personal and social attributes, built environment characteristics, and green space characteristics. Furthermore, aspects like gender, age, social status, income, and religious belief also affect the frequency of people entering green spaces for physical activity (Niu et al., 2022). However, there is a lack of research that focuses on the relationship between urban land use and physical activity (active lifestyle) in Malaysia. Thus, this study aims to investigate the relationship between urban land use and physical activity in Petaling Jaya City, Selangor.

2. Literature Review

Physical activity generally refers to any bodily movement that requires energy expenditure, such as walking, running, exercising, and playing sports. It is propounded as a crucial component for preserving both physical and mental health (Buck et al., 2019). The Physical Activity Guidelines for Americans (DHHS, 2008), as cited by the Malaysian Dietary Guidelines, suggest for an individual to engage in physical activity for at least 150 minutes (5 days x 30 minutes per day) of moderate-intensity or 75 minutes a week of vigorous-intensity aerobic physical activity for substantial health benefits. Past research posits that insufficient physical activity is one of the major risk factors for the development of NCDs (Boone-Heinonen et al., 2010). Furthermore, the lack of physical activity illustrates the citizen's inactive lifestyle that may affect their health (Siti Nur Afifah et al., 2015), subsequently imposing a significant strain on the national economy (WHO, 2019).

Among the factors affecting individuals' decision to conduct physical activity include personal traits, the environment, and societal structures (Lee et al., 2012). Additionally, the level of physical activity can be influenced by land use and urban area design (Siti Nur Afifah et al., 2015) as well as park quality (Rosli et al., 2020). Other researchers (Macovei, Tufan, & Vulpe, 2014) have also used physical activity as an indicator to measure a healthy lifestyle. According to Gadais et al. (2018), among the major components of health include physical activity and nutrition. There are also studies that looked on how the built environment affects recreational physical activity behaviour, with a specific focus on the improvements of green spaces and parks (Cohen et al., 2015; Tester et al., 2009), the development of new parks (Andersen et al., 2017; Cohen et al., 2014; King et al., 2015), and the installation of outdoor PA equipment (Dowda et al., 2020; Ng et al., 2020) – all of which were associated with increased physical activity and use of facilities.

Meanwhile, a study by Ling et al. (2020) explored the relationship between physical activity and urban planning by looking at the respondents' frequency and duration of conducting physical activity. Their results revealed that good urban planning promotes active physical activities among residents, thus reducing the risk of poor health. A number of studies have investigated how different urban park types encourage active lifestyles in developed nations. It was revealed that residents in greener areas often engage in more (and occasionally more vigorous) physical activities like cycling and walking (Andersen et al., 2015; Liu et al., 2017; Shanahan et al., 2015a). These findings suggest that the availability of green spaces encourages more physical activities among residents. It further highlights urban green spaces as vital venues for citizens to engage in outdoor physical exercise, particularly in urban parks, squares, campus green spaces, and residential green spaces. This is in line with Devarajan et al. (2020) who recommend the availability of accessible, useable, and safe green spaces and parks within 0.3 to 0.5 km radius from a residential area for public use. Additionally, residents may benefit from urban green areas as it improves the ecological environment by lowering noise level and improving air quality (Niu et al., 2022).

3. Research Method

3.1 Scope of the Study

This study aimed to examine the influence of urban environment on the level of physical activity. Urban environment was measured through four (4) main aspects, namely the distribution of green spaces, sports facilities, the distance of the facilities, and the convenience of accessing the facilities. Meanwhile, the level of physical activity was measured by the respondents' frequency and duration of doing physical activity.

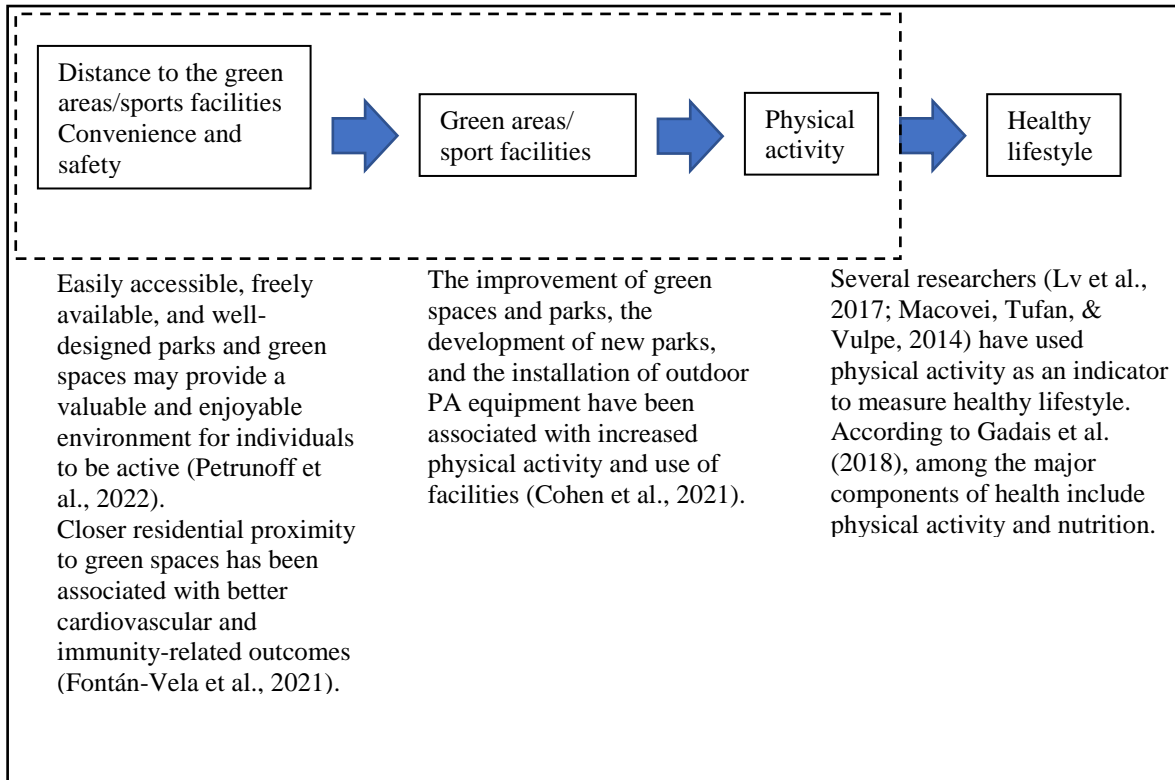


Fig. 1 - Indicator for urban environment aspects

3.2 Case Study

The research area of this study was Petaling Jaya, which is the largest city in the state of Selangor Darul Ehsan and is located in the Petaling District. It comprises a total area of 97.2 km² with Petaling Jaya City Council (PJCC) acting as the local authoritative body. The selection of Petaling Jaya was due to the fact that it is one of the largest cities in Malaysia as well as its suitability to represent urban land use. According to PJCC, Petaling Jaya has a total population of over 619,925 people and 278,800 properties as of July 2022, and the city currently stands as the leading growth centre in Selangor. Seven sections were selected for this study, namely SS 2, SS 4, SS 8, SS 9, Section 3, Section 9, and Section 21.

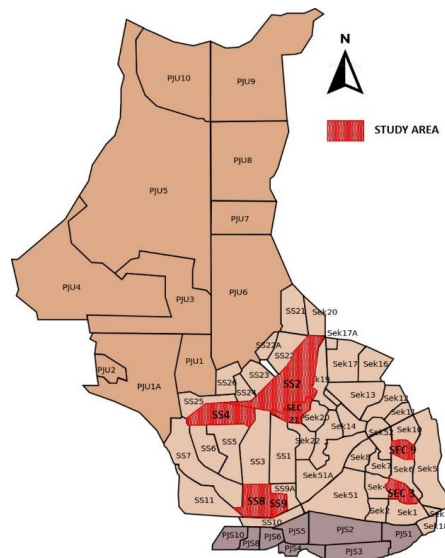


Fig. 2 - Sections selected in Petaling Jaya

3.3 Questionnaire Survey and Sampling of Respondents

The respondents’ level of physical activity was identified through a questionnaire survey, which was administered using stratified convenience sampling. According to the Cochran formula, 384 samples were required for this study; however, only 213 respondents gave their cooperation in answering the questionnaires. This owed to several limitations, particularly the COVID-19 outbreak in 2020 during which this study was conducted. The data collection process took approximately three months and the questionnaire survey was distributed among Petaling Jaya residents with various socio-economic backgrounds. Table 1 shows the respondents’ profiles.

Table 1 - Respondents’ profiles

| | | Frequency | Percentage (%) |
|------------------------------|---------------------|------------------|-----------------------|
| Gender | Male | 120 | 56.34 |
| | Female | 93 | 44.66 |
| | Total | 213 | 100.00 |
| Ethnic | Malay | 101 | 47.42 |
| | Chinese | 79 | 37.09 |
| | Indian | 30 | 14.08 |
| | Others | 3 | 1.41 |
| | Total | 213 | 100.00 |
| Marital Status | Single | 75 | 35.21 |
| | Married | 118 | 55.40 |
| | Divorce | 20 | 9.39 |
| | Total | 213 | 100.00 |
| Age | 20 – 29 years old | 82 | 38.50 |
| | 30 – 39 years old | 63 | 29.58 |
| | 40 – 49 years old | 37 | 17.37 |
| | 50 – 59 years old | 14 | 6.57 |
| | 60 – 69 years old | 11 | 5.16 |
| | 70 years and above | 6 | 2.82 |
| | Total | 213 | 100.00 |
| Educational Level | No formal education | 10 | 4.70 |
| | Primary school | 14 | 6.57 |
| | Secondary school | 74 | 34.74 |
| | University | 115 | 53.99 |
| | Total | 213 | 100.00 |
| Monthly Income | Less than RM 1000 | 1 | 0.47 |
| | RM 1000 – RM 1999 | 35 | 16.43 |
| | RM 2000 – RM 2999 | 62 | 29.11 |
| | RM 3000 – RM 3999 | 33 | 15.49 |
| | RM 4000 – RM 4999 | 12 | 5.63 |
| | RM 5000 – RM 5999 | 4 | 1.88 |
| | RM 6000 – RM 6999 | 1 | 0.47 |
| | RM 7000 – RM 7999 | 0 | 0.00 |
| | RM 8000 – RM 8999 | 1 | 0.47 |
| | No income | 64 | 30.05 |
| | Total | 213 | 100.00 |
| Body Mass Index (BMI) | Underweight | 3 | 1.41 |
| | Normal | 75 | 35.21 |
| | Overweight | 93 | 43.66 |
| | Obesity | 42 | 19.72 |
| | Total | 213 | 100.00 |

Five enumerators, who were Town Planning undergraduates from Universiti Teknologi MARA (UiTM), were recruited to administer the survey at housing and public areas (e.g., playground and neighbourhood parks) across the selected sections in Petaling Jaya. Additionally, a QR code of the questionnaire was distributed to numerous houses in each Section and SS. Table 2 shows the number of respondents for each Section and SS, Table 3 presents the attributes of questions for each section in the questionnaire, and Table 4 illustrates the measurement of urban environment.

Table 2 - Number of respondents based on Section/SS

| SS/Section | No. of House | No. of Respondents | Percentage (%) |
|--------------|--------------|--------------------|----------------|
| SS 2 | 5267 | 32 | 15.02 |
| SS 4 | 1874 | 41 | 19.25 |
| SS 8 | 608 | 34 | 15.96 |
| SS 9 | 429 | 31 | 14.55 |
| Section 3 | 644 | 34 | 15.96 |
| Section 9 | 429 | 9 | 4.23 |
| Section 21 | 1814 | 32 | 15.02 |
| Total | | 213 | 100.0 |

Table 3 - Attributes of the questions

| Section | Attribute | Type of Variable in the Question |
|-----------------------------|---|----------------------------------|
| Respondents' Profile | Gender | Nominal and interval |
| | Ethnic | |
| | Marital status | |
| | Age | |
| | Educational level | |
| | Monthly income | |
| | BMI | |
| Physical Activity | Frequency of moderate and vigorous activity | Likert scale |
| | Duration of moderate and vigorous activity | |

Table 4 - Measurements on urban environments

| Section | Attribute | Measurement |
|----------------------------------|---|--|
| Urban Environment Aspects | Distribution of green spaces | Based on mapping (i-Plan by PLANMalaysia) |
| | Distribution of sports facilities | Based on mapping (Google Map) |
| | Facilities convenience and safety in the neighbourhood area | Observation of the research area |
| | The distance between green spaces and sports facilities | 500-meter radius from green areas/sports facilities to the neighbourhood |

3.4 Method of Analysis

All data regarding the respondents' level of physical activity were analysed using frequency and cross-tabulation via the IBM SPSS Statistics software. Meanwhile, urban environment was measured based on the distribution of green spaces and sports facilities, the facilities' convenience and safety in the neighbourhood areas, and the distance of the green spaces and sports facilities (see Table 4). The urban environment, including land use (PLANMalaysia I-PLAN, 2023), was compared to the level of physical activities among residents in Petaling Jaya to analyse the association between urban environment and the level of physical activities.

4. Results and Findings

4.1 Frequency of Physical Activity

Tables 5 and 6 show the respondents' frequency of doing physical activity. As illustrated in Table 5, 78.87% of respondents actively engaged in vigorous activity. SS 4 had the highest percentage of respondents (95.12%) who were involved in vigorous physical activity at least 2 days per week, followed by SS 2 (93.75%), SS8 (91.18%), and Section 9 (88.89%). Meanwhile, respondents from Section 3, SS 9, and Section 21 were less engaged in vigorous physical activity, with 64.71%, 61.29%, and 59.37%, respectively. Further analysis indicated that respondents from both SS 9 (29.03%) and SS 8 (14.71%) had a high level of engagement in vigorous physical activity (i.e., more than 2 days in a week).

Meanwhile, Table 6 shows that only 27.70% of the respondents engaged in moderate physical activity. Section 3 had the highest percentage of respondents (55.88%) who were actively involved in moderate physical activity, followed by Section 21 (40.62%) and SS 9 (38.71%). On the other hand, respondents from SS 2, SS 4, Section 9, and SS 8 recorded lower percentages of engaging in moderate physical activity, 21.87%, 14.63%, 11.11%, and 2.94%, respectively.

Further analysis of the results in Tables 5 and 6 showed that respondents in SS 4, SS 2, SS 8, and Section 9 were less active in moderate physical activity as the majority of them were already engaged in vigorous physical activity. On the contrary, those in Section 3, Section 21, and SS 9 were less engaged in vigorous physical activity as they were active in moderate physical activity.

Table 5 - Frequency of vigorous activity by the respondents

| Section/SS | Vigorous Activity (Frequency) | | | | | | | | | | Total |
|-------------------|-------------------------------|-------|----------|-------|----------|-------|----------|------|----------|------|-------|
| | None | | 1-2 days | | 3-4 days | | 5-6 days | | 7 days | | |
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | |
| SS 4 | 2 | 4.88 | 36 | 87.80 | 2 | 4.88 | 0 | 0.00 | 1 | 2.44 | 41 |
| SS 2 | 2 | 6.25 | 26 | 81.25 | 3 | 9.38 | 0 | 0.00 | 1 | 3.13 | 32 |
| SS 8 | 3 | 8.82 | 26 | 76.47 | 5 | 14.71 | 0 | 0.00 | 0 | 0.00 | 34 |
| Section 9 | 1 | 11.11 | 7 | 77.78 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 | 9 |
| Section 3 | 12 | 35.29 | 19 | 55.88 | 2 | 5.88 | 1 | 2.94 | 0 | 0.00 | 34 |
| SS 9 | 12 | 38.71 | 10 | 32.26 | 9 | 29.03 | 0 | 0.00 | 0 | 0.00 | 31 |
| Section 21 | 13 | 40.63 | 17 | 53.13 | 2 | 6.25 | 0 | 0.00 | 0 | 0.00 | 32 |
| Total | 45 | 21.13 | 141 | 66.20 | 24 | 11.27 | 1 | 0.47 | 2 | 0.94 | 213 |

Table 6 - Frequency of moderate activity by the respondents

| Section/SS | Moderate Activity (Frequency) | | | | | | | | | | Total |
|-------------------|-------------------------------|--------------|----------|-------|----------|-------|----------|------|----------|------|-------|
| | None | | 1-2 days | | 3-4 days | | 5-6 days | | 7 days | | |
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | |
| Section 3 | 15 | 44.12 | 18 | 52.94 | 1 | 2.94 | 0 | 0.00 | 0 | 0.00 | 34 |
| Section 21 | 19 | 59.38 | 13 | 40.63 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 32 |
| SS 9 | 19 | 61.29 | 5 | 16.13 | 5 | 16.13 | 1 | 3.23 | 1 | 3.23 | 31 |
| SS 2 | 25 | 78.13 | 4 | 12.50 | 3 | 9.38 | 0 | 0.00 | 0 | 0.00 | 32 |
| SS 4 | 35 | 85.37 | 4 | 9.76 | 1 | 2.44 | 1 | 2.44 | 0 | 0.00 | 41 |
| Section 9 | 8 | 88.89 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 9 |
| SS 8 | 33 | 97.06 | 1 | 2.94 | 0 | 0.00 | 0 | 0.00 | 0 | 0.00 | 34 |
| Total | 154 | 72.30 | 46 | 21.60 | 10 | 4.69 | 2 | 0.94 | 1 | 0.47 | 213 |

4.2 Duration of Physical Activity

The Malaysian Dietary Guidelines recommend for an individual to perform 150 minutes of moderate or 75 minutes of vigorous-intensity activity per week. Tables 7 and 8 show the respondents' duration of engaging in vigorous and moderate physical activity.

As illustrated in Table 7, only four sections in Petaling Jaya had high percentages of respondents who were engaged in vigorous-intensity activity for more than 10 minutes per week. The highest percentage was recorded by SS 4 (95.13%), followed by SS 2 (95.13%), Section 9 (77.78%), and SS 8 (70.59%). On the other hand, Section 3, SS 9, and Section 21 recorded lower percentages of respondents engaging in vigorous activity of more than 10 minutes per week, with 64.71%, 64.52%, and 59.37%, respectively. Respondents from SS 2 and SS 4 were likely to engage in vigorous physical activity for a long duration (more than 40 minutes) as both sections had the highest percentage, namely 87.50% and 85.37%, respectively. Additionally, respondents from Section 21 (50.01%) were likely to engage in vigorous activity within a long duration (more than 30 minutes), followed by SS 9 (45.16%), Section 9 (44.44%), and SS 8 (44.12%).

Furthermore, Table 8 shows that three sections had high percentages of respondents who were engaged in moderate-intensity activity for more than 10 minutes a week. The highest percentage was recorded by Section 3 (50.00%), followed by Section 21 (40.62%) and SS 9 (32.25%). Meanwhile, the remaining four sections had low percentages of respondents who were engaged in moderate physical activity for more than 10 minutes a week, namely SS 2 (15.62%), SS 4 (14.63%), Section 9 (11.11%), and SS 8 (2.94%).

Table 7 - Duration of vigorous activity by the respondents

| Section/SS | Vigorous Activity (Duration) | | | | | | | | | | Total |
|-------------------|------------------------------|-------|----------|-------|------------|-------|------------|-------|----------|-------|-------|
| | None | | <10 mins | | 10-20 mins | | 30-40 mins | | >40 mins | | |
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | |
| SS 4 | 2 | 4.88 | 0 | 0.00 | 0 | 0.00 | 4 | 9.76 | 35 | 85.37 | 41 |
| SS 2 | 2 | 6.25 | 1 | 3.13 | 0 | 0.00 | 1 | 3.13 | 28 | 87.50 | 32 |
| Section 21 | 13 | 40.63 | 0 | 0.00 | 3 | 9.38 | 5 | 15.63 | 11 | 34.38 | 32 |
| SS 9 | 11 | 35.48 | 0 | 0.00 | 6 | 19.35 | 7 | 22.58 | 7 | 22.58 | 31 |
| Section 9 | 1 | 11.11 | 1 | 11.11 | 3 | 33.33 | 2 | 22.22 | 2 | 22.22 | 9 |
| SS 8 | 3 | 8.82 | 7 | 20.59 | 9 | 26.47 | 15 | 44.12 | 0 | 0.00 | 34 |
| Section 3 | 12 | 35.29 | 0 | 0.00 | 16 | 47.06 | 2 | 5.88 | 4 | 11.76 | 34 |
| Total | 44 | 20.66 | 9 | 4.23 | 37 | 17.37 | 36 | 16.90 | 87 | 40.85 | 213 |

Table 8 - Duration of moderate activity by the respondents

| Section/SS | Moderate Activity (Duration) | | | | | | | | | | Total |
|-------------------|------------------------------|-------|----------|------|------------|-------|------------|-------|----------|------|-------|
| | None | | <10 mins | | 10-20 mins | | 30-40 mins | | >40 mins | | |
| | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | <i>f</i> | % | |
| Section 3 | 15 | 44.12 | 2 | 5.88 | 15 | 44.12 | 2 | 5.88 | 0 | 0.00 | 34 |
| Section 21 | 19 | 59.38 | 0 | 0.00 | 7 | 21.88 | 5 | 15.63 | 1 | 3.13 | 32 |
| SS 9 | 20 | 64.52 | 1 | 3.23 | 6 | 19.35 | 2 | 6.45 | 2 | 6.45 | 31 |
| SS 2 | 27 | 84.38 | 0 | 0.00 | 1 | 3.13 | 3 | 9.38 | 1 | 3.13 | 32 |
| SS 4 | 35 | 85.37 | 0 | 0.00 | 2 | 4.88 | 4 | 9.76 | 0 | 0.00 | 41 |
| Section 9 | 8 | 88.89 | 0 | 0.00 | 1 | 11.11 | 0 | 0.00 | 0 | 0.00 | 9 |
| SS 8 | 33 | 97.06 | 0 | 0.00 | 1 | 2.94 | 0 | 0.00 | 0 | 0.00 | 34 |
| Total | 157 | 73.71 | 3 | 1.41 | 33 | 15.49 | 16 | 7.51 | 4 | 1.88 | 213 |

The above results on the frequency and duration of physical activity (Tables 5, 6, 7, and 8) indicate that the majority of respondents from SS 4 and SS 2 were more likely to do physical activity of vigorous-intensity and were

considered the most active as they performed physical activity at least two days per week (SS 4 = 95.12%; SS 2 = 93.75%) with a longer duration of more than 40 minutes per week (SS 4 = 85.37%; SS 2 = 87.50%). Thus, they achieved the recommended duration of 75 minutes for vigorous-intensity physical activity. Similarly, half of the respondents from Section 21 were considered active as they engaged in vigorous physical activity for at least 2 days in a week (59.37%) (see Table 5) for a long duration of over 30 minutes (see Table 7). This suggests that half of the respondents from Section 21 achieved the recommended duration of 75 minutes for vigorous-intensity physical activity.

Meanwhile, respondents from SS 9, SS 8, and Section 9 were considered moderately active. Our results showed that respondents from these sections had a high frequency of performing vigorous physical activity (SS 8 = 91.18%; Section 9 = 88.89%; SS 9 = 61.29%) (see Table 2); however, less than half of them (SS 9 = 45.16%; Section 9 = 44.44%; and SS 8 = 44.12%) were engaged in vigorous physical activity for more than 30 minutes (see Table 7). It suggests that less than half of the population in these three sections were actively engaged in vigorous activity and achieved 75 minutes of vigorous-intensity physical activity. On the other hand, respondents from Section 3 were considered less active as 64.71% of them had low frequency in performing vigorous activity percentage (see Table 5). They also recorded the lowest percentage (17.64%) regarding the duration in performing vigorous activity (see Table 7). This indicates that respondents from Section 3 did not achieve either the 150 minutes per week duration for moderate intensity or the 75 minutes per week duration for vigorous intensity.

Following the results in Tables 5, 6, 7, and 8, it can be observed that respondents from all sections were likely to perform vigorous physical activity. Many of them were found to be involved in physical activity of longer duration but less frequency; however, they were considered active because they achieved the recommended duration of 75 minutes per week for physical activity of vigorous intensity. Whereas, respondents who were considered less active often performed physical activity less than the recommended duration and frequency per week.

4.3 Urban Environment

Table 9 shows the indicator of land use that affects the respondents' physical activity. For this purpose, vigorous activity was used to compare the urban environment features as many of the respondents were actively engaged in vigorous activity.

Table 9 - Indicators to evaluate urban environment features

| Section | Level of Physical Activity | Green Area (Outdoor) | Sports Facilities (Indoor) | Convenience Walking Environment | Figure | Remarks |
|--------------|--|---|---|--|----------------------|--|
| SS 2 SS 4 | The most active with the highest percentage of respondents engaged in vigorous activity and longer duration (>40 minutes). | Green areas were distributed equally within the section. Most of the areas were covered and within 10-minutes walking distance to a green area. | Located within the section near to the urban park (SS2 Park). | Convenient and safe environment. | Figure 2 Figure 3 | Respondents from this section were mostly active in vigorous activity and this section had a good environment. |
| Section 21 | 50% of the respondents were actively engaged in vigorous activity. | No green areas within the section. | No indoor facilities within the section and nearby. | Less convenient to reach the nearby green areas because the residents had to cross the busy main road. | Figure 4 | Respondents from this section were considered active, but the environment was considered less convenient and there were no facilities at all. |
| SS 9 | Moderately active. Less than 50% of the respondents were engaged in vigorous activity. | Linear park located at the south of this section. | Nearby sports facilities, which were in SS8. | Small and busy road. | Figure 5 | There were no green areas for these sections except for SS 9. However, there were sports facilities (indoor) for the three sections. About 45% |
| Section 9 | | No green areas within | There were nearby sports | Less convenient to | Figure 6 | |

| | | | | | | |
|------------------|---|---|--|--|----------|--|
| | | the section. However, there was an urban park (Taman Jaya Park) adjacent to this section. | facilities within 10-minutes walking distance from this section. | reach the nearby green areas because the residents had to cross the busy main road. | | of the respondents from each section were active because of the sports facilities in the sections and nearby. |
| SS 8 | | No green area within the sec | Industrial areas were located within the section. Nearby sports facilities within 15-minutes walking distance. | | Figure 7 | |
| Section 3 | Less active. Less than 20% respondents who were active in vigorous activity | There is no green area within this section, but there are a few green areas nearby this section within 10-minutes walking distance. | No indoor facilities in the section and nearby. | Less convenient to reach the nearby green area because the residents need to cross the busy main road. | Figure 8 | Respondents from this section were less active than those from other sections. There were no green areas or sports facilities in this section. Moreover, the environment of this section was less convenient for the respondents to perform physical activity. |

This section describes the distance and accessibility of the green spaces and sports facilities. Table 10 shows the land use for every section that could influence the respondents' level of physical activity.

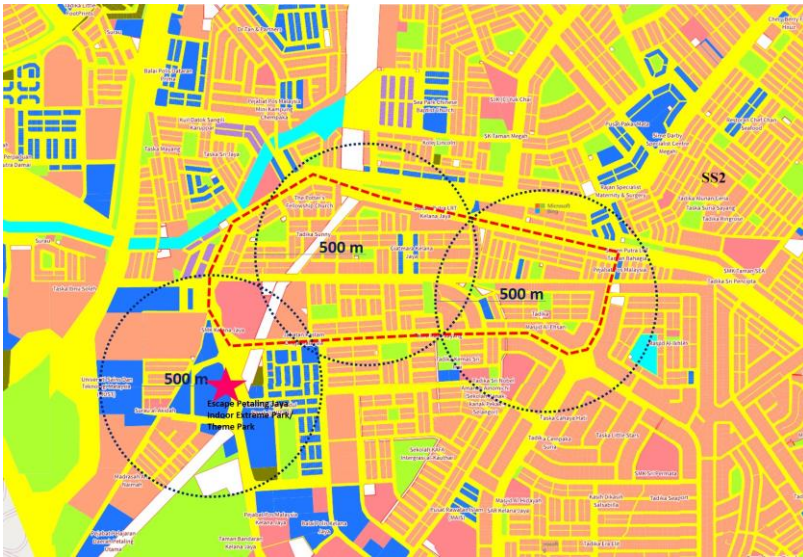
Legend:



Table 10 - Current land use for every section

Figure

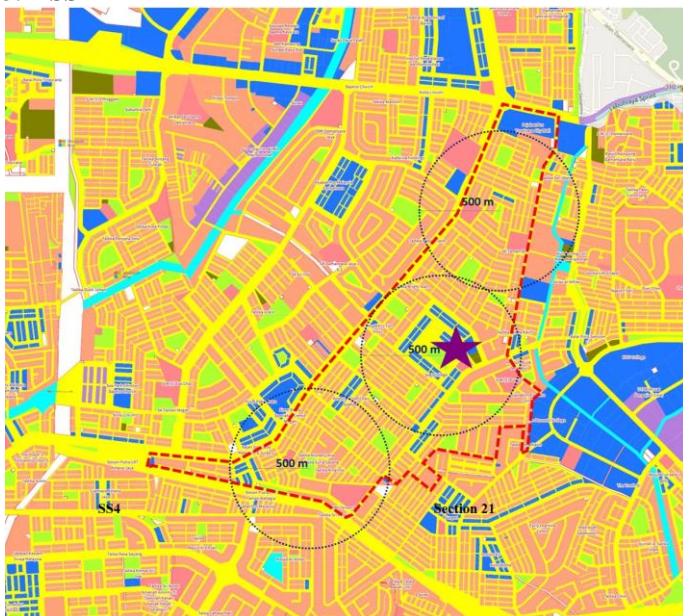
2. SS 4



Explanation

SS 4 and SS 2 had the same category of land use, namely residential areas. Most respondents from both sections were actively engaged in vigorous physical activity. This is because there were green areas and sports facilities available within the sections. The open space for both residential areas was within walking distance and reachable for the residents as it was located between the residential areas and covered. Moreover, there were various facilities provided in the open space, such as badminton courts, basketball courts, and jogging tracks. Respondents from SS 4 and SS 2 were inclined towards vigorous-intensity activity due to the availability of these facilities provided and easy access to the open space. The environment was also comfortable for them to exercise and jog around the residential areas.

3. SS2



- ★ **Sports facilities indoor:**
 - Escape Petaling Jaya
 - Indoor Extreme Park/ Theme Park
- ★ **Green area (outdoor):**
 - SS2 Park

4. Section 21

Section 21 had no green areas or indoor sports facilities; however, it was assumed that the respondents were willing to travel to nearby sports facilities and green areas at SS 2 (located to the north of Section 21) and the surrounding area of Section 21.



Sports facilities indoor:

- Arena Archery Tag
- Sports Garage (Futsal)



Sports facilities indoor:

- The Challenger Sports PJ (Badminton)

5. SS9



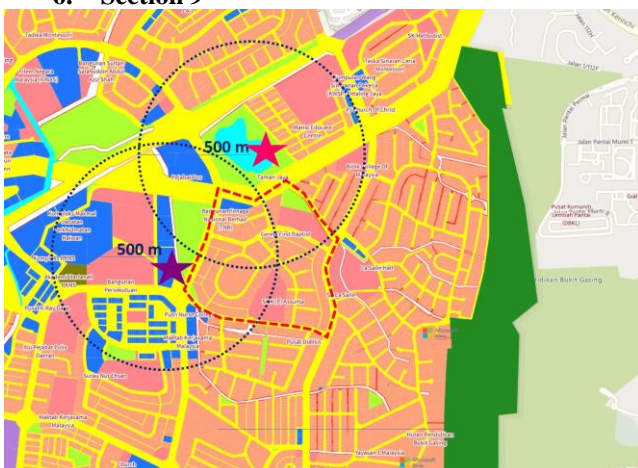
Respondents from SS 9 were considered moderately active although the green areas were not distributed equally within the section. SS 9 had a linear green area located at the south of the section. Additionally, there were sports facilities (indoor) adjacent to this section, which were within 15-minutes walking distance.



Sports facilities indoor:

- Indoor Go Kart Track (X Park Sunway Serene)

6. Section 9



The main land use for Section 9 was residential area. As shown by Figure X, no green areas can be seen in this section. Respondents from Section 9 were considered moderately active. Although no green space was available within the section, there was an urban park located to the north of Section 9.



Green area (outdoor):

- Urban Park (Taman Jaya Park)

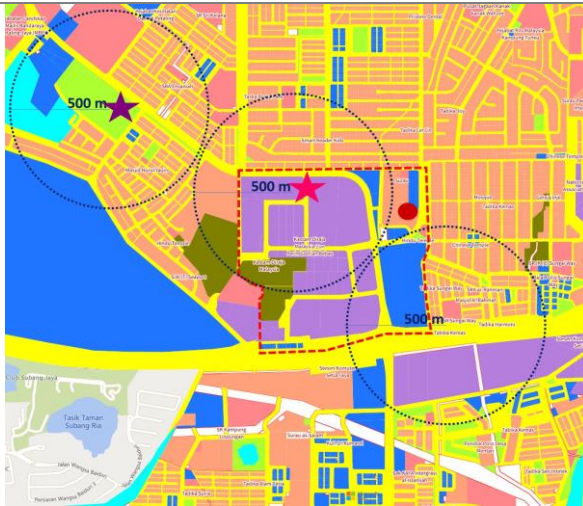


Sports facilities (outdoor):

- PJ Palms Sport centre

7. SS8

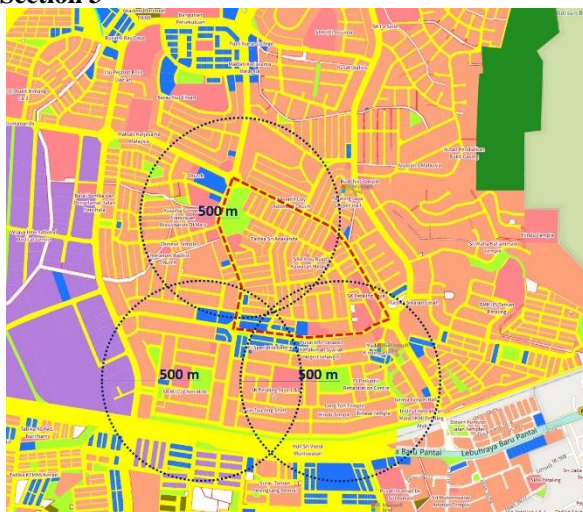
The land use of SS 8 differed from other sections as it mainly comprised industrial area. The section was surrounded by



residential areas with one low-cost flat. Even though SS 8 had no open spaces, the respondents were active in vigorous-intensity activity. This was because there were extreme sports facilities located within and nearby the section. Many of these facilities were accessible and within walking distance.

- ★ Sports facilities (indoor): Indoor Go Kart Track
- ★ Sports facilities (indoor): Kompleks sukan PKNS
- Low cost Flat

8. Section 3



Section 3 was a residential area. As shown in Photo X, the section had no open spaces of walking distance and the respondents from this section had to cross the busy main road between Section 3 and Section 1 (PJ Old Town).

Source of land use maps: PLANMalaysia (I-Plan), 2023

5. Conclusion

In conclusion, this study found that respondents from all sections were likely to perform vigorous activity for a longer duration but less frequently for at least 2 days per week. However, those who conducted 75 minutes of vigorous-intensity activity were considered active because they achieved the recommended duration. Meanwhile, respondents who were considered less active performed physical activity less than the recommended duration and less frequently in a week. Our results further demonstrated that sections with more green areas and sports facilities as well as convenient environment tend to have active respondents. Meanwhile, sections with either green areas or sports facilities still produced active respondents. It was further revealed that some sections had no green areas or sports facilities; however, the respondents were willing to travel to nearby sections with green areas and sports facilities. These findings hope to assist relevant stakeholders, particularly city planners, in improving the urban environment to promote a healthier community.

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