

10th MALAYSIA STATISTICS CONFERENCE 2023
Looking Beyond GDP: Toward Social Well-being and
Environmental Sustainability

26th September 2023
Sasana Kijang, Bank Negara Malaysia

Sub Theme: Using Geospatial Data for Sustainability Analysis

Public Urban Green Spaces Provision in Kuala Lumpur: Is Each Area Treated Equal?

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Abstract:

Having adequate access to open spaces and green spaces in urban city is not a luxury but a necessity for physical and social wellbeing. However, rapid development in Kuala Lumpur which entails densification and growing population, poses challenges to providing sufficient and accessible open/ green spaces, from the lens of availability and equality. Utilizing public open spaces and park data made available by the Kuala Lumpur City Hall, this study aims to explore availability of public open/ green spaces and park of different hierarchy in Kuala Lumpur with comparison between different areas. This study found that i) Kuala Lumpur public open/ green spaces are largely made up of city park, with increased importance of local play areas and green linear space and ii) there is disparity of public open/ green spaces provision between areas in Kuala Lumpur. This study wraps up with future research agenda which includes indicator enhancement to measure provision of public open/ green spaces, consideration of citizens' perspective of open/ green spaces availability and accessibility and correlation of socio economics factors with inequality of open/ green spaces access.

Keywords:

Public open spaces; UGS; equality of UGS

1. Introduction:

1.1 Background

Living in the era of development where open spaces and green spaces are often traded for construction of new buildings is especially felt in urban areas such as Kuala Lumpur where densification continues to demand for sufficient infrastructure to support growing population. Against this background, having adequate and equal access to open spaces and green spaces in urban city is an interesting area of study. Various study conducted shows that green spaces postulate physical health, mental and social

wellbeing benefit through park facilitation of physical activity; destressing effect, avenue of social meeting (Lee and Maheswaran, 2011); placement of cultural importance among citizens; and sustaining environment biodiversity (Dreyer et al., 2019). In Malaysia, green areas are used for recreational activities which range from jogging, walking, playing sports and passive activities such as meeting friends and watching people (Malek et al., 2015; Ibrahim and Nizarudin, 2019; Dreyer et al., 2019). Larger green areas such as Forest Research Institute Malaysia (FRIM) which is the green lung of Klang Valley is used for environmental learning tapping on its biodiversity richness, in addition to being an attraction for recreational activities (Dreyer et al., 2019).

According to WHO (2017), urban green space (UGS) is defined as all urban land covered by vegetation, including on private and public land, regardless of sizes and functions, including small water bodies such as lake, ponds and streams. In Malaysian National Urbanization Policy 2 (2016), green spaces are defined as areas that are covered with vegetation including open space, recreational space, infrastructure and utility corridor, reserved forest and residential green spaces. Small urban green spaces (SUGS) which is a scaled down version of larger parks (Fatiah and Zakariya, 2021) are a type of UGS. Van Herzele and Wiedemann (2003)'s study of public preference and planning practice of green spaces establishes five guiding principles of UGS provision which includes i) citizens-based approach where UGS are to support urban citizens' quality of life underlining that citizens' point of view on UGS should be taken into consideration; ii) functional levels where green spaces inside and outside the urban areas are no substitute for one another and UGS should be assessed based on relevant functional scale; iii) pre-conditions for use which emphasize on proximity and safety criteria; iv) variety which offers range of experience of activities; and v) multiple use which allows green spaces to be used freely.

1.2 Urban Green Spaces in Kuala Lumpur Context

Provision of open spaces, green spaces and recreational areas in the city of Kuala Lumpur stands as an important agenda in Kuala Lumpur City Plan 2020 (KLCP2020) and Kuala Lumpur Structure Plan 2040 (KLSP2040). Both plans have target implementation to increase availability of open and green spaces that is accessible by the public. According to KLCP2020 and KLSP2040, the development of different types of park guided by established park hierarchy aims to build park to serve different catchment population, which is essentially embracing the second guiding principles of UGS provision by Van Herzele and Wiedemann (2003). City park which is the highest hierarchy of parks is to serve Kuala Lumpur and surrounding areas within the Kuala Lumpur conurbation. This is followed by district park, neighbourhood park and local parks which caters for catchment population of 200,000, 50,000 and 10,000 citizens, respectively. Local play area is of the lowest hierarchy including urban plaza, pocket parks and linear green space, located in residential area and city center within walking distance from where citizens live and work.

In this study, availability of public open/ green spaces and park of different hierarchy in Kuala Lumpur are explored. Areas in Kuala Lumpur which are also designated as zones are Damansara Penchala (DP), Sentul Manjalara (SM), Wangsa Maju Maluri (WMM), City Center (CC), Bukit Jalil Seputeh (BJS), Bandar Tun Razak Sungai Besi (BTRS). These 6 areas are used to compare public open/ green spaces distribution.

2. Methodology:

2.1 Data Collection

Secondary data obtained from the eMap features made available in City Planning System of Kuala Lumpur City Hall is used for this study. Attributes of data extracted for analysis are primary usage of land, land use code; park area size in hectares and kilometres square, area the park is located; and description of activity. Below filters are used as the selection criteria.

- Layer = Pelan Zon Guna Tanah PBRKL2020
- Kod Zon GT2018 = OS1

Land use code OS1 which denotes public open space (Tanah Lapang Awam) has definition of open spaces for recreational, sports and cultural activities which includes playground, pocket park, public park, indoor /outdoor sports facilities, urban plazas and green linear areas (Dewan Bandaraya Kuala Lumpur, 2022).

2.2 Data Preparation and Tools

Data returned by the above search is processed using Python version 3.11.3 in Spyder IDE version 5.4.3. Python package BeautifulSoup and Pandas are used to extract data from HTML pages and perform data compilation tasks. Once the list of parks and open spaces are compiled, data quality check, result analysis and output table generation are conducted using Excel version 16.76. Data quality assessment which covers blank value check, duplicates and value validity indicates that the data quality of extracted list is satisfactory for analysis. Summary of extraction which returns 1,849 records is shown in Appendix A.

3. Result:

Kuala Lumpur consists of 1,808.7 hectares of public open/ green spaces (out of a total area of 24,232.8 hectares). Comparing between 6 areas within Kuala Lumpur, Damansara Penchala area has the highest public open/ green spaces while City Center and Wangsa Maju Maluri areas have the lowest. See Figure 1. Considering that different area is made up of different size, density of public open/ green spaces is calculated for further comparison between areas, as elaborated in Section 3.2.

Area	BJS	BTRS	DP	CC	SM	WMM	Overall KL
Total Public Open Space Area (Hectare)	342.5	296.4	479.4	164.5	325.6	200.3	1,808.7
City Parks	66.4	109.7	263.1	110.0	177.8		727.1
District Parks	57.2	23.4				32.7	113.3
Neighbourhood Parks	19.8	51.0	10.6	28.8	28.3	57.3	195.9
Local Parks	28.6	43.0	27.6	4.2	40.2	45.2	188.8
Local Play Areas	68.1	54.6	26.3	7.4	61.0	53.7	271.0
Green Linear Areas	6.1	3.1	10.5	3.7	12.4	3.9	39.7
Sports Facilities	96.2	11.5	141.4	10.4	5.9	7.5	272.9
Total Area (Hectare)	4,322.9	4,116.9	4,745.3	1,779.2	4,610.0	4,658.6	24,232.8

Figure 1: Amount of Public Open/ Green Spaces by Type and Area

3.1 Types of Public Open/ Green Spaces

Figure 2 shows that city parks cover 40.20% of the public open/ green spaces in Kuala Lumpur, followed by sports facilities (15.09%), local play areas (14.98%), neighbourhood parks (10.83%), local parks (10.44%), district parks (6.26%) and green linear areas (2.19%). Researchers observe that city parks are not available in Wangsa Maju Maluri area and district parks are not in Damansara Penchala, City Center and Sentul Manjalara area. Sports facilities are predominantly located in Bukit Jalil Seputeh and Damansara Penchala areas. Refer to Figure 1 and 4.

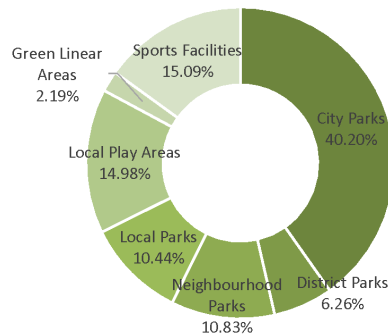


Figure 2: Types of Public Open/ Green Spaces

3.2 Density of Public Open/ Green Spaces

Density of public open/ green spaces is calculated as the ratio of public open/ green spaces area size and total area size. This measurement ranges between 4.3% to 10.10% between different areas with an overall ratio of 7.46% for Kuala Lumpur (Figure 3). Similar density measurement further granularized by types of public open/ green spaces are shown in Figure 4. In earlier observation of City Center and Wangsa Maju Maluri having low availability of open/green spaces, factoring in total areas, City Center appears to have a relatively high density of public open/ green spaces while observation of Wangsa Maju Maluri with low percentage of open/ green spaces holds using the density indicator (4.3%).

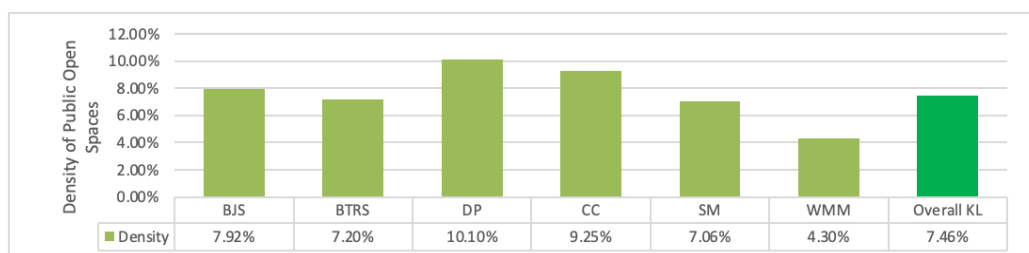


Figure 3: Density of Public Open/ Green Spaces by Areas

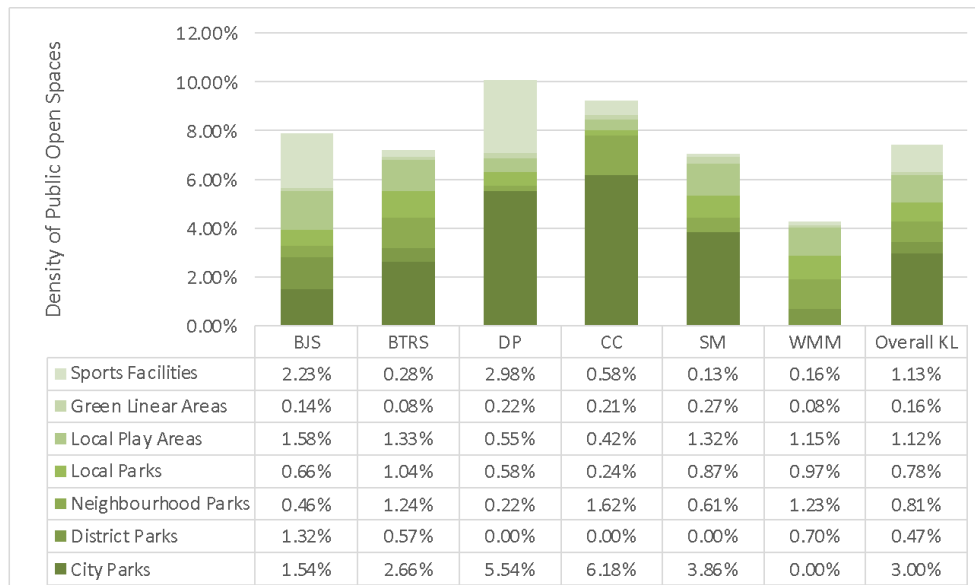


Figure 4: Density of Public Open/ Green Spaces by Types

3.3 Distribution of Types of Public Open/ Green Spaces

Result in Figure 5 shows that distribution of types of public open/ green spaces differs across areas in Kuala Lumpur. City Center and Damansara Penchala areas have a significant coverage of city parks (more than 50%) but contrarily with a small coverage of other lower level hierarchy park especially district park which is non-existent. Sentul Manjalara area has a similar pattern with high availability of city parks but without district parks. However, provision of lower level parks such as neighbourhood, local and local play areas is rather balanced. Wangsa Maju Maluri area has a well distributed district park, neighbourhood park, local park and local play areas, but not equipped with city parks. Bukit Jalil Seputeh and Bandar Tun Razak Sungai Besi areas have relatively balanced distribution of types of public open/ green spaces compared to other areas. It is noted that Bukit Jalil Seputeh area has a much higher percentage of public open/ green spaces for sports facilities compared to all other areas except Damansara Penchala.

Area	BJS	BTRS	DP	CC	SM	WMM	Overall KL
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
City Parks	19.4%	37.0%	54.9%	66.9%	54.6%	0.0%	40.2%
District Parks	16.7%	7.9%	0.0%	0.0%	0.0%	16.3%	6.3%
Neighbourhood Parks	5.8%	17.2%	2.2%	17.5%	8.7%	28.6%	10.8%
Local Parks	8.4%	14.5%	5.8%	2.6%	12.3%	22.6%	10.4%
Local Play Areas	19.9%	18.4%	5.5%	4.5%	18.7%	26.8%	15.0%
Green Linear Areas	1.8%	1.0%	2.2%	2.2%	3.8%	1.9%	2.2%
Sports Facilities	28.1%	3.9%	29.5%	6.3%	1.8%	3.7%	15.1%

Figure 5: Distribution of Types of Public Open/ Green Spaces By Area

4. Discussion and Conclusion:

4.1 Kuala Lumpur public open/ green spaces are largely made up of city park, with increased importance of local play areas and green linear space

Overall, Kuala Lumpur has public open/ green spaces provision of 7.46% (1,808.7 hectares) of its total area (24,232.8 hectares). These public open spaces are made up of city parks, district parks, neighbourhood parks, local parks, local play areas, green

linear areas and sports facilities. Figure 6 shows that Kuala Lumpur public open/ green spaces are covered largely (40.2%) by city parks notably, Taman Tasik Perdana and Taman Lembah Kiara. Local play areas and green linear spaces in total made up 17.2% of public open/ green spaces in Kuala Lumpur. These spaces which are designed using smaller plot of land are gaining traction in the recent years due to limited amount of spaces available to build bigger park. Standard provision of local play areas of 0.5 hectares as compared to 2 hectares for local parks (KLCP2020) has provided congruent motivation to develop smaller open spaces as seen in various initiatives in KLCP2020 and continuity in KLSP2040. These initiatives include using spaces between buildings, alleys, area underneath MRT rail structure as pocket park and urban plaza; integrating areas/ parks by developing green linear spaces as a form of park connector (KLSP2040); and redevelopment sites are required to provide urban parks with minimum facilities such as plazas, seating areas and landscape areas (KLCP 2020).

4.2 Disparity of public open/ green spaces provision between areas

As highlighted in prior study by Nor and Abdullah (2019), there is inequality in terms of density of urban green spaces between areas in Kuala Lumpur. The result from this study further supports this finding. Three areas (Damansara Penchala, City Center and Bukit Jalil Seputeh) have higher public open/ green spaces density compared to the overall average of 7.46% for Kuala Lumpur. On the other hand, Sentul Manjalara, Wangsa Maju Maluri and Bandar Tun Razak Sungai Besi areas have lower density of public open/ green spaces compared to Kuala Lumpur overall average. Wangsa Maju Maluri area with density of 4.3% is the lowest among these areas, showing a big disparity especially against City Center and Damansara Penchala. See Figure 7.

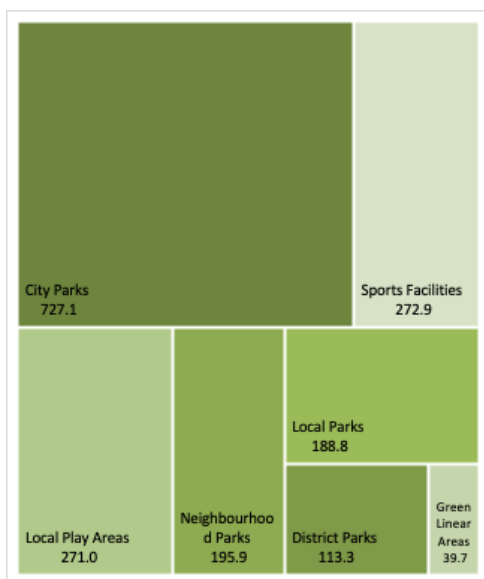


Figure 6: Total Areas by Park Hierarchy (values in hectares)

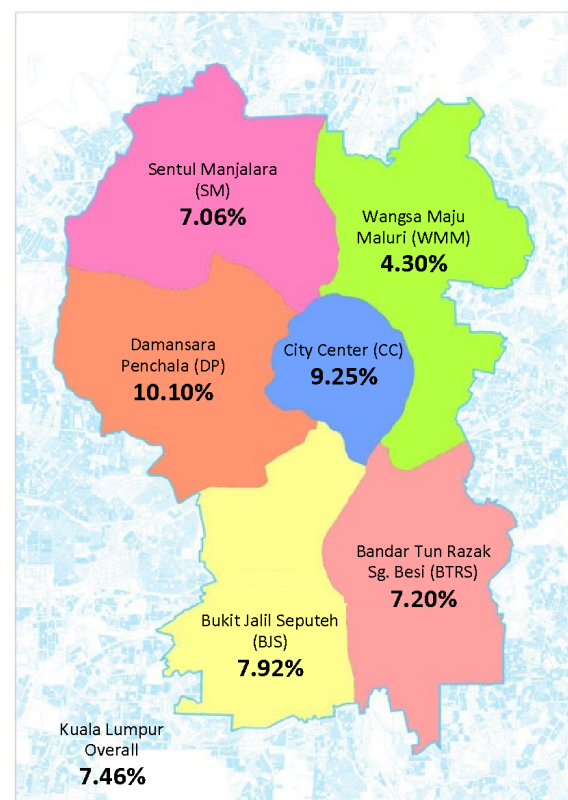


Figure 7: Density of Public Open/ Green Spaces in Kuala Lumpur

In terms of provision of public open/ green spaces from the perspective of park hierarchy, distribution of types of parks differs between areas. The second guiding principles in Van Herzele and Wiedemann (2003) posits that larger areas of forest and city parks in the surrounding are used for weekend recreation and smaller parks closer to citizens' residences and workplace are for local daily life which highlights the importance of open spaces of different functional levels that should not be substituted for one another. In the context of Kuala Lumpur, the lower level parks especially the local play areas and local parks which provides accessibility to public open/ green spaces within walking distance is important for daily recreational purposes as compared to the higher level parks such as city parks and district parks where citizens can reach using private or public transportation during leisure time. Damansara Penchala and City Center have unbalanced distribution of higher and lower level parks where the low availability of lower level parks in these areas highlights potential inaccessibility to recreational areas for daily activities. Further study probing accessibility to city parks from walking distance perspective should be conducted to confirm if these city parks can play the role of local parks and local play areas for daily essential recreational activities.

There is a high disparity of distribution of sports facilities in different areas. Sport facilities are concentrated in two areas – Bukit Jalil Seputeh and Damansara Penchala, highlighting a big range of 1.8% to 29.5% in terms of sports facilities provision. Other than these two areas, sport facilities in other areas are minimal (Figure 5).

4.3 Future research agenda

4.3.1 Indicators enhancement

While density of public open/ green spaces quantitatively indicates availability of public open/ green spaces for an area (as investigated in this study), indicator of provision of spaces per inhabitant is recommended by country/ city planning bodies and international organizations such as WHO, to measure availability and accessibility. Provision of green spaces is measured using two indicators which are i) green space provision per inhabitant related to green spaces within walking distance to residential area (Kabisch et al., 2016; Grunewald et al., 2017; Zepp et al., 2020) and ii) green space provision per inhabitant related to total amount of green space (Grunewald et al., 2017; Zepp et al., 2020). A study on 182 German cities using ratio of population who can access green areas within proximity threshold, shows that close to three fourths of these citizens have access to nearby and larger park within 300 m and 700 m, respectively (Grunewald et al., 2017). The enhanced indicator which provides an improved visibility of open/ green spaces provision in a city shall be used for further study.

4.3.2 Citizens' perspective of public open/ green space provision

WHO (2017) recommends that citizens should be able to access public open/ green area of minimum 5m² to 10m² per inhabitant within 300m, which is about 5 minutes of walk. Threshold of minimum urban open/ green space per inhabitant set by different cities and bodies varies, where Berlin and Leipzig in Germany aim to provide at least 6m² and 10m², respectively; Berlin's Department of Urban Development and the Environment recommends a minimum of 5m² per person within 500m, as pointed out by Kabisch et al. (2016). Malaysian National Urbanization Policy sets a target of 20m² of open spaces per inhabitant and the same target is acknowledged in KLSP2040. While it is laudable to have a benchmark that planning authorities strive to achieve in terms of public open/ green space provision, there exists an unfilled gap on how citizens view the

current state of provision and accessibility to public open/ green areas, which is pointing to the first guiding principles of urban green spaces provision by Van Herzele and Wiedemann (2003). There is a work in progress comparative study which compares citizens' perspective of urban green spaces availability and accessibility with the current state, current policy and WHO's recommendation.

4.3.3 Inequality of open/ green space in relation to socio economic background

There is unequal provision of urban green spaces in terms of socio-economic background such as income, education, employment status, migration background and nationality, and between cities, which exists in both developed and developing country. For instance, when it comes to accessing urban green spaces, there is less coverage of urban green spaces for lower education class (as compared to higher education class) and there is a longer distance to urban green spaces for lower income class (as compared to higher income class) based on a study in Germany by Wüstemann et al. (2017). In Debrecen, Hungary, socialist housing estates which is known as the lower status neighbourhood is lack of good quality green spaces. Contrarily, wealthy section of the city is covered with a good amount private quality green areas (Csomós et al., 2020).

Socio economic background should not hinder citizens from having equal access to open spaces and green spaces. As we are embracing inclusivity and equality to live and thrive, future study on how socio economic factors correlates with inequality of open/ green spaces access will be beneficial to investigate this further.

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Appendix:

Attribute	Value	Records Count
Primary usage of land	Kawasan Hijau	1849
Land use code	OS1	1849
Park area size (in hectare)	Between 1-e7 to 100.695	1849
Park area size (in meter square)	Between 0.01 to 1,006,946	1849
Area the park is located	BJS	356
	BTRS	306
	DP	336
	PB	123
	SM	413
	WMM	315
	Description of activity	Kawasan Hijau Linear
Kawasan Permainan Tempatan		1082
Kemudahan Sukan		56
Taman Bandar		261
Taman Daerah		22
Taman Kejiranan		120
Taman Tempatan		183

Appendix A: Data Values in Extraction List