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Examining the Needs of Green Infrastructure (GI) Facilities in Strata Low-cost Flats, Selangor

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ABSTRACT
Rapid urbanization has transformed the pattern of urban land use to focus more on housing development. Unfortunately, the focus is less on improving the optimal use of community and green infrastructure (GI) facilities for communities in low-cost housing. Studies have shown that the lack of proper facilities and GI have impacted the individual, physical, psychological, and social health of a community. The outdoor facilities of low-cost housing developments are claimed to be very limited. Hence, the planning standards and guidelines for housing should go beyond their basic provisions, to offer a more conducive environment that improves the health and wellbeing of the community, especially in the event of a pandemic. Hence, the paper presents the preference of GI facilities in three low-cost strata housing flats in Selangor (Lembah Jaya, Kajang Utama, and PKNS PJS2 low-cost flats). The data collection consists of (a) spatial analysis using drone images that were converted into AutoCAD spatial maps; (b) interviews with the Joint Management Bodies; and (c) a questionnaire survey of residents (Lembah Jaya–n=116; Kajang Utama Flats–n=50; PKNS PJS2–n=85). The results reveal the limitations of the existing developments, challenges, and needs of the community. Considering the current COVID-19 pandemic, the outdoor spaces in the housing areas are indispensable for residents to relax their minds and do various allowable outdoor activities. This paper emphasizes that the provision of a new model for community and GI facilities in low-cost apartments is a must. A comfortable living environment in the area will support the ecological and social system of a community, thus promoting a good society. It urges the government, developers, and local governments to change the development approach for this type of housing to one that emphasizes a healthier, higher-quality, and more sustainable environment for the local community.

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1. Introduction

The United Nations (UNPF-2007) projected that by 2030, 80% of the world's population will concentrate in urban areas. The increase in the population at the local and global levels in this Fourth Industrial Revolution will continue to transform the urban ecosystem in Malaysia. High-rise low-cost housing is an important residential concept in urban life, particularly for the lower-income to medium-income groups. As such, low-cost

construction demand in many Malaysian towns and cities is becoming higher to meet the population's needs.

The low-cost housing development is affordable housing for the section of society whose income is below the median household income (Abdul Hadi, 2019). Low-cost housing provision in Selangor ensures social-economic stability and gives the chance for Malaysia's low-income groups to own houses. There are several types of low-cost housing, such as multilevel flats ranging from 5-18 floors, and landed properties. However, the basic type is the limited floor area, which can be as small as 700 square feet with three bedrooms (Baharuddin, 2012). In Selangor, for example, three main types of flats meet this requirement: PR4 (Low/Medium/Medium Apartment Houses), PR5 (Selangorku Apartment House), and PR6 (Independent Price Apartment House).

The urge to build more dwellings has put less thought towards improving the outdoor housing spaces and green infrastructure (GI) within the immediate housing compounds and the surrounding neighbourhood. In the case of low-cost flats in Selangor, the provision of outdoor facilities, including spaces for green infrastructure (GI) facilities are specified in the guidelines and planning standards manual set for Selangor state (JPBD, 2016). The determined facilities consist of the basic outdoor infrastructure based on the housing types of PR1 to PR8 in Selangor. Low-cost housing categories are in the range of PR4 to PR6. The basic outdoor facility for low-cost housing is outlined in the guidelines and planning standards. Depending upon the types of development and availability of area, built infrastructure for outdoor spaces are such as a kindergarten, prayer room, hall, garbage house, stall spaces, or food court. The green area is for recreational areas, building setbacks, and beautification, such as playfields, courts, buffer zones, and plant parameters. However, the outdoor spaces are considered very minimal and only offer the most basic outdoor facilities to the residents (Omar et al., 2016; Goh and Yahaya, 2011). On the other hand, low-cost high-rise housing residents require outdoor spaces that can fulfil their individual, recreational, social, and community activities.

Many works of the literature suggest that the lack of community spaces and GI in the neighbourhood has impacted the individual, physical, psychological, and social health of a community. Quality outdoor spaces promote a good society, a sense of belonging, and closeness to the community. A community space is an outdoor area that provides additional facilities for residents to enjoy, relax, and socialize. Some examples are, such as walking tracks, playgrounds, stalls, community centres, or simply a common courtyard, a narrow corridor, a small plaza, or any incidental space. Among the spaces are the GI facilities, which is defined as a natural environment in the form of parks, playing fields, bodies of water, neighbourhood open space, home gardens, pocket spaces, courtyards, residual green areas, and streets. Hence, the availability and enhancement of such spaces encourage individual, physical, psychological, social, or even economic development within a community. Effective GI facilities that have been well-designed having a strong aesthetic appeal that invites users to spend time in them. The resulting activity in these spaces will make the surroundings look livelier, hence enhancing the overall appearance of the neighbourhood (Fu et al., 2015; Zhu, 2015). Once the area can accomplish neighbourliness through GI facilities, the surrounding neighbourhood will be a thriving community. Given that, previous studies have explored the capabilities and benefits of GI to society, as well as the appealing design of GI in high-and middle-income urban areas and settlements (Douglas et al., 2017; McCormick, 2017; NorAtiah et al., 2015). The analysis of the needs and challenges faced by low-income groups living in low-cost settlement areas, on the other hand, requires more serious attention, particularly during a Movement Control Order during COVID-19 pandemic that restricts the movement residents, which disproportionately affects residents who live in limited and low-quality recreational areas.

Based on the issues of lack of community spaces that happen in low-cost housing as discovered in literature reviews, the paper explores whether there are similar issues and needs for residents in low-cost housing in urban areas of Selangor. These cover several dimensions that relate to the challenges, preferences, and needs of the residents of the low-cost flats in Selangor. It involves exploration of the sites' community and GI facilities, and a survey of residents who live in three low-cost strata flats in Selangor, namely Lembah Jaya flat in Ampang district, Kajang Utama, Kajang, and PKNS PJS2 flat in Petaling Jaya, Selangor. Three low-cost housing flats in Selangor were selected, namely Lembah Jaya, Kajang Utama, and PKNS PJS2 flats. The exploration of the existing spatial layout of the housing areas will reveal the potential and limitations of the existing development of the housing areas. These surveys were to elucidate the challenges of using outdoor spaces in low-cost flats and their neighbourhoods and to understand the elements that residents truly need for their housing areas. Considering the current COVID-19 pandemic, the outdoor spaces in the housing areas are considered indispensable for residents to relax their minds and do various allowable outdoor activities. This paper emphasizes that the provision of a new model for community and GI facilities in low-cost apartments is a must for any low-cost housing developments in urban areas. A comfortable living environment in the area will support the ecological and social system of a community, thus promoting a good society.

2. Literature Reviews

2.1 Green Infrastructure (GI) Limitations in the Low-Cost Housing

Dwellings are the main spaces where people spend most of their daily lives and interactions. Quality housing is dwellings that meet all aspects of the population's needs, socially, economically, and environmentally. It is well known that any low-cost housing development makes the best use of its land by constructing residential buildings and other outdoor built and green infrastructures. The provision of GI facilities for low-cost flats is claimed to be very limited and basic according to the housing types (Omar et al., 2016; Goh and Yahaya, 2011). For example, Omar et al. (2016) indicated that the facilities are not sufficient to entertain the entire neighbourhood, especially the young community. They are fully utilized as recreational areas, playfields and courts, buffer zones, and planting parameters

according to the guidelines and standards set by the state government. Nevertheless, the research in Lembah Jaya, Kajang Utama, and PKNS PJS2 flats reveals that when considering the views and experiences of the residents who have lived for quite some time in this type of housing, they need outdoor GI facilities beyond the basic ones that will meet their current situation. These views will be discussed further in the findings section. This is because living in small dwellings and dealing with limited GI facilities often causes excessive pressure on their occupants, thus affecting their individual, physical, and psychological well-being (Jennings and Bamkole, 2019; Hanapi and Ahmad, 2016). Similarly, it affects their satisfaction with their community. Furthermore, with the undeterred COVID-19 pandemic, the public spaces in this residential area are indispensable for residents to do outdoor activities and relax their minds.

2.2 Benefits of GI Facilities

Studies on human interaction with the environment through recreational and social activities have shown many impacts and benefits of outdoor spaces immediate or near homes (Jennings and Bamkole, 2019; McCormick, 2017; Gascon et al., 2017; Douglas, et al., 2017; Finlay et al., 2015). The provision of GI facilities in the housing compound and around the neighbourhood relates to the ability of all age-spectrum of residents to do necessary and voluntary activities. For example, a study on low-income older adults by Finlay et. al. (2015) suggests that GI areas are valuable resources for them. However, the cost of access to many services and facilities can pose a substantial barrier for older people because every task relies more on walking for utilitarian and recreational purposes. Hence, this population sought out affordable exercise and leisure activities near their homes for a healthy lifestyle, such as activities such as walking, visiting with friends in communal spaces, enjoying local gardens, and walking to the grocery store. For children, McCormick (2017) implies that access to outdoor spaces with facilities is associated with improved mental well-being, overall health, and cognitive development of children. It promotes attention restoration, memory, competence, supportive social groups, self-discipline, moderates stress, improves behaviours and symptoms of ADHD, and was even associated with higher standardized test scores.

The GI facilities in low-cost housing can evoke positive physical and psychological wellbeing of individuals and the social cohesiveness of society. For example, activities can reduce the attention fatigue and stress of an individual from daily hectic urban life. The community can also have a common space to gather and interact in their neighbourhood. Studies have shown that the population of the local community will be more progressive and satisfied with their overall wellbeing when living in a conducive environment (Zhu & Fu, 2017; Shin et al., 2006).

2.3 Issues and Effects of Limited Outdoor Spaces

Studies suggest that the lack of proper GI facilities to carry out activities such as resting, recreation, and socialising outside ones' home, especially for low-income people, has impacted the individual, physical, psychological, and social health of a community (Jennings and Bamkole, 2019; McCormick, 2017; Gascon et al., 2017). As a result, various challenges are faced by residents living in low-cost housing. For example, living in crowded conditions in low-cost housing areas with a lack of indoor and outdoor space will have detrimental effects on ones' overall health and wellbeing (Hanapi and Ahmad, 2016; Karim, 2012). Hanapi and Ahmad (2016) suggest that children living in high-density, low-cost housing are less likely to spend time outdoors, thus limiting or hindering children's outdoor physical activities. Their findings revealed that four distinguished physical characteristics, namely, poor safety, crowding, inadequate facilities, and poor neighbourhood relationships, were found to be the major contributors to fewer physical activities among children. Other studies, for example, raise issues regarding residents' lack of satisfaction with their homes and the communities that they live in (Karim, 2012; Jiboye, 2012; Mohit, et al., 2010). For example, a study by Mohit et al. (2010) indicates that the residents of low-cost housing perceive a moderate level of satisfaction with public and neighbourhood facilities, and their social environment, suggesting that the housing developments are better supplied with public facilities to satisfy their residents. Karim (2012) implies that community facilities are an important domain in any housing area, and more so for the lower-income group. Residents in low-cost housing deserve better quality and service and enough facilities. For example, the location of facilities should not be far from their homes, within comfortable walking distance, and should be provided with adequate children's play spaces. Hence, the low-cost housing environment is facing the issue of satisfactory living standard, which is contrary with what has been aspired in the National Housing Policy - Thrust 6, that is enhancing the level of social amenities, basic services, and liveable environment of the low-income earners in the public housing (NHP, 2011; NHP, 2019).

2.3.1 Physical and Psychological Effects

From physical and psychological standpoints, statistics have shown that the number of cases related to being overweight, obese, depression, and mental illness in Malaysia has increased among adults, young people, and even children. For example, the number of cases showed that Malaysia was among the highest in obesity cases (43.5%), with heart attack being the leading cause of death among Malaysians since 2005 (Ministry of Health, Malaysia, 2017). Non-communicable diseases (NCDs) such as diabetes, hypertension, heart-related diseases, and high cholesterol in Malaysia affect nearly 3.4 million people. One out of 5 adults in Malaysia have diabetes, which makes up a total of 3.9 million people aged 18 years and above (Ministry of Health, Malaysia, 2019).

In terms of psychological effects, a survey conducted by the National Health and Morbidity Survey (NHMS) in 2019 showed that 9.2% of B40 household income children have a mental health problem. Depression among Malaysian adults affects half a million people. It is said that mental illness is expected to be the second cause of the deterioration in the health of Malaysians

after heart disease. These conditions are associated not only with life and work stress but also with being less active and a sedentary lifestyle. This is because one out of four adults in Malaysia is physically inactive. The data includes 27% of urban dwellers and 39% of students who are in their youth. Such a lifestyle increases life-threatening diseases or non-communicable diseases (NCDs) such as diabetes, heart-related diseases, and mental disorders that ultimately result in morbidity and death.

2.3.2 Social and Community Effects

From a social standpoint, residents feel less harmony in their community, thus leading to a lack of a sense of belonging and attachment to their local community. As suggested by many researchers, the feeling of belonging to a community is important in society (Gonyea, et al., 2018; Nor Atiah, et al., 2015). This includes a sense of attachment to the physical environment of the place, as well as social bonding with the community. This is because the feelings are related to satisfaction with one's living conditions in a housing community, be it in terms of the physical environment or social connection to the community. It spurs the willingness to invest time, energy, or money into nurturing relationships between family members, neighbours, and friends. An individual develops that sense of belonging to their community through satisfaction with their living conditions and environment, good social interaction, transactions, and cooperation with the community.

Based on social issues, it is suggested that people living in high-rise buildings do not recognize each other (He, 2018). Hence, neighbours living nearby do not build a positive community atmosphere. Social interaction is difficult in high-rise buildings, so social relationships are hard to develop (Gifford, 2007). As a result, there is a lack of trust, care, respect, and mutual assistance among the residents. This is related to the lack of outdoor infrastructure, including communal space and GI facilities. Limited external public space is one of the causes of the inability of residents to meet and mingle. For example, with a lack of outdoor spaces, the elderly, who are usually retirees, will spend a lot of time at home and do not engage in outdoor activities (Freeman et al., 2019). Youngsters will spend their time outside their neighbourhood with a lack of parental surveillance. On the safety aspect, the lack of interaction leads to a lack of natural surveillance in the housing areas. Positive social qualities create a population's tendency to help each other. The lack of natural surveillance makes the neighbourhood susceptible to the occurrence of crimes and vandalism. Therefore, efforts should be made to improve the housing environment so that residents can live comfortably and feel safe in their communities to nurture a sense of belonging and attachment to their place and community.

Homes and the outdoor living environment need to be comfortable, conducive, and safe. Based on the literature reviews, the paper implies that optimal and comfortable outdoor communal and GI facilities in low-cost housing communities promote better living conditions, healthy lifestyle, closeness, and care among each other, thus strengthening the sense of community (Ross et al., 2020; Ross and Searle, 2019; Francis et al., 2012). That can affect the quality of life in society. The conditions contribute to the prosperity and unity of the community. Even with small spaces, they can be optimally used for various activities if they are designed as intended and desired by the community. The space will eventually provide a conducive environment for residents that will improve the health and well-being of the low-income community. In other words, the residents will be more comfortable, safe, appreciative, and satisfied with their neighbourhood.

3. Methodology

3.1 Data Collection and Analysis

The data collected in this study consists of primary data acquired from several methods: spatial analysis, interviews with the Joint Management Bodies (JMB), and a questionnaire survey of residents. The types of GI available at each study site were identified using drone images that were converted into AutoCAD spatial maps. It was also confirmed by site visits. The location or position of existing GI using spatial analysis aids the analysis process by visualizing the percentage and types of infrastructure. The interview data obtained background information about the housing from the JMB staff, such as the population, the types of GI, activities undertaken, constraints, and needs of GI in the study areas.

Most of the data for the study came from the questionnaire survey. The items of the survey contained the background of respondents, residents' concerns in the housing area, and the GI that residents need in their living environment. The items were measured using the nominal scale, the Likert scale, and open-ended questions. They were analysed and summarized descriptively using percentages.

Before the actual survey, the questionnaire was tested by the JMB staff, who were also the residents and the participants in the interview. This is to improve the wording, clarity, and reliability of the questionnaire items. A convenient sampling method was used to collect the data, in which the respondents were the residents of the three case study sites. The estimated total number of residents living in each flat is 2700. Hence, based on the sample size table determined by Adam (2020), the questionnaires should be distributed to 239 residents (90% confidence level; t=1.645) of each flat. However, the rate of return from the residents was lower than the targeted sample population. The questionnaire responses obtained from the residents were: Lembah Jaya (n=116), Kajang Utama (n=50), and PKNS PJS2 flat (n=85). Hence, the researchers acknowledge this limitation. Nonetheless, the survey data was not the only data used in interpreting the data. It is supplemented by interview and spatial analysis data to achieve an acceptable understanding of the results of the study.

3.2 Description of Study Area

Three sites in Selangor were selected, namely, Lembah Jaya flat in Ampang, Kajang Utama flat in Kajang and PJS 2 PKNS flat in Petaling Jaya. Lembah Jaya flat is in Lembah Jaya, Ampang. This flat was built as a re-location of squatters that came to Selangor from other states, such as Kedah, Perak, Johor, and Kelantan. According to the Joint Management Body of Lembah Jaya, there

are 525 units of dwelling in this high-rise building that was completed in 1990. The housing area was originally a settlement in the mining area from the 1970s to the 1980s. The land was later converted into low-cost residential flats, lots of houses, commercial centres, and embassy buildings following the government's recommendation to implement a zero-squatter program around the Klang Valley. Based on the spatial layout analysis, the land uses of the Lembah Jaya area are varied. The majority consists of housing areas, followed by industry (Figure 1). There is an educational institution nearby the high-rise flats. Looking at the layout, the outdoor spaces within the compound of the flat are spacious, but they consist mainly of hard surfaces for parking with very few green areas. According to the JMB and from the site visit, there is no playground in the compound except for a small triangle green area (4m2), supposedly a playlot area in front of the housing entrance, but with no play equipment.

Figure 1 Lembah Jaya flat and the neighbourhood context

Kajang Utama flat is in Taman Kajang Utama, Kajang, Selangor. The housing area is located between Kajang town and Bandar Baru Bangi. According to the JMB Kajang Utama, it is a 5-story building block with 400 units of housing, which are occupied by mostly B40 and M40 residents. The flat consists of four blocks separated by a playing field. Each building consists of two corridors separated by two staircases at the end of the block. 60 per cent of the residents are Malay, 25% are Indian and 15% are Chinese, and other ethnic groups and migrant workers. Based on the spatial layout analysis, Kajang Utama flat is surrounded by several housing areas, commercial areas, educational institutions, and industrial areas. The major land uses of Kajang Utama flat are residential areas, followed by industrial areas and commercial areas (Figure 2). Kajang Utama has several schools and other public facilities. SK Kajang Utama and SMK Kajang Utama are the educational institutions in Taman Kajang Utama. The location of the schools is adjacent to each other and their distance from Flat Kajang Utama is only 550 meters. Among the three study areas, this housing is spacious and green, in terms of the availability of GI and the width of the streets. Based on the site visit, there is no proper sidewalk and a lack of shelter, even though the landscape area is spacious.

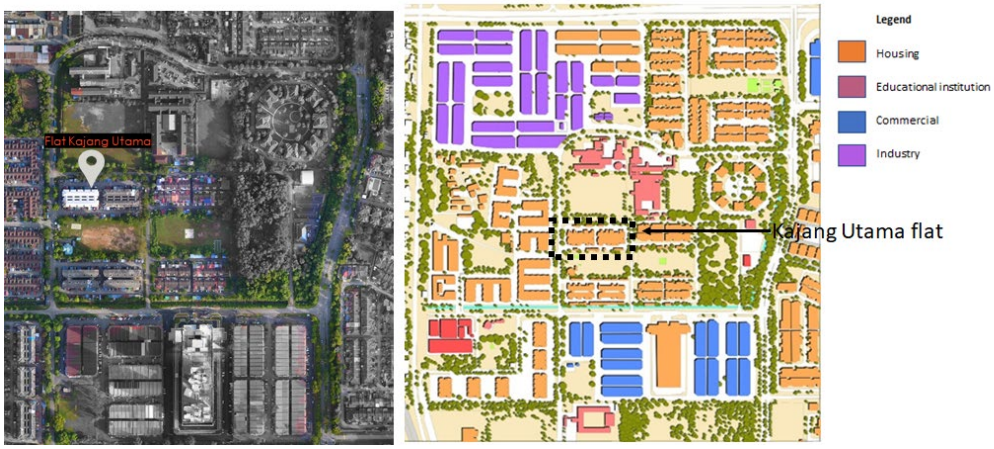

Figure 2 Kajang Utama flat and the neighbourhood context

PKNS PJS2 flat is in Petaling Jaya near Taman Medan Cahaya and Taman Dato Harun. According to the JMB of PKNS PJS2 flat, the housing area consists of five buildings 5-story high with 400 units of houses. It was originally a residential area that had relocated squatters from Kampung Dato Harun in 1999. A majority of the resident is in the B40 and M40 groups. Based on

the spatial layout analysis, it is quite a dense area squeezed in between other housing developments. The land uses are various and other public facilities are near (Figure 3). The neighbourhood consists of various public facilities, including the transportation system, commercial, health, and education facilities. The flats' compound has a variety of GI spaces such as playground and planting parameters surrounding the housing area. However, due to their age, the facilities are mostly run down and unkempt. The residents make do with the outdoor spaces by building their community shelter and garden. Based on the site visit and interview, no sidewalk connects the housing area with other neighbourhoods, GI, and public facilities. The road systems are narrow and busy with traffic.

Figure 3 PKNS PJS2 flat and the neighbourhood context

4.0 Results and Discussion

The results from the questionnaire survey are presented in several sections, namely: (a) Background of respondents, (b) Challenges, and (c) The preference of GI in the neighbourhood. The responses are tabulated descriptively in percentage from the measurement scales mentioned in the methodology section.

4.1 Background of Respondents

Table 1 shows the summary of the respondents' background in the three study areas. The results are not meant to be compared due to different sampling sizes and settings of the housing areas. The items consist of six dimensions, which are gender, age, educational background, occupation, income level, nature of residency, and duration of the residency.

Table 1 Background of Respondents in Three Study Areas

	Item	Measure	Lembah Jaya Flat (n=116)	Kajang Utama Flat (n=50)	PKNS PJS2 Flat (n=85)
1.	Gender	Male	38%	64%	63%
		Female	62%	36%	37%
2.	Age	12-19 yrs old	0.9%	0%	0%
		20-29 yrs old	17%	**29.5%**	21.2%
		30-39 yrs old	**33%**	**35%**	**22.4%**
		40-49 yrs old	**36%**	**29.5%**	20%
		50-59 yrs old	11.2%	6%	**28.2%**
		>60 yrs old	1.7%	0%	8.2%
3.	Educational background	College/university	39%	**58.8%**	32%
		Primary & Secondary	**55%**	**35.2%**	**61%**
		No formal education	6%	6%	7%
4.	Occupation	Government sector	6%	17.6%	17.4%
		Private sector	**60%**	**58%**	**45%**
		Self-employed	14%	5.8%	16%
		Not employed (student, housewife)	20%	18.6%	21.6%
5.	Income	RM4001-RM5000	2%	5.8%	3%
		RM3001-Rm4000	13%	13.2%	19%
		RM2001-RM3000	30%	29%	19%

		RM1001-RM2000	**40%**	**52%**	**24%**
		<RM1000	15%	0%	**35%**
6.	Residency	Permanent	**92%**	48%	**93.5%**
		Temporary	8%	**52%**	6.5%
7.	Duration of residency	>20 years	3%	11%	**64.5%**
		16-20 yrs	15%	0%	9%
		11-15 yrs	**51%**	**35.2%**	10%
		5-10yrs	16%	18.6%	10%
		<5 yrs	15%	**35.2%**	6.5%

The total number of respondents obtained from Lembah Jaya flat is 116, 50 respondents from Kajang Utama and 85 respondents from PKNS flat. Two-thirds of Kajang Utama and PJS2 respondents are male, and two-thirds of female respondents are from Lembah Jaya flat. In terms of age, the respondents in Lembah Jaya consist of 69% of older adults and in Kajang Utama, 64.5% of them are the age of 30 to 49 years old. However, in PKNS flat, the respondents consist of more respondents of older adults between the ages of 40 to 59 (48.2%).

The item for education level showed that half of the respondents from Lembah Jaya and PKNS flats obtained up to a secondary level of education (SPM/LCE). For Kajang Utama, half of the respondents have tertiary education. Kajang Utama consists of more temporary residents than permanent residents, which means that they are most probably renting the place and working near their residency. More than half obtained a college or higher education. This shows that most of the respondents were employees who are still in the workforce. The educational background also infers that the respondents have basic knowledge of the environment. In terms of the income level, respondents from all three housings received minimum income, with the highest income being RM2000. Half or more than half of respondents work in the private sector.

4.2 Residents' Concern on GI Facilities

This section consists of question that relates with challenges that become the residents' concern when living in the low-cost strata housings. Challenges related to the communal and GI facilities are presented from the open-ended responses of the questionnaire. The responses were analysed categorically and are shown in Table 2. Since it was an open-ended response, it is acknowledged that the result has limitations because not all respondents from each residency answered the question. Only one-third of the respondents answered the question due to their reluctance to fill in this type of question.

Table 2 Types of concern

Concerns	Lembah Jaya Flat	Kajang Utama Flat	PKNS PJS2 Flat
Green infrastructure & built facilities	No recreational park No space for gardening. No playground No shade at surau and kindergarten Limited parking space	Lack of playground maintenance Need beautifying the environment – e.g. re-paint building, Lack of shelter Narrow route	Limited outdoor space No walkway Need a greener environment. Need recreational area Need planting space

Nonetheless, based on the responses, there are several significant issues were identified. For example, Lembah Jaya flat is very lacking in GI facilities (Figure 4). This finding is parallel with what has been suggested by Omar et al. (2016), who indicated that the facilities in low-cost flats are not sufficient to entertain the entire neighbourhood, especially the younger residents. Firstly, the absence of a playfield and playground for small children to spend their leisure time, having playtime after school and on the weekends has become the main concern of the residents. In Lembah Jaya flat, the only open space allocated for children is a 2 x 2 m2 triangle space near a busy entrance that was supposed to be a playlot. Since it is not a functional and safe play space, it was abandoned and became just an empty grass area. There are no walking distance playfields for youngsters to play and be active. A recreational park is located far from the neighbourhood. At the same time, there is no space for gardening, an activity that can be carried out together in a community that will induce social bonding. The other concern is the lack of shade within the compound of the high-rise flat such as near surau and the kindergarten. The only vast open space is hard barren surfaces allocated for residents' parking area. Even though the spatial analysis showed that the hard surfaces for the parking area are spacious, there is still not enough to accommodate vehicles. This is because the strata housing is a 16-story high-rise building with at least 2000 occupants. Therefore, in this case, the residents must make do with the existing parking with a good system and management. Due to this as well, most of the left-over outdoor spaces are used by residents to park their vehicles. As a result, there is no space to plant trees and there are minimal planting spaces.

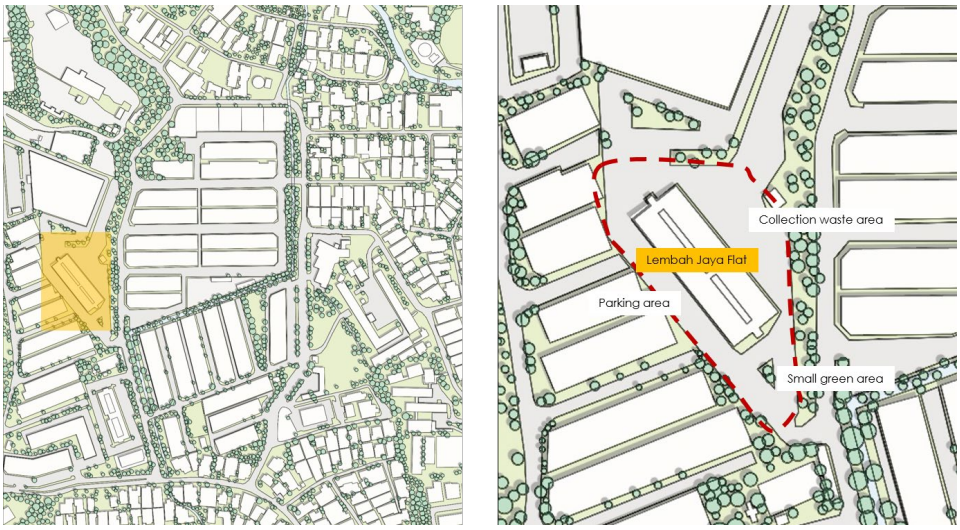

Figure 4 GI spaces in Lembah Jaya flat

On the other hand, the respondents in Kajang Utama flat have ample outdoor green spaces. Figure 5 of the Kajang Utama spatial map shows that the area consists of an open playfield with a playground, and a street landscape with a wide road system. Nonetheless, they raised their concern about the lack of maintenance of the existing built landscape features, such as the playground area. Even though there are spaces, landscape furniture such as seating areas and shelters is not available. Some respondents claimed that the pedestrian route was narrow. This result expressed by the respondents can be interpreted that even though there is a wide road system, no proper sidewalk and pedestrian routes are connecting to important public facilities within the housing area and the neighbourhood. Hence, they have to walk adjacent to moving vehicles, therefore it is 'narrow' for walking and unsafe. Beautifying the environment is another dimension revealed from the responses. It means that it relates to proper upkeep and maintenance of the area for a better living environment for the residents in Kajang Utama flat.

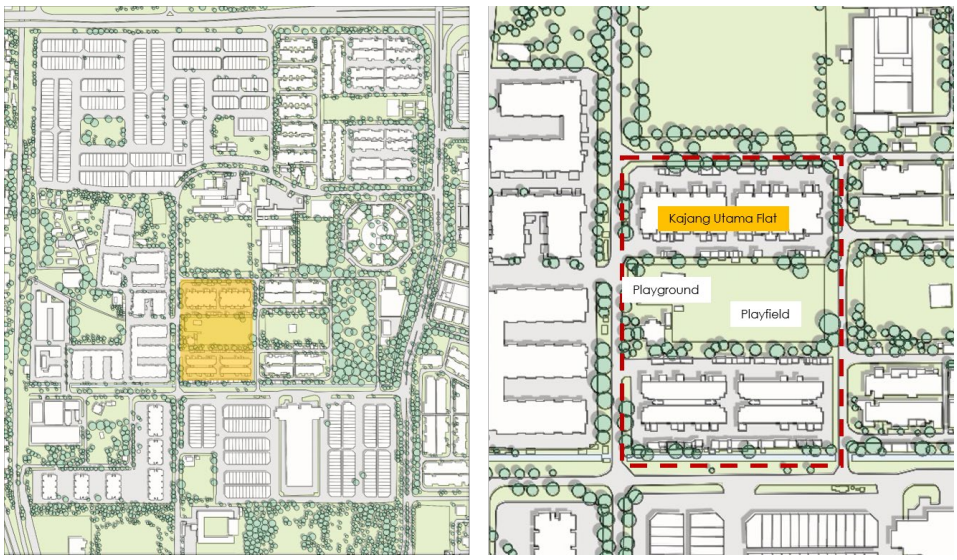

Figure 5 GI spaces in Kajang Utama flat

The respondents in PKNS PJS2 flat raised issues about the lack of walkways and limited community and GI facilities. The spatial layout of PKNS PJS2 flat is compact because it is an old neighbourhood located in a dense area of Petaling Jaya, Selangor (Figure 6). As a result, the responses of the open-ended survey were inclined toward needing a greener environment, more recreational areas near their residence, and more planting spaces for gardening. Due to its compact built-up, there are very narrow pedestrian routes but with some street plantings. But it has no accommodation for future improvement to achieve comfortable pedestrian walkways.

Figure 6 GI spaces in PKNS PJS2 flat

Based on the responses from the three flats, they imply that the settings of each flat are different, yet some have similar conditions concerning the outdoor space of the neighbourhood. For example, if the outdoor area is spacious, such as in Kajang Utama, there are issues with the upkeep of the overall environment and image. Due to the limited GI facilities, especially in Lembah Jaya and PKNS PJS2 flats, it hinders residents from doing individual activities such as leisure and recreation, as well as community activities including gardening. The current pandemic situation worsens the residents' living conditions, which implicates them in terms of physical activity and mental stress. The lack of outdoor spaces is highlighted in many works of literature, such as by Hanapi and Ahmad (2016), who claim that children who live in high-density, low-cost housing will be less likely to spend time outdoors. This is true in the context of Lembah Jaya which has almost no play space for children and youngsters, thus limiting or hindering their outdoor physical activities. As such, the implications of not having ample nearby outdoor spaces for physical activities, especially for youngsters and children, can be detrimental. Similar responses to PKNS PJS2 flat on the needs for outdoor spaces for recreation and community garden areas. These responses are more directed towards the needs of older adults' activities. Research by Finlay and co-authors (2015) indicates that outdoor facilities and GI areas are valuable resources for residents, especially for the elderly. They need to get quick access to the facilities because of barriers to mobility for older people. Hence, they afford and depend on immediate outdoor green spaces outside their dwellings for utility and recreation, as suggested by Finlay et al. (2015). As for Kajang Utama flat, the most important aspect of improvement should be directed towards better upkeep and uplifting the environment, for example, by adding landscape furniture such as benches and shelters. The facilities can attract residents to do activities outside and get to know their neighbours. The majority of the residents rent the place. If the residents were presented with a clean and beautiful neighbourhood environment, they are more comfortable, become familiar with the place that they live in, and are willing to participate and socialize with neighbours. Familiarity and bonding to a place are important dimensions for a sense of community, as posited by many researchers such as Ross et.al. (2020), Ross and Searle (2019), and Francis et al. (2012).

4.3 Preferred GI Facilities

This section finds out the types of GI facilities that the residents of three low-cost strata housing need in the immediate compound of their residency and their neighbourhood. The preference for the types of GI was measured using a ranking scale as shown in Table 3. Based on literature reviews, there are eight types of GI categories. They were included in the questionnaire. Respondents were asked to rank the most preferred GI that they want to have in their neighbourhood and consider important for their community. Rank 1 means the most preferred GI and Rank 8 is the least preferred GI. The ranking question was supplemented by an open-ended question in Section D of the questionnaire that asked the respondents about the changes that they needed to their housing area.

Table 3 Ranking scale for preference of GI

Categories of GI		Ranking scale: 1-highest; 8-lowest		
		Lembah Jaya Flat %/rank (R) (n=116)	**Kajang Utama Flat %/rank (R) (n=50)**	**PKNS JPS 2 Flat %/rank (R) (n=86)**
	Open playfield	**89% (R1)**	**88% (R1)**	**96% (R1)**
	Recreational green infrastructure (park)	**73% (R2)**	**78% (R3)**	48% (R5)
	Small garden & pocket spaces	**64% (R3)**	**83% (R2)**	**70% (R2)**
	The green area in front of buildings	62% (R4)	38% (R4)	**63% (R3)**
	Designed green corridor	47% (R5)	5%	38% (R6)
	Reserve natural land	28% (R6)	5%	58% (R4)
	Civic open space (square/plaza)	17% (R7)	16% (R5)	10% (R7)
	Natural green corridor	4% (R8)	5%	3% (R8)

Table 3 shows the ranking of responses from the highest to the lowest rank for three case study sites. The highest-ranking on the most preferred GI for Lembah Jaya flat shows inclination towards four types of GI. They are open playfields (89%-R1), recreational parks (73%-R2), small gardens and pocket spaces, and green spaces in the building's compound, such as in commercial, institution, community, and religious centres (62%-R3). The highest ranking on preferred GI in Kajang Utama flat is for three types of GI, namely open playfield (88%-R1), small gardens and pocket spaces (83%-R2), and recreational park (78%-R3). The highest ranking on preferred GI in PKNS PJS2 flat are four types of GI, namely open playfield (96%-R1), small gardens and pocket spaces (70%-R2), green spaces in the building's compound (63%-R3), and reserve natural land (58%-R4). Hence, the results from the three case study areas reveal nearly similar preferences of GI in their neighbourhood. The three highest rankings of GI consist of the open playfield, recreational park, small garden space, and green area in front of building compounds.

What can be interpreted from these results is also about the concerns of residents regarding the outdoor environment of their neighbourhood (Section 4.2). The residents preferred an open playfield, which could accommodate youngsters and adult residents. Other preferred GIs are recreational parks, small garden spaces around the neighbourhood, and in the compounds, because various activities can be carried out here, either individually or as a community. Concern regarding the lack of play areas for small children and youngsters is prevalent, especially in Lembah Jaya flat. Concern about activities for older adults was raised by residents in PKNS flat because there of this age group of residents in this flat. In this current situation, the positive changes in outdoor spaces and the environment in the housing areas are even more crucial, for residents to overcome the effects caused by the COVID-19 pandemic. Studies by Jennings and Bamkole (2019) and Hanapi and Ahmad (2016) have noted that living in small dwellings and dealing with limited outdoor spaces causes pressure on their occupants. This situation can be inferred as happening in the three case study sites in Selangor, which affects their overall health and well-being.

The responses from the ranking question were supplemented by an an-open-ended question in the survey. A maximum of thirty-five respondents from Lembah Jaya flat, nine respondents from Kajang Utama flat, and twenty-eight respondents from PKNS PJS2 flat answered the open-ended question. Even though the responses were limited due to several factors, the researchers got to understand the reasons behind their preference for GI in the neighbourhood. The open-ended answers were thematically analysed to reveal five (5) important types of GI needed by the residents. They are recreational GI, playfield, planting space, shaded areas, and social space. Firstly, the respondents from Lembah Jaya noted that they need a recreational park for all to do recreational activities and socializing (35 responses). They appreciate it if the space is within walking distance of their home, which can save money and time on travelling and other expenses. Meanwhile, a playground is important for children because it enables them to play in the designated area safely without disturbing other residents or making noise. They stressed that the facility is needed to discourage children from immersing themselves too much in gadgets. Kajang Utama respondents noted that recreational space enables them to spend relaxing time (4 responses). Respondents from PKNS PJS2 flat said a recreational park that is within reach enables them to be

comfortable and do exercise, especially for older adults, to achieve healthy living (28 responses). Respondents from all three flats noted that they need gardening space (Lembah Jaya-23; Kajang Utama-4, PKNS PJS2-15). The reasons are such as they can spend leisure time planting a garden, saving money on vegetable consumption, it is a favourite passing time activity, especially for the elderly in the community, and sharing their produce with neighbours. Shaded areas are important for all three case study sites. Trees can shade pedestrians during warm days (Lembah Jaya-12 respondents), reduce heat, and give better air quality and comfort to the surrounding area (PKNS PJS2 – 10 respondents). Overall, planting trees around the neighbourhood will offer a greener environment and teach the younger generation to value the natural environment. Social space is one of the important dimensions noted in the open-ended responses. Social spaces are needed for residents to do leisure recreation that can relax their minds. Elements such as shelters need to be added and upgraded with appropriate facilities for them to be a conducive gathering space for activity and hold events for the community. This element is considered a node for social bonding with the community.

Based on the ranking and the open-ended responses, it can be implied that all case study sites need improvement in the form of GI facilities, such as improving the existing outdoor community spaces, greenery, and providing more landscape furniture and elements. Mostly, these responses pointed out the need for outdoor facilities where residents can seek refuge from crowded living conditions inside their dwellings. For example, GI should be near home so that it is reachable, particularly for the elderly to do exercise and relax in the immediate area of their home. Gardening space is also useful for reducing daily food expenses and promoting healthy eating habits of residents of low-income groups. Local authorities and non-government agencies can assist in terms of seed supply and designating left-over spaces in the flats' compounds for the residents to work on these areas and do activities together. Playfields, courts, and playgrounds should be properly allocated so that youngsters and children can be active and be near their homes without parents' concern about safety. Tree-lined streets provide shade and reduce the temperature, improve air circulation and oxygen, and give comfort to the surroundings. A green environment and a healthy community should be promoted in the neighbourhood. Thus, GI facilities can ensure better well-being for the low-income community. This is in line with studies by many that suggest access to outdoor spaces with facilities is associated with improved overall health and well-being (e.g. McCormick, 2017) and satisfaction towards the community (e.g. Zhu & Fu, 2017; Karim, 2012).

5.0 Conclusion

Housing development has been an important social and political agenda in Malaysian development policies. The housing scenario should create a conducive and liveable environment for all spectrums of residents, be it high-income or low-income groups of citizens. The housing environment with quality facilities and services will support the daily activities and the lives of its residents. Similarly, a healthy lifestyle, especially in the current pandemic situation, can be intensified with good provision of communal and GI facilities, particularly in the low-cost housing environment. Thus, the current planning standards and guidelines for housing should go beyond their basic provisions, that is, to offer a conducive environment that improves the wellbeing of the low-income community.

A good planning layout of outdoor spaces in the housing areas equipped with amenities, basic infrastructure, a good transport system, a comfortable neighbourhood, guaranteed security, and a clean environment will prosper the community living in any neighbourhood. Therefore, based on the views of the residents, a quality housing environment should be directed towards improving the outdoor living conditions of low-cost housing developments to meet their needs physically, socially, economically, and environmentally. The findings of this study suggest that physically, residents need GI facilities that cater mostly to youngsters, children, and the elderly in the form of recreational areas, playfields and playgrounds to achieve active living. Socially, they need landscape elements such as shelters, comfortable width with shaded pedestrian paths, and a community garden to do leisure activities individually and meet others. Planting activity is seen to bring economic benefits in terms of lowering food costs and sharing products from the garden. Environmentally, a greener environment will bring comfort, increase the overall image of the neighbourhood, or even offer a good lesson to the younger generation about the value of the natural environment. Thus, we must plan development that emphasizes the use of this space and its other potential to be used as elements in a housing development. It calls for the government, developers, and local authorities to modify the development approach for this type of housing to emphasize a healthier, quality, and sustainable environment for the local community. This is in line with the focus on ensuring shared prosperity and well-being for societal harmony in Malaysia.

The study acknowledges limitations that limit further discussion of the findings from the residents through a survey questionnaire. Among others, the limitations of the study obtained from closed-ended questions are not supplemented well with open-ended questions due to the low rate of response. The residents might have constraints or be reluctant to express themselves in written format rather than the tick responses from the closed-ended questions. Hence, the rationale for the discussion is based on the limited responses obtained from the small numbers of residents and is cross-referenced with the reviews of literature. As such, future studies that use the method of approaching housing residents should opt to obtain more data using semi-structured interview sessions. This can ensure the elaboration of results in a comprehensive manner.

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