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Assessing Safety Level of Affordable Housing Based on Safe City Concepts

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Abstract. Safety of residential areas, especially affordable housing has become an important aspect, and has been listed as part of Sustainable Development Goal (SDG) initiatives by the United Nation (UN). Several initiatives on measuring the safety level have been proposed, including Safe City Index 2019, Safe City Program, Defensible Space Concept, crime prevention through environmental design (CPTED), Smart Sustainable Cities, etc. However, some of these initiatives focus only on crime, others focus on steps to improve safety and other models that are broader but not specific to safety. Besides that, these models place less emphasis on the aspects of spatial assessment, especially the safety level assessment based on affordable housing location in Malaysia. To handle these issues, this study's aim is to enhance current indicators to assess the safety level of affordable housing, using Kuala Lumpur, Malaysia as a case study area. This study identified 6 indicators; crime, safety and security, infrastructure security, accessibility, natural disaster, and health security. Spatial analysis was done based on the indicators, and from the results, it shows that almost all of the affordable housing score are more than 50%, with the highest score is 76.50%, and the lowest score is 44.7%. This indicator can be used as a basis to assess the safety level of affordable housing, especially in Kuala Lumpur, Malaysia.

1. Introduction

Safety of housing areas has become a consideration for residents lately, especially for affordable housing. Urbanization process raised many concerns in the region, especially on the safety of its

residents, that will affect their quality of life [1]. United Nation (UN) has listed that safety of communities is part of Sustainable Development Goals (SDG), as part of goal number 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation, and part of goal number 11: Make cities and human settlements inclusive, safe, resilient and sustainable [2].

To handle these issues, several initiatives have been designed and implemented, to reduce the security issues, or disaster risks that are based on the concept of safe city. Safe City concept dedicated to ensure the urban area free from all the physical, social and mental threats [3,4]. The concept of Safe City is the urban or city is in a protected state, not creating an atmosphere that can encourage incidents that interferes with the well-being of the local people and their occupants are always in the most secure, prosperous, healthy and cheerful condition [5]. With this situation and safety of residents well-protected, people will avoid danger and disaster, free from fear and able to conduct a safe and sound life [5].

Several initiatives on concept of safe city has been proposed previously, including Safe City Index (2019) [5], Safe City Program in Malaysia [6], Defensible Space Concept [7], Crime Prevention through Environmental Design (CPTED) [8], and Smart Sustainable Cities in Cagliari, Italy [9].

Some of these initiatives have different focus, some initiative focuses only on crime, while another focus on step to improve safety and other model that are broader focus but not specific to safety. Besides that, these initiatives lack on the aspects of spatial assessment, especially on the safety level of affordable housing surrounding in Malaysia. To cater these issues, this study aim is to enhance current indicators to assess the safety level of affordable housing, using Kuala Lumpur, Malaysia as case study area. The scope of study focused on the indicators to assess from several aspects, and use the affordable housing scattered in Kuala Lumpur area, Malaysia.

2. Background Study
To assess the safety level of affordable housing, the definition of safe city concept, and the relationship between safety with affordable housing need to be addressed. Safe city concept can be defined as a city that is free from all kinds of physical threats, social and mental threats and protected from any tendencies that can threaten the welfare of society and contribute to creating a prosperous, secure and comfortable environment [5]. A city should be a safe place to live, work and play [5]. There are three aspects that are related to each other that influence the success of a city and a society which are housing, public facilities such as schools and shops and urban environment that influences the behavior of the local community [10].

In Malaysia, to overcome the issues with safety and crime prevention, the safe city concept was introduced in 2004 [10]. The Malaysian government has asked all locals to identify and implement the Safe City concept when planning policies for their local areas. The Paper Work of the Safe City Implementation Program was introduced with 23 steps that were divided into 3 main programs to reduce and prevent crime, and increase the safety of housing areas [10]. Safe city concept requires involvement and cooperation between several layers of communities, government, and private agencies in designing and creating the safe surrounding [11,12]. The concept of a safe city requires the involvement and cooperation of every layer community and government and private agencies in creating a safe environment. Crime prevents measures that are emphasized to achieve a quality and prosperous life. The goals of the safe city concept have 4 main threats; Natural Disaster, Violence, Accidents Indoors and Outdoors, and Social and Moral Degradation [11]. Figure 1 shows the goals of safe city concepts.
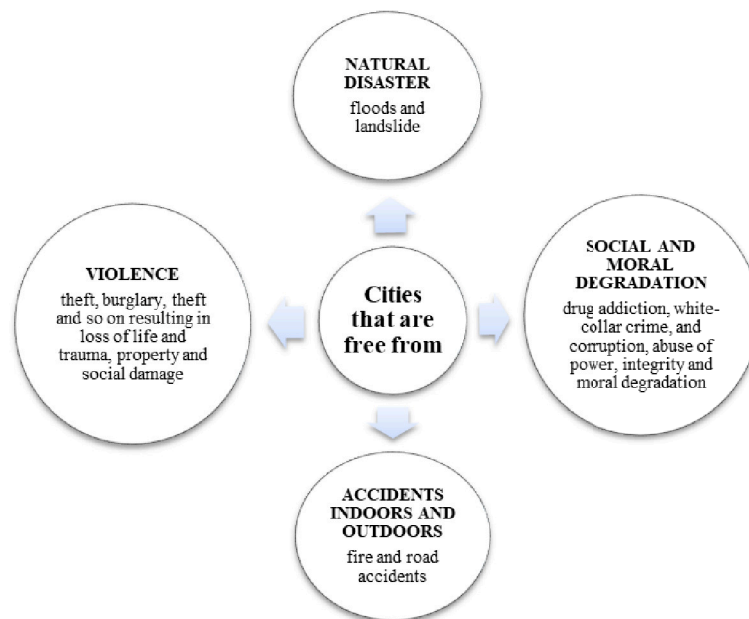
Figure 1. Goals of creating a safe city concept [11].

One of the main implementation of safe city concepts it to affordable housing area [13]. Affordable housing are important and currently being implemented for almost every countries in the world, especially the developing countries [14]. Affordable housing also has become major agendas for almost every country, and the concept of affordable housing should consider safety as part of its criteria [15]. A safety affordable housing can be considered as affordable residential area that free form all kinds of physical threats, including from social, mental, and other tendencies that can threaten the communities. With safer area of affordable housing, communities can contribute more of well-being and at the same time prevent crime and disorderly behaviour [12].

One of the methods to assess the safety level of affordable housing, is via using indicators. Indicators are based on the parameters or criteria's that being design and develop to see the scoring of safety level. To assess safety level, several model, criteria, frameworks, and indicators was previously developed, such as Safe City Index 2019 [5], Safe City Program, Defensible Space Concept and Crime Prevention through Environmental Design (CPTED) [1], Safe City Program in Malaysia [6], Defensible Space Concept [7], and Smart Sustainable Cities in Cagliari, Italy [9].

These previous studies have different focus and priorities. Safe City Index 2019 focused on urban security and resilience in interconnected area, and CPTED more focused on strategies of designing environmental to prevent crime.

To improve these indicators, an integration of these indicators with spatial information and analysis can be included with current practices. Via integration of spatial information and analysis, the exact location of affordable housing can be identified, the facilities, environmental surrounding area, hot area or areas where crime is likely to occur can be identified, detected and map into the affordable housing area. Figure 2 shows the conceptual model to assess safety level, via integrating spatial information and analysis.
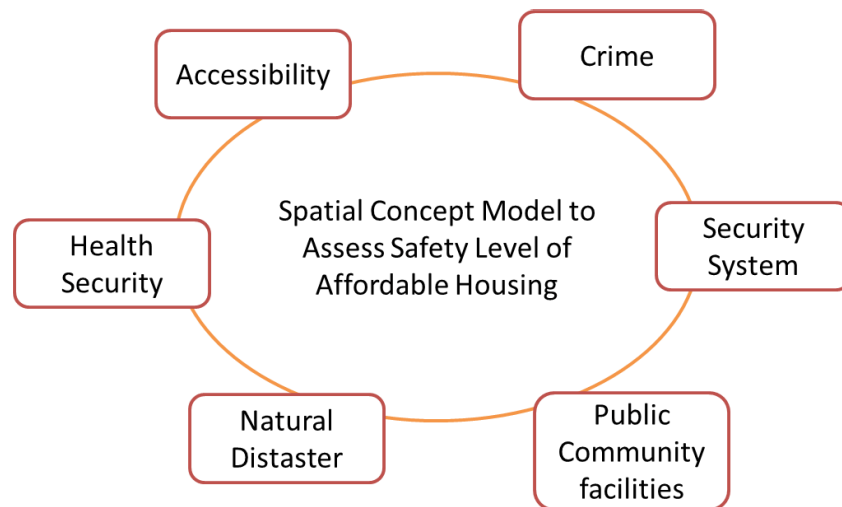
Figure 2. conceptual model to assess safety level, via integrating spatial analysis [13].

3. Methodology

To assess the safety level of affordable housing, this study implements 3 main phases, that based on the research objective. Figure 3 shows the research methods used in this study. The first phase is to identify the issues and limitation from previous study. In these phases, previous models, indicators, formulas, and framework has been studied, and issues related to safety level of affordable housing has been identified.

The second phase is to enhance the previous indicators to assess the safety level. In this phase, this study has identified the related indicators, sub-indicators, and the scoring for each sub-indicator. These indicators and sub-indicators were then listed, and being used in the phase 3, to determine the safety level based on these indicators. Each indicator was given weight, to identified it significant. This weight was given based on numbers of this indicators was mention from previous study, and from expert. Table 1 show the list of indicators, it's weight, sub-indicators, condition and score for each sub-indicator.

The third and final phase is to assess the affordable housing safety level using spatial analysis, to assess its safety level. There are 6 main indicators, and each affordable housing given score based on the analysis, and then being weighted, before the final score being produced. The results of scoring from analysis of each indicator were produced, and the results from all indicators then will be combined and used as an assessment for the safety level of the affordable housing.
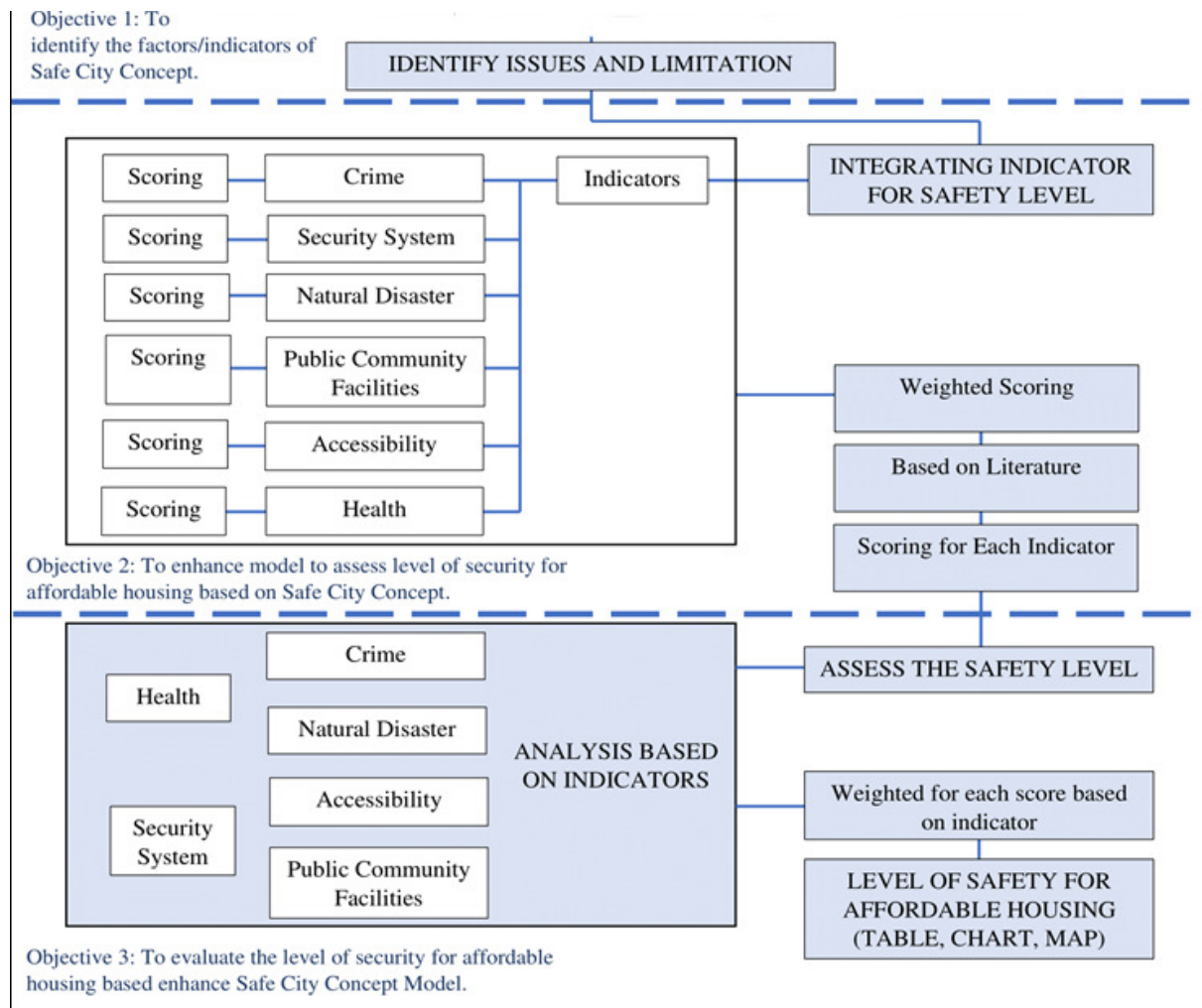
Figure 3. Methodology used in this study

Table 1. List of indicators to assess the safety level of affordable housing.

Indicators	Weight	Sub-indicators	Condition	Score
Crime	0.118	Burglary Crime Rate	< 2% of areas with the lowest crime rate	5
			> Next 14% of areas	4
			> Middle 68% of areas	3
			> Next 14% of areas	2
			> Next top of areas with the highest crime rate	1
Security System	0.294	Safety Mirror	Have safety mirror	1
			Didn't have safety mirror	0
		CCTV	Have CCTV	1
			Didn't have CCTV	0
Natural Disaster	0.059	Flood	Within Flood area	0
			Not Within Flood area	1
Public Community Facilities	0.294	Pedestrian Path	Have pedestrian path	1
			Didn't have pedestrian path	0
		Street Lighting	Have Street Lighting	1
			Didn't have Street Lighting	0
Accessibility	0.176	Police Station	Within 800 meters from police station	1

Health	0.059	Dengue Cases	Beyond 800 meters from police station	0
			Didn't have any cases within a year	2
			Have 1 – 5 cases within a year	1
			Have more than 5 cases within a year	0

In phase 3, spatial analysis was done to identified the distance of affordable housing with all the sub-indicators. Figure 4 shows the buffer analysis for sub-indicator accessibility (police station), and figure 5 shows the example of buffer analysis for all the sub-indicators of affordable housing. Weight for each indicator was formulate based on how many times this indicator was listed in previous studies, and then divided into percentage.

To get the safety level, the score of each sub-indicator was calculated, and combined using Weighted Criteria. And the sum of score value in each cell were computed. Figure 6 show the calculation of total score with weightage.
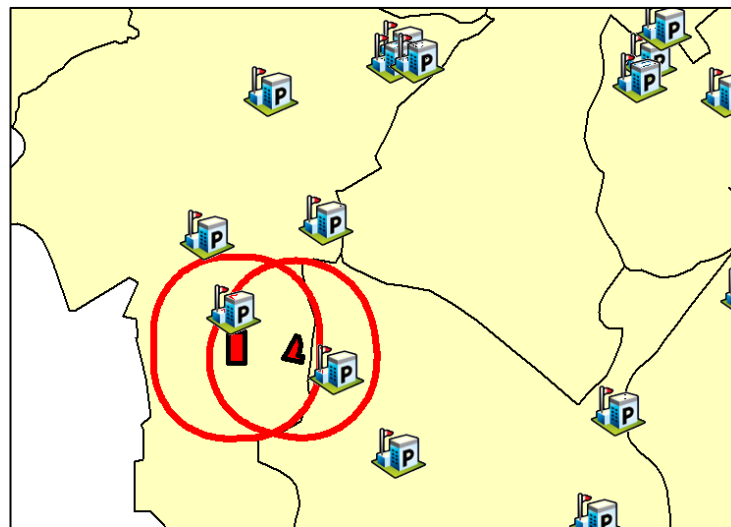
Figure 4. Buffer Radius for Accessibility of The Affordable Housing with The Police Station for 800 m.
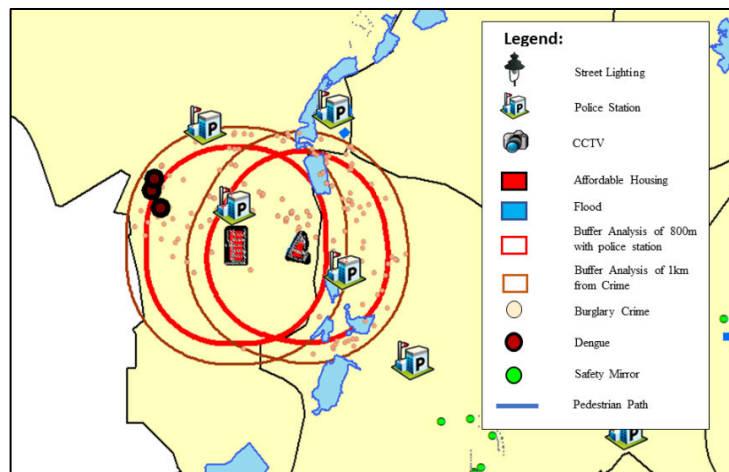
Figure 5. The example of the analysis

$$Total\ Score\ with\ weightage = \frac{Total\ Score\ each\ Indicator}{Total\ Max\ Score\ each\ Indicator}\ x\ weightage\ each\ indicator$$

Figure 6. The calculation to get the total score with weightage.

Data that being collected in this study is the spatial and attribute data of location of affordable housing, the crime information, safety mirror location, CCTV location, pedestrian path, street lighting, flood area location, dengue cases area, and police station. This data was collection from different sources, including from Department of Irrigation and Drainage, PLANMalaysia, and other sources such as downloaded data from Open Street Map (OSM), and survey to field site.

4. Results and Discussion

Results of this study can be divided into 2 main results; the first results are the results of score for each indicator, and the second result is on the combination of all the score. The second result is the level of safety for affordable housing, that based on the safe city concept. For the first analysis, it consists of 6 analyses, that based on the indicators listed in table 1, including the analysis for security system, public facilities, accessibility, crime, natural disaster and health.

a. Security system indicator

The first analysis is the analysis for security system indicators. For this analysis, the score given based on 2 sub-indicators, which is safety mirror, and the availability of CCTV. From the analysis, only 1 affordable housing possess the safety mirror, and other affordable housing didn't have a CCTV. From here, it shows that to increase the safety level of this affordable housing, one of the suggestions to be taken is via installing a CCTV or safety mirror within the affordable housing area. Table 2 show the score of security system indicator. Figure 7 shows the results of this analysis.

Table 2. Score for security system indicator

AH_ID	House Name	Score		Total Score	%
		SM	CCTV		
AH 1001	PPAM Bukit Jalil	1	0	1	50
AH 1002	PPAM Metropolitan Kepong	0	0	0	0

AH 1003	PPR Desa Rejang	0	0	0	0
AH 1004	PPR Gombak Setia	0	0	0	0
AH 1005	PPR Kampung Baru Air Panas	0	0	0	0
AH 1006	PPR Kampung Muhibbah	0	0	0	0
AH 1007	PPR Kerinchi	0	0	0	0
AH 1008	PPR Raya Permai	0	0	0	0
AH 1009	PPR Seri Semarak	0	0	0	0
AH 1010	PPR Sri Aman	0	0	0	0
AH 1011	PPR Sri Pantai	0	0	0	0
AH 1012	PPR Taman Wahyu	0	0	0	0
AH 1013	PPR Wangsa Sari	0	0	0	0
AH 1014	Prima Alam Damai	0	0	0	0
AH 1015	Residensi Bukit Jalil	0	0	0	0
AH 1016	Rumawip Gombak	0	0	0	0
	Total Max Score	**1**	**1**	**2**	

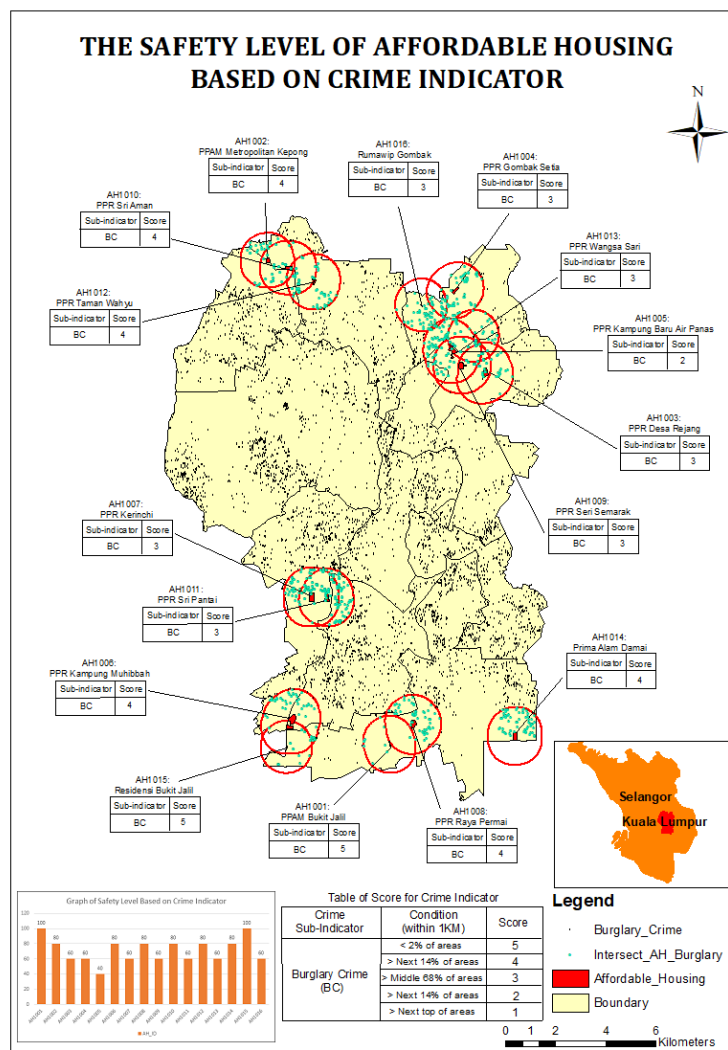*Notes: SM – Safety Mirror, CCTV – Closed-Circuit Television.*

Figure 7. The results of Crime indicator.

b. Public facilities

The second analysis is the analysis on the public facilities indicator. This analysis consists of 2 sub-indicators, which is pedestrian path and street lighting. For this indicator, only 3 affordable housing didn't have proper pedestrian pathway, while others have and have full score. For street lighting, all the affordable housing has with full score. Table 3 shows the affordable housing id, name, and the score for each sub-indicator.

Table 3. Score for public facilities indicators.

AH_ID	House Name	Score		TS	%
		PP	SL		
AH 1001	PPAM Bukit Jalil	1	1	2	100
AH 1002	PPAM Metropolitan Kepong	1	1	2	100
AH 1003	PPR Desa Rejang	1	1	2	100
AH 1004	PPR Gombak Setia	1	1	2	100
AH 1005	PPR Kampung Baru Air Panas	1	1	2	100
AH 1006	PPR Kampung Muhibbah	1	1	2	100
AH 1007	PPR Kerinchi	1	1	2	100
AH 1008	PPR Raya Permai	1	1	2	100
AH 1009	PPR Seri Semarak	1	1	2	100
AH 1010	PPR Sri Aman	0	1	1	50
AH 1011	PPR Sri Pantai	1	1	2	100
AH 1012	PPR Taman Wahyu	1	1	2	100
AH 1013	PPR Wangsa Sari	0	1	1	50
AH 1014	Prima Alam Damai	0	1	1	50
AH 1015	Residensi Bukit Jalil	1	1	2	100
AH 1016	Rumawip Gombak	1	1	2	100
	Total Max Score	**1**	**1**	**2**	

Notes: PP - Pedestrian Path, SL - Street Lighting

c. Accessibility

The third analysis is on the accessibility indicator. In this indicator, it's only had 1 sub-indicator, which is distance to police station. From the analysis, it shows that almost half of the affordable housing in this study score full marks, and others score 1. Table 4 shows the results of this analysis.

Table 4. Score for accessibility indicators.

AH_ID	House Name	Score	TS	%
		PS		
AH1001	PPAM Bukit Jalil	1	1	50
AH1002	PPAM Metropolitan Kepong	1	1	50
AH1003	PPR Desa Rejang	1	1	50
AH1004	PPR Gombak Setia	2	2	100
AH1005	PPR Kampung Baru Air Panas	1	1	50
AH1006	PPR Kampung Muhibbah	1	1	50
AH1007	PPR Kerinchi	2	2	100
AH1008	PPR Raya Permai	2	2	100
AH1009	PPR Seri Semarak	1	1	50
AH1010	PPR Sri Aman	1	1	50
AH1011	PPR Sri Pantai	2	2	100
AH1012	PPR Taman Wahyu	1	1	50

AH1013	PPR Wangsa Sari	2	2	100
AH1014	Prima Alam Damai	2	2	100
AH1015	Residensi Bukit Jalil	2	2	100
AH1016	Rumawip Gombak	1	1	50
	Total Max Score	**2**	**2**	

Notes: PS - Police Station

d. Crime

The next analysis is the crime indicators. In this study, it's only focus on burglary, due to data limitations. From the analysis, it shows that, 2 of the affordable housing score with 100 percent, which indicated that this affordable housing doesn't have any burglary case, and only 1 affordable housing have score under 50%, which indicated that there a lot of burglary cases happen in this affordable housing. Table 5 show the results of analysis for Crime indicator.

Table 5. Score for crime indicators.

AH_ID	House Name	Score BC	TS	%
AH 1001	PPAM Bukit Jalil	5	5	100
AH 1002	PPAM Metropolitan Kepong	4	4	80
AH 1003	PPR Desa Rejang	3	3	60
AH 1004	PPR Gombak Setia	3	3	60
AH 1005	PPR Kampung Baru Air Panas	2	2	40
AH 1006	PPR Kampung Muhibbah	4	4	80
AH 1007	PPR Kerinchi	3	3	60
AH 1008	PPR Raya Permai	4	4	80
AH 1009	PPR Seri Semarak	3	3	60
AH 1010	PPR Sri Aman	4	4	80
AH 1011	PPR Sri Pantai	3	3	60
AH 1012	PPR Taman Wahyu	4	4	80
AH 1013	PPR Wangsa Sari	3	3	60
AH 1014	Prima Alam Damai	4	4	80
AH 1015	Residensi Bukit Jalil	5	5	100
AH 1016	Rumawip Gombak	3	3	60
	Total Max Score	**5**	**5**	

e. Natural Disaster

The fifth analysis is the analysis on the Natural Disaster, with only one sub-indicator, which is the flood disaster. The maximum score for flood is 1, and the minimum score is 0, and the maximum score is 1. From the analysis, all the affordable housing score 100% except affordable housing AH1006, that is inside the flood area. Table 6 show the result of this analysis.

Table 6. Score for Natural Disaster indicator.

AH_ID	House Name	Score F	TS	%
AH 1001	PPAM Bukit Jalil	1	1	100
AH 1002	PPAM Metropolitan Kepong	1	1	100
AH 1003	PPR Desa Rejang	1	1	100
AH 1004	PPR Gombak Setia	1	1	100
AH 1005	PPR Kampung Baru Air Panas	1	1	100

AH 1006	PPR Kampung Muhibbah	0	0	0
AH 1007	PPR Kerinchi	1	1	100
AH 1008	PPR Raya Permai	1	1	100
AH 1009	PPR Seri Semarak	1	1	100
AH 1010	PPR Sri Aman	1	1	100
AH 1011	PPR Sri Pantai	1	1	100
AH 1012	PPR Taman Wahyu	1	1	100
AH 1013	PPR Wangsa Sari	1	1	100
AH 1014	Prima Alam Damai	1	1	100
AH 1015	Residensi Bukit Jalil	1	1	100
AH 1016	Rumawip Gombak	1	1	100
	Total Max Score	**1**	**1**	

f. Health

The last analysis is on the health indicator. In this indicator, it only consists of 1 sub-indicator, which is the dengue cases recorded in the affordable housing area. From the analysis, only 4 affordable housing have score 1, which indicated there is 1 to 5 dengue cases reported in a year. Other affordable housing shows that there no dengue cases reported.

Table 7. Score for Health indicator.

AH_ID	House Name	Score Dengue	Total Score	Percentage (%)
AH1001	PPAM Bukit Jalil	2	2	100
AH1002	PPAM Metropolitan Kepong	2	2	100
AH1003	PPR Desa Rejang	1	1	50
AH1004	PPR Gombak Setia	2	2	100
AH1005	PPR Kampung Baru Air Panas	1	1	50
AH1006	PPR Kampung Muhibbah	1	1	50
AH1007	PPR Kerinchi	2	2	100
AH1008	PPR Raya Permai	1	1	50
AH1009	PPR Seri Semarak	2	2	100
AH1010	PPR Sri Aman	2	2	100
AH1011	PPR Sri Pantai	2	2	100
AH1012	PPR Taman Wahyu	2	2	100
AH1013	PPR Wangsa Sari	2	2	100
AH1014	Prima Alam Damai	2	2	100
AH1015	Residensi Bukit Jalil	2	2	100
AH1016	Rumawip Gombak	2	2	100
	Total Max Score	**2**	**2**	

g. Safety Level of Affordable Housing

From all the analysis of each indicator, the last analysis is to have overall results on the safety level for all the affordable housing in the study area. Because of the score for each sub-indicator is different, to normalize the score into percentages, Analytical Hierarchy Process (AHP) was used, with weighted criteria technique. Table 8 shows the results of the overall score from this analysis.

Table 8. The Safety Level Score of Affordable Housing.

AH_ID/House Name	Score														Total	Safety Level (%)
	C		SS			PCF			ND		H		A			
	BC	TW	SM	CCTV	TW	PP	SL	TW	F	TW	D	TW	PS	TW		
AH1001	5	0.118	1	0	0.147	1	1	0.294	1	0.059	2	0.059	1	0.088	0.765	76.50
AH1002	4	0.094	0	0	0	1	1	0.294	1	0.059	2	0.059	1	0.088	0.594	59.40
AH1003	3	0.071	0	0	0	1	1	0.294	1	0.059	1	0.030	1	0.088	0.542	54.20
AH1004	3	0.071	0	0	0	1	1	0.294	1	0.059	2	0.059	2	0.176	0.659	65.90
AH1005	2	0.047	0	0	0	1	1	0.294	1	0.059	1	0.030	1	0.088	0.518	51.80
AH1006	4	0.094	0	0	0	1	1	0.294	0	0	1	0.030	1	0.088	0.506	50.60
AH1007	3	0.071	0	0	0	1	1	0.294	1	0.059	2	0.059	2	0.176	0.659	65.90
AH1008	4	0.094	0	0	0	1	1	0.294	1	0.059	1	0.030	2	0.176	0.653	65.30
AH1009	3	0.071	0	0	0	1	1	0.294	1	0.059	2	0.059	1	0.088	0.571	57.10
AH1010	4	0.094	0	0	0	0	1	0.147	1	0.059	2	0.059	1	0.088	0.447	44.70
AH1011	3	0.071	0	0	0	1	1	0.294	1	0.059	2	0.059	2	0.176	0.659	65.90
AH1012	4	0.094	0	0	0	1	1	0.294	1	0.059	2	0.059	1	0.088	0.594	59.40
AH1013	3	0.071	0	0	0	0	1	0.147	1	0.059	2	0.059	2	0.176	0.512	51.20
AH1014	4	0.094	0	0	0	0	1	0.147	1	0.059	2	0.059	2	0.176	0.535	53.50
AH1015	5	0.118	0	0	0	1	1	0.294	1	0.059	2	0.059	2	0.176	0.706	70.60
AH1016	3	0.071	0	0	0	1	1	0.294	1	0.059	2	0.059	1	0.088	0.571	57.10
Total Score															9.491	
Total Max Score	5		1	1		1	1		1		2		2		14	

*Notes:
A: Accessibility
BC: Burglary Crime
C: Crime
D: Dengue
F: Flood
H: Health
ND: Natural Disaster
PCF: Public Community Facilities
PP: Pedestrian Path
PS: Police Station
SL: Street Lighting
SM: Safety Mirror
SS: Security System
TW: Total Score with Weightage

The analysis done in this part is to give weightage for each score, name as Total Score with Weightage (TW). This analysis process is important to normalize the score for each indicator, because some indicator only have maximum score of 1, and other indicator have maximum score of 5 (Table 1).

From the analysis, it shows that all the affordable housing in the study area has score above 50%, with 2 affordable housing have percentage score above 80%, which is AH1001 and AH1015. Besides that, 1 affordable housing have lowest score of 50%, which is AH1005.

5. Discussions

From the analysis, there are several results of the safety level of affordable housing based on each indicator listed in Table 1. Most of the indicators such as crime, health, natural disaster, public community facilities and accessibility shows the result of safety level in each affordable housing that above 50%. For crime indicator, most of the affordable housing is above 50% except PPR Kampung Baru Air Panas with only 40% score. It shows the low crime rate in almost all affordable housing in the study area. For public community facilities indicator, most of the affordable housing shows the result of safety level above 50%, which indicated that the affordable housing in the study area equipped with better public community facilities. The next analysis is on the natural disaster indicator, shows that most of the affordable housing reach above 50% except PPR Kampung Muhibbah. This indicated that most of the affordable housing are outside the flood area.

For analysis of health indicator, most of the affordable housing shows the result of safety level above 50%. The analysis is solely on number of dengue cases, and from analysis, the results show the low number of dengue cases in each affordable housing. Next analysis is on accessibility indicator, where the results show that most of the affordable housing shows the score that above 50%, and this indicated that most of affordable housing is near or within the reach to nearest police station. The next indicator is on the security system. For this indicator, the result show that most of the affordable housing score more than 50%.

For overall results of safety level of affordable housing where include all the indicator based on table 8, it shows that most of the location of affordable housing reach above 50% of the safety level and only one that have score of 50%. The highest score and percentage of safety level is PPAM Bukit Jalil where both obtain 0.765 total score with weightage and 76.50%. It shows that the location of the affordable housing has the higher safety level. It is because, the location of the affordable housing has the high score for all the sub-indicator except on the CCTV indicator. Even though CCTV is one of the indicators that has high weightage, PPAM Bukit Jalil obtained high score for most of the indicators.

The lowest score and percentage of safety level are PPR Sri Aman where obtain just 44.70%, It shows that the location of affordable housing is less safety based on safe city concept. It is because, PPR Sri Aman does not have the indicators that has higher weightage such as security system and public community facilities.

From the analysis, this study shows that the indicators that have been developed can be used as a fundamental in assessing the safety level of affordable housing. Even though only 6 indicators and 8 sub-indicators, this study has proven that these indicators can be used to assess the safety level of affordable housing that based on safe city concepts.

However, several aspects can be improved, especially in the indicators and sub-indicators, beside the data, and enhancement of several condition of the sub-indicators. For example, the conceptual model developed consist of 6 indicators, and 19 indicators [13], however, due to lack of data, only 8 sub-indicators can be used in this study.

Besides that, another improvement can be done, is via including bigger surrounding area from the affordable housing, and also increase the number of affordable housings, especially from different state, or district. Besides that, to further improve the indicators, a survey on the local residents on their safety awareness and also survey of resident's feel safe can be include in these indicators. The weightage that based on the type of crime can also being carried out to further improve.

6. Conclusion

Affordable housing has become priority to serve people's need for shelter. One of the aspects for good location of affordable housing is it safety of the affordable housing surrounding. Several initiatives have been designed and studied previously but lack of spatial information to assess the safety level focusing on affordable housing. The aim of this study is to enhance the current indicators to assess the safety level of the affordable housing in Malaysia. Results show that most of the affordable housing in the study area have safety level score more than 50%, however 3 affordable housing score between 50%-60%. Only 2 affordable housing score more than 80%. This proved that these indicators can be a based to assess the safety level of affordable housing. Further improvement such as better sub-indicators and conditions, beside the spatial data and bigger study area can be proposed for further study.

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