
Environmental Study of Developing Index on the Health and Well-being of Occupants in Affordable Housing in Malaysia

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Abstract

The rise of affordable housing in Malaysia has inspired a study on the indoor environmental quality (IEQ) of affordable housing. This is because there are several studies that have proven that IEQ influences the health and wellbeing of the residents. The study was conducted in four different apartment developments in Klang Valley, Malaysia, by using a questionnaire survey. The Human Development Index (HDI) is developed based on the data collected from the study, using the formula provided by the Ministry of Youth and Sports Malaysia in their annual Malaysia Youth Index report (IBM). The HDI has indicated that the *health and well-being* of the occupants in Malaysian affordable housing developments are at the neutral category, scoring 72.16 over 100. *Physical condition* stands at an index score of 74.29 whilst *no fatigue* is at poor level with a score of 56.82, whereas for *psychological condition*, all the indicators are in the neutral category except for *No annoyance* item, which is in the good category. The index was developed for IEQ factors in affordable housing with data collected from the questionnaire survey. The index developed has shown that factors of IEQ are in both the Extremely disappointed range and the Extremely important range. The *acoustic comfort* factor gained the lowest score for level of satisfaction whilst *indoor air quality* gained the highest score for level of importance of IEQ. *Noise level* scored the lowest in the level of satisfaction and *state of health* scored the highest score for level of importance. This study aims to provide an overview on the health and wellbeing of occupants in Malaysian affordable housing and to assist the improvement of affordable housing for future development in order to improve the quality of life of residents in affordable housing developments.

Keywords: human development index, health, well-being, affordable housing, Malaysia, environmental quality

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INTRODUCTION

The development of affordable housing in Malaysia has increased, significantly, as the government of Malaysia has taken the initiative to provide affordable housing schemes, such as *Perumahan Rakyat 1 Malaysia* or known PR1MA to overcome the housing issues. These housing schemes focus specifically on the middle-income group living in the main cities, particularly in this case is Kuala Lumpur. However, the quality of affordable housing, especially in terms of indoor environmental quality (IEQ) is uncertain despite the positive development of affordable housing. This is important as IEQ has been proven to influence the health and well-being of building occupants (Kamaruzzaman et al. 2015, 2017, 2018). Moreover, the

World Health Organization (WHO) has recorded several issues regarding symptoms such as dizziness and nausea experienced by building users without any known cause. Therefore, in 2017, a questionnaire study relating to IEQ in affordable housing developments was conducted and the data were collected and analysed (Kamaruzzaman et al. 2017). A human development index (HDI) was then produced using the data collected from the study.

AFFORDABLE HOUSING IN MALAYSIA

According to Ling et al. (2017), housing affordability is a worldwide issue in both developing and advanced economy countries, especially at the key cities. They (2017) argued that this is due to the extended job

opportunities offered in the city, which provide higher income growth and urbanisation. The Bank Negara Malaysia (BNM) (2018) agrees that urbanisation and growth in population have contributed to house availability where it is estimated globally, there are 330 million urban households that are financially overstretched by housing cost. Ling et al. (2016, 2017) defined affordable housing as housing that is sufficient in terms of quality and location and is not costly to the extent that it prevents the users from satisfying other daily basic needs. They (2016) further explain that the house should be financed by less than three times of a household's median income to be considered as affordable housing. Therefore, the Malaysian government took the initiative to overcome this issue by providing several housing schemes such as PR1MA and MyHouse. The Prime Minister's Office (PMO) has allocated a budget for affordable housing schemes in the Eleventh Malaysia Plan (2016-2020) and aims to construct 653, 000 affordable housing units. Hence, it is essential to investigate the indoor environmental quality (IEQ) of the affordable housing schemes for future housing developments.

INDOOR ENVIRONMENTAL QUALITY (IEQ)

Despite the development, the quality of affordable housing, specifically the indoor environmental quality (IEQ) is still uncertain. This is important as previous studies have shown that IEQ influences the health and productivity of the building users. Indoor environmental quality as defined by the Centres for Disease Control and Prevention (CDC) (2013) is the quality of a space or a building that affects the health and well-being of the users. Thus, the quality of a building space is important to be considered as it will affect the health and productivity of the users. Additionally, Langer et al. (2016) stated that IEQ influences quality of life, and it is believed that IEQ can affect the users in both the short and long-term (Vardoulakis et al., 2015; Yousef et al., 2016) as well as both physically and psychologically (Kamaruzzaman et al. 2017). There are four main axes of IEQ; indoor air quality (IAQ) (Kamaruzzaman et al. 2018, Yousef et al. 2016), thermal comfort (Abdul-Wahab et al. 2015, Kamaruzzaman et al. 2018, Martellotta et al. 2016), acoustic comfort (Martellotta et al. 2016, Nimlyat and Kandar 2015), and visual comfort (Carlucci et al. 2015, Martellotta et al. 2016). Each axis expands into several elements that influence the IEQ such as temperature under thermal comfort, ventilation under IAQ, noise level under acoustic comfort, and glare level under visual comfort.

Sick Building Syndrome (SBS)

The symptoms experienced by the building occupants in an inadequate IEQ space are called Sick Building Syndrome (SBS). The United States Environmental Protection Agency (EPA) stated that the term SBS, is the condition to describe acute health symptoms that were experienced by the users without any known cause that are connected to the time spent in a building space. The WHO has listed several symptoms of SBS, which are headache, irritation of eyes, nose, and throat, dry cough, dry and itchy skin, dizziness, nausea, difficulty in breathing, fatigue, chest tightness, fever, shortness of breath, and more. Additionally, Martin-Gil et al. (1997) added allergies and increase of asthma attack as symptoms of SBS. Moreover, the symptoms of SBS are not limited to physical condition but also psychological condition of the users, where it can cause stress and anxiety (Martellotta et al. 2016, Vardoulakis et al. 2015, Savenkova et al, 2018).

SURVEY STUDY FINDINGS

A questionnaire on the study was conducted in January 2017 at four different affordable housing development locations in Klang Valley, Malaysia. The questionnaire questions the respondents on their satisfaction towards the elements of IEQ, as well as asking them to rate the importance of the factors. Additionally, the questionnaire asks questions regarding the health of the respondents whilst living in their apartment unit. A total of three hundred and eighty-four (384) questionnaires were distributed by hand. However, only one hundred and thirty-two (132) were returned. 62% of the respondents are female, and 62% of the respondents are owners of their unit. The majority of the respondents are range between 26 – 55 years old, and 63% of the respondents have stayed at their residence for up to 5 years.

IEQ from the Perspective of the Respondents

Fig. 1 illustrates the mean value for the satisfaction level and the level of importance of the IEQ factors. The values that are lower than 3.45 indicate dissatisfaction towards the factors whilst values higher than 4.19 represent the most important aspects of IEQ in the affordable housing unit, from the perspective of the building users.

Based on **Fig. 1**, respondents are most dissatisfied with the noise level, the outward appearance of the unit, and the attractiveness of the unit, followed by the colours of the unit, the amount of air movement, the amount of space, the glare around the unit and the privacy between the unit. On the other hand, the factors

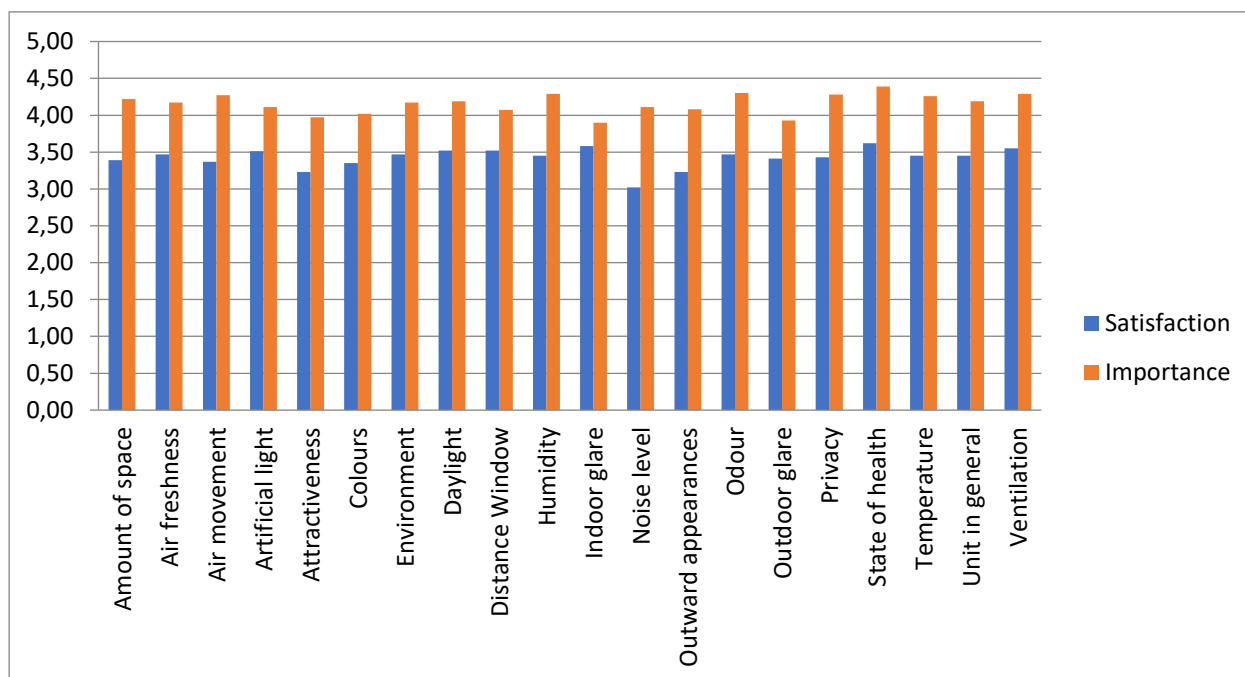


Fig. 1. Mean value for satisfaction level and level of importance towards the IEQ Factors

that are considered as important are the state of the health in the unit, the odour around the unit, ventilation, humidity, privacy of the unit, air movement, the temperature and amount of space.

According to Nimlyat and Kandar (2015) as well as Martellotta et al. (2016), the noise level and privacy belong to the acoustic comfort of IEQ, whilst the elements outward appearance (Kamaruzzaman et al. 2017, Yousef et al. 2016), attractiveness of unit (Kamaruzzaman et al. 2017, Nimlyat and Kandar 2015), colours (Carlucci et al. 2016, Lai et al. 2009), and glare level (Carlucci et al. 2015, Kamaruzzaman et al. 2017) are part of visual comfort. Next, the thermal comfort consists of ventilation (Turunen et al. 2014, Yousef et al. 2015) and air movement (Abdul-Wahab et al. 2015, Martellotta et al. 2016), whereas the IAQ consists of ventilation (Turunen et al. 2014, Yousef et al. 2015), amount of air freshness (Kamaruzzaman et al. 2017, Yousef et al. 2016) air movement (Abdul-Wahab et al. 2015, Martellotta et al. 2016), and odour (Kamaruzzaman et al. 2017). Thus, based on the study findings, the most dissatisfying aspect of IEQ is the visual comfort, while the most important aspect of IEQ is the acoustic comfort.

Respondents' Health Condition

It was found that 47.7% of the respondents consulted a doctor for the symptoms of SBS. The majority of them experienced no changes (65.2%) in their health condition, with 18.2% of the respondents experiencing improvements in health and 16.7% of

them experiencing decrease in health. Almost half of the respondents spent 6-10 hours (44.7%) daily in their residents, followed by over a quarter who spent 11-15 hours per day (27.3%). **Fig. 2** shows the percentage for the respondents' health condition.

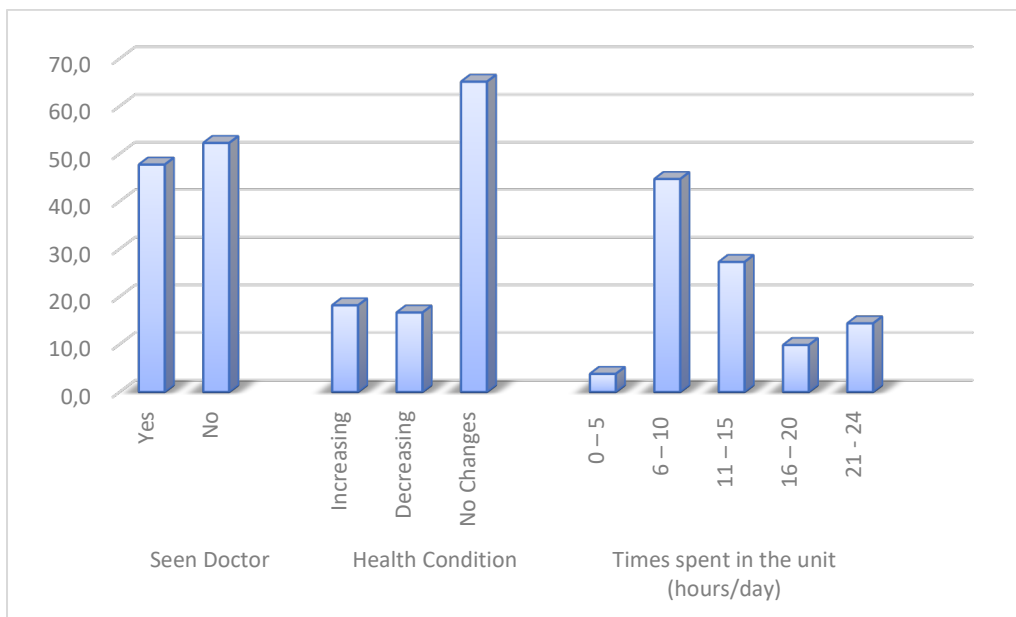


Fig. 2. Respondents' Health Conditions (Percentage)

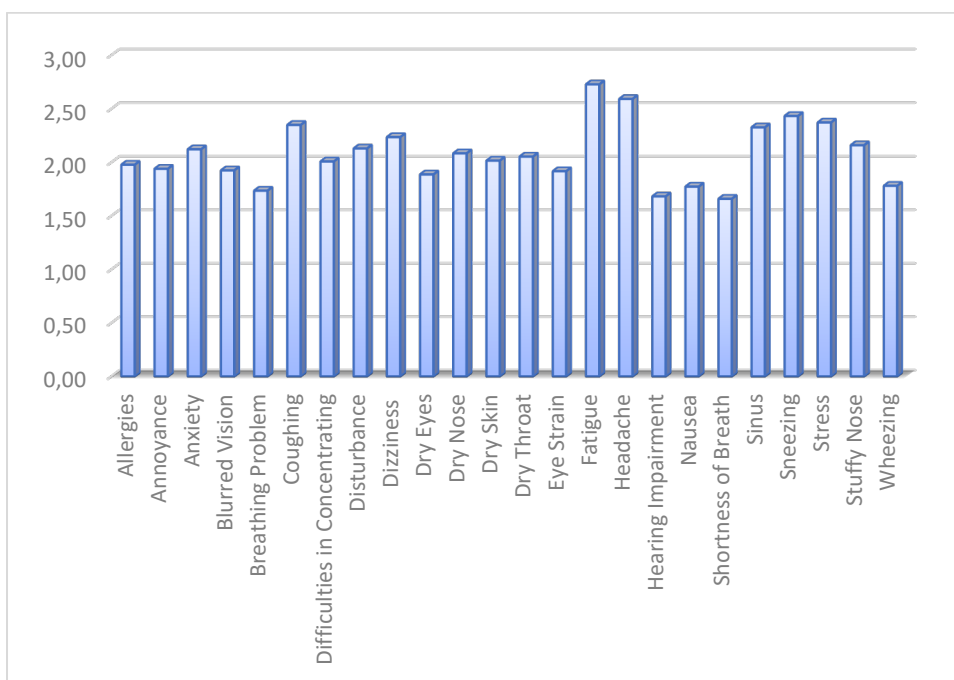


Fig. 3. Mean value for experienced SBS Symptoms

Next, the respondents were asked to rate the frequencies that they have experienced the symptoms of SBS. **Fig. 3** presents the mean value of the frequencies of SBS symptoms experienced by the respondents.

The figure shows that the most frequent symptoms experienced by the respondents are fatigue and a headache. Sneezing and stress are also some of the symptoms that are frequently experienced the respondents. The data collected from the questionnaire are then used to produce the HDI.

HUMAN DEVELOPMENT INDEX (HDI)

Nayak (2013) claims that traditionally, human development was measured by income growth, however, in the 1980's unemployment levels escalated. He further explained that people realise that economic growth may increase the nations' wealth, but human development depends on the way that growth is generated and utilized, as the consideration of economic growth neglects significant elements such as income inequalities, education, and health. Since 1990 the United Nation Development Programme (UNDP),

have been publishing the Human Development Report (HDR) to introduce a new approach for evolving human well-being. The Human development approach aims to expand the richness of human beings rather than economic growth; thus, it focuses on people and their quality of life and choices. Ranis et al. (2006) define human development as a process of growing human choice, specifically to expand longevity and healthy life, to be educated, and to experience a good standard of living. They further suggest that human development includes political freedom, human rights, and self-respect, and as the UNDP (2016) stress, human development is fundamentally about the human freedom. The UNDP explain the human development index (HDI) as a “summary measurement of average achievement in key dimensions of human development.” Deb (2015) stated that the HDI is conceived with time by combining several aspects such as health, education and income into a composite index to measure well-being. The HDI which was initially developed by Sen (1999) and Nussbaum (2000), provides the theoretical underpinning of human development that is based on individualistic capabilities or freedom in a society (Stewart, 2013; Deb, 2015; Orhan, 2008). Stewart (2013) stated that the HDI observe the function rather than capabilities of an individual as function can be observe and measured compared to capabilities without compromising human freedom of choices.

HDI Formulae

The Ministry of Youth and Sports Malaysia produces an annual report; IBM report regarding the health and well-being of youth called the Malaysia Youth Index report. They have provided a formula to calculate the index score of health and well-being for the youth. According to the IBM (2016) report, in order to achieve the index score, the average score for all domains and indicator should be calculated. This can be achieved by averaging the indicator score, thus producing the domain score. The steps and formula as explained by the IBM (2016) report is as below.

Step 1: Calculate the indicator score:

$$X_{indicator} = \frac{\sum_{k=1} \left[\frac{M_k - M_k^s}{R} \right]}{n_{item}} \times 100$$

$$k = 1, 2, 3, \dots, n_{item}$$

Step 2: Calculate the domain score:

$$X_{domain} = \frac{\sum_{i=1} [X_{indicator}]}{n_{indicator}}$$

Table 1. Index score representation (Source: IBM 2016)

| Score Value | Score indicator |
|-------------|-----------------|
| 0 – 39 | Extremely Poor |
| 40 – 49 | Very Poor |
| 50 – 59 | Poor |
| 60 – 74 | Neutral |
| 75 – 79 | Good |
| 80 - 100 | Very Good |

Table 2. Index score representation

| Score Value | Score indicator | | |
|-------------|------------------|------------------|---------------------|
| | Health Condition | IEQ Satisfaction | IEQ Importance |
| 0 – 39 | Extremely Poor | Extremely Poor | Very Unimportant |
| 40 – 49 | Very Poor | Very Poor | Unimportant |
| 50 – 59 | Poor | Poor | Neutral |
| 60 – 74 | Neutral | Neutral | Important |
| 75 – 79 | Good | Good | Very important |
| 80 - 100 | Very Good | Very Good | Extremely important |

$$i = 1, 2, 3, \dots, n_{indicator}$$

Step 3: Find the index Score:

$$X_{index} = \frac{\sum_{i=1} [X_{domain}]}{n_{domain}}$$

$$i = 1, 2, 3, \dots, n_{domain}$$

where:

M_k = Mean

M_k^s = Minimum scale value

R = maximum scale value – minimum scale value

n = Total

Thus, the index scores were calculated based on the formula provided. The score uses values from 0 to 100 where it reads the lowest score as “Very Poor” whereas the highest score as “Very Good.” Therefore, the higher the index score, the better the quality of life and wellbeing of the occupants in the affordable housing development. **Table 1** indicates the score as stated in the IBM (2016) report.

However, in order to synchronize the scale format of the study, the score value for this study is as **Table 2**. Therefore, based on the index score in **Table 2**, the higher the score for health condition, the better the health condition. For the IEQ Satisfaction, the higher the score the better the IEQ factor. Finally, the level of importance aims for the highest score as the higher the score, the more important is the IEQ factor.

Table 3. Overall score for the Health and Wellbeing

| Domain | Score Value | Level |
|--------------------------|--------------|----------------|
| Physical Condition | 74.29 | Neutral |
| Psychological Condition | 70.02 | Neutral |
| Total Index Score | 72.16 | Neutral |

Table 4. Overall score for SBS Symptoms Based on Domain

| Domain/Indicators | | Score Value | Level |
|--------------------------|--------------------------------|--------------|----------------|
| Physical Condition | No Allergies | 75.50 | Good |
| | No Blurred Vision | 76.89 | Good |
| | No Breathing Problem | 81.63 | Very Good |
| | No Coughing | 66.29 | Neutral |
| | No Dry Eyes | 77.84 | Good |
| | No Dry Nose | 72.92 | Neutral |
| | No Dry Skin | 74.62 | Neutral |
| | No Dry Throat | 73.67 | Neutral |
| | No Eyestrain | 77.08 | Good |
| | No Fatigue | 56.82 | Poor |
| | No Hearing Impairment | 82.95 | Very Good |
| | No Nausea | 80.68 | Very Good |
| | No Shortness of Breath | 83.52 | Very Good |
| | No Sinus | 66.86 | Neutral |
| | No Sneezing | 64.20 | Neutral |
| No Stuffy Nose | 71.02 | Neutral | |
| No Wheezing | 80.49 | Very Good | |
| Total Index Score | | 74.29 | Neutral |
| Psychological Condition | No Annoyance | 76.52 | Good |
| | No Anxiety | 71.97 | Neutral |
| | No Difficulty in Concentrating | 74.81 | Neutral |
| | No Dizziness | 69.13 | Neutral |
| | No Headache | 60.23 | Neutral |
| | No Sleep Disturbances | 71.78 | Neutral |
| No Stress | 65.72 | Neutral | |
| Total Index Score | | 70.02 | Neutral |

HDI on the Health and Wellbeing of Occupants in Malaysia Affordable Housing

The SBS is divided into two domains which are physical and psychological condition and each factor consists of several items. The score value for the health and wellbeing of the occupants in the residential housing is as in **Table 3**. **Table 3** indicates that the total index score for health and wellbeing of the occupants is categorized as neutral with an index score of 72.16 where the physical condition and psychological condition domain are categorized as neutral with the score value of 74.29 and 70.02 respectively.

Table 4 shows the overall score for the symptoms based on domain. The physical condition domain consists of 17 indicators which are: allergies, blurred vision, breathing problem, coughing, dry eyes, dry nose, dry skin, dry throat, dry skin, fatigue, hearing impairment, nausea, shortness of breath, sinus,

sneezing, stuffy nose and wheezing. The score value for 'No shortness of breath', 'no hearing impairment', 'no breathing problem', 'no nausea' and 'no wheezing' are at 'very good' with scores of 83.52, 82.95, 81.63, 80.68 and 80.49 respectively. Next, 'No dry eyes', 'no eyestrain', 'no blurred vision' and 'no allergies' are at the 'good' level with scores 77.84, 77.08, 76.89 and 75.50 respectively. While the score value for 'no dry skin', 'no dry throat', 'no dry nose', 'no stuffy nose', 'no sinus', 'no coughing' and 'no sneezing' are at the 'neutral' level with scores 74.62, 73.67, 72.92, 71.02, 66.86, 66.29 and 64.20 respectively. Finally, 'no fatigue' is the only indicator at 'poor' level with score 56.82. The psychological condition domain consists of seven indicators which are: difficulty in concentrating, anxiety, sleep disturbances, dizziness, stress and headache. The 'no annoyance' is at 'good' level with score 76.52. However, all other indicators 'no difficulty in concentrating', 'no anxiety', 'no sleep disturbances', 'no dizziness' and 'no stress' are at the 'neutral' level with scores 74.81, 71.97, 71.78, 69.13, 65.72 and 60.23 respectively.

The effect of IEQ in the affordable housing community should be observed and investigated as it influences the health and wellbeing of the building occupants significantly. For example, the psychological indicators as listed in the SBS symptoms relate closely with depression and suicidal tendency. Two of the SBS symptoms listed in the questionnaire are stress and anxiety. The American Psychological Association described stress and anxiety as tension feeling, worried thoughts, and physical changes. Kulsoom and Afsar (2015) stated that stress is related to "irritability, impatience and difficulty to relax", whereas anxiety is related to "autonomic arousal, skeletal muscle tension and situational aspects." Wang et al. (2017) stated that stress events and stressful lifestyle are contributing factors of suicidal intention (Wang et al. 2017) and depression (Hagler 2017). Additionally, according to Kalsoom and Asfar (2015), several factors such as sleep disturbances and difficulty in concentrating are two contributing factors of depression.

The psychological health conditions in affordable housing developments are at neutral level with the scores of 70.02 over 100. According to Kamaruzzaman et al. (2017), the psychological symptoms experienced by the building occupants might be due to lack of privacy within the unit, and due to the location of the affordable housing, where it is located close to a commercial hub and highways or main ways. The location of the apartment development influences the

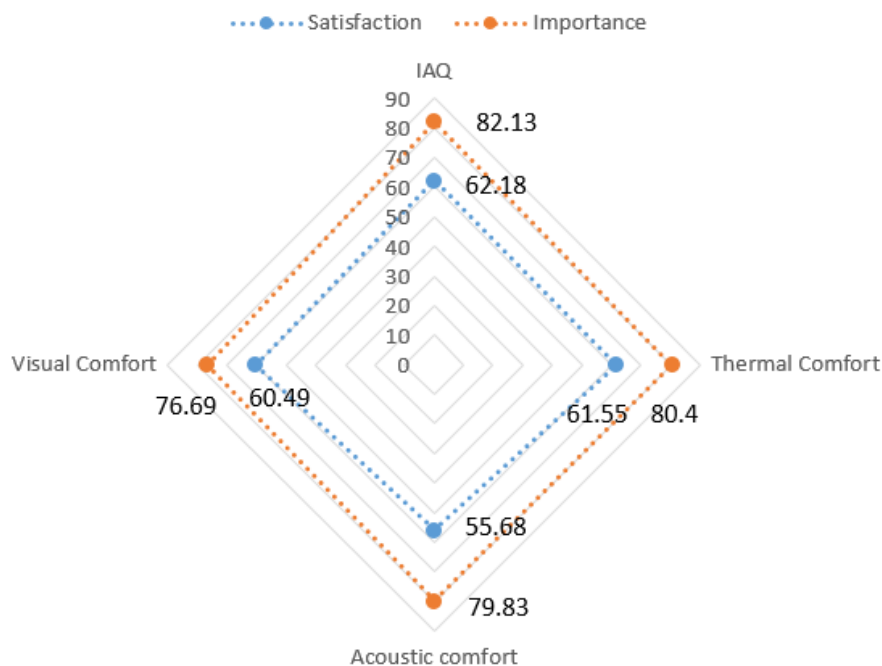


Fig. 4. Overall Score by satisfaction and importance for IEQ factors

Table 5. Overall satisfaction score for IEQ factors

| Domain/Indicator | Score Value | |
|--------------------------|-----------------------|-------------|
| | Level of Satisfaction | Level |
| Indoor Air Quality | 62.18 | Neutral |
| Thermal Comfort | 61.55 | Neutral |
| Acoustic Comfort | 55.68 | Poor |
| Visual Comfort | 60.49 | Neutral |
| Total Index Score | 59.98 | Poor |

Table 6. Overall importance score for IEQ factors

| Domain/Indicator | Score Value | |
|--------------------------|---------------------|-----------------------|
| | Level of Importance | Level |
| Indoor Air Quality | 82.13 | Extremely Important |
| Thermal Comfort | 80.40 | Extremely Important |
| Acoustic Comfort | 79.83 | Very Important |
| Visual Comfort | 76.69 | Very Important |
| Total Index Score | 79.76 | Very Important |

acoustic comfort of the housing development area, where the source of sound is from high trafficking vehicles. Furthermore, the vehicles produce high concentrations of smoke and carbon monoxide which affect the IAQ of their apartment unit (Kamaruzzaman et al. 2017). Ergo, the improvement of IEQ quality in affordable housing developments in Malaysia could contribute to improving the quality of life of the residents.

HDI on the IEQ of Affordable Housing in Malaysia

Additionally, the indices for each of the IEQ factors were developed using the same formula provided by the IBM. The total index scores are in the 'poor' level. Acoustic comfort produces the lowest score with 55.68 indicated as 'poor' level, followed by visual comfort (score 60.49, 'neutral' level), thermal comfort (score 61.55, 'neutral' level), and finally IAQ (score 62.18, 'neutral' level). Table 5 represents the overall score for the level of satisfaction towards the factors of IEQ.

Next, the level of importance falls into the 'very important' level with a total index score at 79.76. The

highest score of 82.13 for AIQ is indicated as 'extremely important' level, followed by the thermal comfort (score 80.40, 'extremely important' level), acoustic comfort (score 79.83, 'important' level) and visual comfort (score 76.69, 'important' level). Table 6 represents the overall score for the level of importance for the factors of IEQ. Fig. 4 represents the total score for each indicator of IEQ.

Each of the indicators consists of several items that affect the IEQ. The IAQ consists of six elements, which are; Ventilation, Humidity, Air Movement, Air Freshness, Odour, and State of Health. The total score for IAQ is 62.18 for users' satisfaction and 82.13 for the level of importance which fall in the neutral category and extremely important category, respectively. State of health received the highest score for satisfaction (score 65.53), followed by the ventilation (score 63.64), air freshness and odour (score 61.74 respectively), humidity (score 61.18) and finally, the air movement (score 59.28). In terms of importance, the state of health is categorised as the extremely important element in IAQ factor as it scores 84.66. Further elements in the list are the Odour (score 82.58), ventilation and

Table 7. Overall score for IAQ

| Domain/Indicator | Score Value | |
|--------------------------|-----------------------|---------------------|
| | Level of Satisfaction | Level of Importance |
| Ventilation | 63.64 | 82.20 |
| Humidity | 61.18 | 82.20 |
| Air Movement | 59.28 | 81.82 |
| Air Freshness | 61.74 | 79.36 |
| Odour | 61.74 | 82.58 |
| State of Health | 65.53 | 84.66 |
| Total Index Score | 62.18 | 82.13 |

Table 8. Overall score for Thermal Comfort

| Domain/Indicator | Score Value | |
|------------------------------|-----------------------|---------------------|
| | Level of Satisfaction | Level of Importance |
| Control over the Environment | 61.74 | 79.36 |
| Temperature | 61.36 | 81.44 |
| Total Index Score | 61.55 | 80.40 |

Table 9. Overall score for Acoustic Comfort

| Domain/Indicator | Score Value | |
|--------------------------|-----------------------|---------------------|
| | Level of Satisfaction | Level of Importance |
| Noise Level | 50.57 | 77.65 |
| Privacy | 60.80 | 82.01 |
| Total Index Score | 55.68 | 79.83 |

humidity (score 82.20 respectively), air movement (score 81.82) and finally air freshness (score 79.36).

Table 7 shows the overall score for IAQ.

Next, the thermal comfort score is 61.55, which places the factor in the ‘neutral’ category and 80.40 in the extremely important category. The thermal comfort consists of two elements in total. The lowest scores for level of satisfaction are temperature (score 61.36) and control over the environment with the score of 61.74. Next, for the level of importance, temperature scores 81.44 followed by control over the environment (score 20.36). **Table 8** represents the overall score for thermal comfort.

The third factor of IEQ is acoustic comfort which consists of only two items, which are Noise Level and Privacy. Acoustic comfort received the lowest score with 55.68 for the satisfaction level which belongs to the poor range while it scores 79.83 for the level of importance which is at the very important level. The Noise Level (50.57) falls into the poor category and scored 77.65 which places it in the very important category for the level of importance. On the other hand, Privacy scores 60.80 and 82.01 which place it in the neutral category and extremely important category respectively. **Table 9** represents the total score for acoustic comfort.

The final factor of IEQ is visual comfort which consists of ten items. The total satisfaction score for visual comfort is 60.49 which puts it in neutral category

Table 10. Overall score for Visual Comfort

| Domain/Indicator | Score Value | |
|-------------------------------|-----------------------|---------------------|
| | Level of Satisfaction | Level of Importance |
| Amount of Artificial Lighting | 62.69 | 77.84 |
| Amount of Daylight | 62.88 | 79.73 |
| Indoor Glare Level | 64.58 | 72.54 |
| Outdoor Glare Level | 60.23 | 73.30 |
| Distance to Window | 63.07 | 76.70 |
| Colours | 58.71 | 75.38 |
| Unit Attractiveness | 55.87 | 74.24 |
| Unit in General | 61.36 | 79.73 |
| Outward Appearances | 55.87 | 76.89 |
| Amount of Space | 59.66 | 80.49 |
| Total Index Score | 60.49 | 76.69 |

with 76.69 for level of importance which is at very important category. The visual comfort factor falls in both poor and neutral categories with amount of space, colours, unit attractiveness and outward appearances falling in the poor category whilst factors such as amount of artificial lighting, amount of day light, glare level (indoor and outdoor), distance to the window and unit in general fall in neutral category. On the other hand, the importance level of each indicator in visual comfort falls between the neutral and very important categories. The overall score for visual comfort is as shown in **Table 10**.

CONCLUSION

A study in Klang Valley, Malaysia was conducted to examine the environmental quality indoor and the health and wellbeing of the occupants living in Malaysian affordable housing. The study assesses the perspective of the residents in four different affordable housing developments by questionnaire. The questionnaire consists of questions regarding the health and wellbeing of the occupants as well as their opinion on indoor environmental quality (IEQ) of their apartment unit. The data were then collected and an index was developed. The index was calculated using the formula provided by the Ministry of Youth and Sports Malaysia for their annual report on the Youth Index Report.

The index for health and wellbeing of the occupants in Malaysian affordable housing is at neutral level as it scores 72.16 over 100. This result shows that a paramount step should be taken in order to improve the quality of life within affordable housing developments in Malaysia. In order to improve the quality of life of the occupants, the IEQ of the apartment units should be improved significantly, as the quality of indoor environment affects the health and productivity of the

building users. The index for IEQ was produced and found that the score is at neutral category, with the score of 70.02 over 100. All four factors of IEQ need to be improved especially the acoustic comfort factor as it scores the lowest in terms of level of satisfaction.

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