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EMERGENCY SAFETY FOR MULTI-STOREY PUBLIC HOUSING IN KUALA LUMPUR

***Nurul Liyana Hanapi[1], *Sabarinah Sh Ahmad[1], Azli Abd Razak[2]**

[1]Centre of Studies for Architecture, Faculty of Architecture, Planning & Surveying, Universiti Teknologi MARA, Puncak Alam, Malaysia.
[2]Faculty of Mechanical Engineering, Universiti Teknologi MARA, Shah Alam, Malaysia

*Corresponding author's email: sabar643@salam.uitm.edu.my

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Abstract

Emergency safety factor in buildings is the least achieved element as highlighted in many studies. Poor safety factor could affect a building's evacuation process as the evacuees are exposed to a greater danger. Thus, this paper focuses on highlighting the common issues raised in public housing and how they affect the evacuation process, through observational study. The findings show that public buildings are highly dependent on passive design approaches to ensure occupant safety during an emergency. Many safety issues are highlighted. Among them, cost and occupant mentality are the main factors contributing to other issue related to safety factor. Cost restricts safety measures, causing problems with maintenance and management, whereas occupants' behaviour causes maintenance and management efforts to be even more difficult. Further potential studies could focus on ways to mitigate emergency safety issue in buildings as it will not only benefit in terms of safety during an emergency but also increase occupant satisfaction towards public multi-storey residential buildings in Malaysia.

Keywords: Public housing, dissatisfaction, safety, evacuation

1.0 BACKGROUND OF THE STUDY

In the Seventh Malaysia Plan (1996-2000), public housing was introduced to cater to the needs of the low-income groups. The initial plan was to help resolve the issues of squatter settlements, especially in urban context, following the "Zero Squatter by 2005" initiative (Goh & Yahaya, 2011). Although the states are accountable for land matters including housing, some studies stated that the government has been under a great pressure to provide affordable housing for the low-income group (Zain, 2012). It is seen in existing public housing where many occupants emphasised their low satisfactory levels towards the building safety factor (Husin, Nawawi, Ismail, & Khalil, 2011; Ramli, Akasah, & Masirin, 2014).

There are many accommodation programmes run by the government that fall under the public multi-storey residential buildings namely, Special Low-Cost Housing Programme (SLCHP), People Housing Programmed (PHP / PPR) and Integrated People Housing Programmed (IPHP) (Ramlan & Zahari, 2016). Public multi-storey residential buildings are one of the projects that aim to help low-income families to gain access to adequate, affordable and quality housing (Goh & Yahaya, 2011). Although it achieved the target to provide adequate and affordable housing, the quality of the housing is often neglected (Hashim, Samikon, Nasir & Ismail, 2012). Thus, this paper focuses on finding the common issues arise in the public multi-storey building that could jeopardise its occupants' safety during emergency evacuation.

2.0 LITERATURE STUDY

The underlying issue with PPR buildings mainly involves cost constraints. The government provides an opportunity for low-income earners to own or rent a property, however, to meet these needs, the budget is often limited. Although it benefits the low-income groups, the aforementioned cost constraints often result in fire safety design approaches that depends heavily on passive approaches as active approaches often implies higher costs. Furthermore, with minimal charges imposed on rental rates, a resultant issue of maintenance arises. Building maintenance managers often faced high cost to upkeep the building maintenance caused by end-users' behavior that include vandalism and a lack of care towards the public realm in their housing area (Abdullah, Zubedy & Najib, 2012). All of the issues mentioned above could affect the evacuation safety.

2.1 Occupant Satisfaction Level for Public Residential Building

The satisfaction level of occupants can be determined two ways; one is to conduct a survey on residents living in public housing, and another is to observe the building quality through building assessment checklist. Satisfaction is derived from the feeling of contentment where the desire for certain expectation is met and becomes the key indicator of whether the building is adequate for occupant's needs (Mohit, Ibrahim & Rashid, 2010). One of the earliest study that evaluated occupant satisfaction towards public housing in Malaysia highlighted issues of dissatisfaction towards the dwelling unit (Husna and Nurijan, 1987) Current research trends are focused on issues of management that are believed could become the main contributing factor towards low satisfaction levels among residents of public housing (Abdullah *et al.*, 2012).

Building maintenance is found to be one of the highest factors affecting building quality and it is the least satisfied item in the public housing (Abdullah et al., 2012; Goh & Ahmad, 2011). Some studies stated that the main issue of managing public housings were the low priority set for maintenance and remedial works that led to over-budgeted expenses (Hashim et al., 2015; Ta, 2006). Other studies stated that the low maintenance charges and abandonment after a period of time was a contributing factor (Sulaiman, Hasan, & Jamaluddin, 2016). However all the studies agreed on the lack of civic mindedness towards common areas that lead to several issues such as vandalism, indiscriminate littering, refuse disposal, noise, theft and others. The irresponsible behaviour towards common areas by some public housing residents proved the lack of awareness among the residents (Ta, 2006).

A Post Occupancy Evaluation (POE) study found that attributes affecting evacuation efficiency often fall under moderate and poor categories (Husin, Nawawi, Ismail, & Khalil, 2015). Fire systems, vehicle parking, corridor and staircase are among the attributes that have a moderate score and lift systems have lower scores where 66% of respondents believed evacuation safety fell under the poor categories and 23% believed it was very poor (Husin *et al*., 2015). Previously, the same research team analysed the occupants' needs for housing, which found that the security to prevent crime, need for building safety feature, and need to facilitate the evacuation of occupants in times of emergency had a high mean score among all aspects discussed (Husin, Nawawi, Ismail, & Khalil, 2014). Another study focused on the recommendations for proper planning where the consideration of special requirements specifically for the disabled and elderlies as it would enable these categories of people to live independently (Ta, 2006). It shows that the development of the public housing has the least consideration for disabled or elderly occupants.

Although maintenance and safety issues are viewed as two separate factors, these issues have direct interrelation with one another where proper management and maintenance have positive influences on the

safety of the public building and would lead to better quality of life (QOL). Until today there is no suitable safety performance procedure developed to specifically evaluate the performance of public housing in Malaysia. Many developed countries have their own safety procedures to measure the weight rating scale that indicates the safety performance of a specified building. As a result, to provide affordable housing for low-income groups, the housing quality of public multi-storey residential could have been compromised. It would lead to the low performance of building safety, as it is one of the key attributes of building quality.

3.0 METHODOLOGY

The building was first identified and after obtaining permission the author proceeds with the site visit together with two forms; the building assessment form and UBBL 1984 building checklist. To narrow down the typology of the building, the public multi-storey residential building is chosen as it relies heavily on the effectiveness on escape route design during an emergency. The method used for data collection is through observational study. Three buildings with different layout configurations are chosen as a case study, namely PPR Kampung Limau, PPR Seri Pantai and Putra Ria Apartment in Kuala Lumpur. Figure 1 shows the flowchart of the observational study employed in this paper.

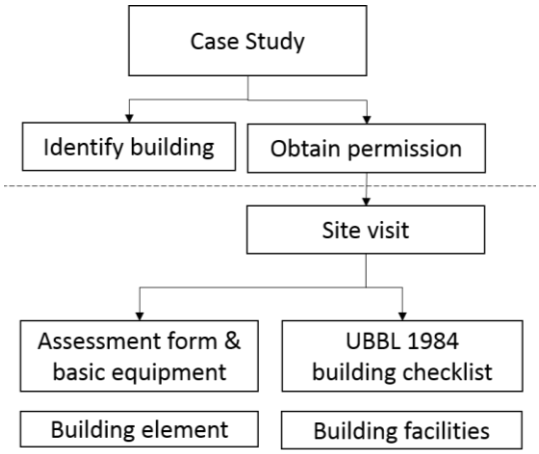

Figure 1. Research methodology flow chart for observational study

4.0 RESULTS AND DISCUSSION

4.1 Analysis of the escape route design and building specification

Table 1 shows the fire safety data gathered from the three case studies based on the UBBL 1984 building checklist. All the escape routes designed for public multi-storey residential are naturally ventilated thus no protected shafts, fire doors and pressurised systems are installed. With minimal cost, the naturally ventilated escape route design is the most effective way to ensure that occupants are not exposed to smoke danger in case of fire. However, naturally ventilated areas could cause the fire to ignite faster as it provides a continuous source of oxygen.

No emergency sign is installed in the building as the layout of the buildings is linear and occupants are most likely familiar with the building. Fire hydrants, hose reels and portable fire extinguishers are provided at all the buildings to comply with the required safety measures. Each building has three staircases, which could cater to high flow rates and each building has a single fire lift, which could be accessed at every floor

level and all the fire staircase are open to public use. Overall, all three buildings comply with the CIS 2 and UBBL 1984 requirements. However, the maintenance and management of the buildings were suspect as all the safety features were not in good condition. All these issues are to be further discussed in section 4.2.

Table 1. Safety Standard for Low-Cost Multi-Storey Residential

By-Law	Facilities	PPR Kg Limau	PPR Seri Pantai	Putra Ria Apt	Analysis
156	Protected shaft containing staircase	-	-	-	All the staircases provided are open to natural ventilation thus no protected shaft and fire door are provided in all the buildings
162	Fire door	-	-	-	
164	Door Closer for Fire Door	-	-	-	
165	Travel Distance to Exit	Yes	Yes	Yes	Dead end limit & maximum travel distance are within the allowable distance
167	Storey exit	-	-	-	Each housing has only 1 escape door. Storey exit are omitted in this case
168	Staircases	3	3	3	Three separate staircases, which reduce occupancy load. The width of staircases are maintained and no door is provided at the staircase area
169	Exit route	136	170	135	No exit route sign. Width of exit route might decrease along its path
172	Emergency sign	-	-	-	No emergency sign needed for the building as all residents are aware of the location of staircases
179	Protected lobby	-	-	-	No protected lobby provided
198	Ventilation staircases	Natural	Natural	Natural	No mechanical pressurised system installed
225	Detecting and extinguishing fire	-	-	-	No detection alarm provided
	Fire hydrant	Yes	Yes	Yes	91.5 meter apart, nearest to fire brigade access
227	Portable extinguisher	2	2	2	Two portable extinguishers are provided at every staircase
243	Fire lift	1	1	1	

4.2 Common Issues in the Case Study Buildings

The study observed many common issues that arise in the public multi-storey residential buildings that are believed to affect evacuation efficiency. Many studies have highlighted the issues of lift systems in public housing. The over dependency on lift usage and high number of occupancy often overload the lift systems, and lead to frequent needs for repairs and maintenance. Since the fire lift is also open for public use, it is also exposed to failures that could create issues of evacuation safety during an emergency.

Maintenance should be the main priority in order to ensure the safety of residents. Poor maintenance could cause a bevy of problems. Chipped staircases steps and rusted and broken handrails that expose sharp edges could cause accidents during an emergency evacuation. The temporary obstacles could be seen at almost every floor at all three buildings. Pieces of furniture could become an obstacle if they block the passageways and affect evacuation efficiency. As previously mentioned in the literature review, although the descriptive fire safety codes mentioned the physical characteristics of the building, the physical obstacles that could lead to serious delays and bottlenecks that can hinder evacuation efficiency ought to be considered (Oven & Cakici, 2009).

Table 2. Issues arising at the case study buildings

Issue	PPR Kampung Limau	PPR Seri Pantai	Putra Ria Apartment	Outcome
Lift (closed for maintenance)	Yes Occurrence = often	Yes Occurrence = often	No Occurrence = often	high number of occupancy causing heavy usage and 'fire lift' are also open for public use
Illegal parking (car)	Yes	yes	yes	Limited parking causing residents to double park even during non-peak hours.
Illegal parking (motorcycle)	Yes (centre courtyard)	Yes (centre courtyard)	Yes (centre courtyard)	In case of fire, the fire can spread easily.
Firefighting equipment (vandalism)	Yes	yes	yes	Some of the firefighting equipment are vandalized
Firefighting equipment (locked)	Yes	yes	yes	Management decided to lock all the equipment to avoid vandalism
Damage along the escape route	Yes	yes	yes	Poor maintenance and vandalism
Placing personal belongings in common area	Yes	yes	yes	Either for personal use or unwanted items

The issues of residents leaving filled garbage bags indiscriminately at the common areas and refusing to cooperate with the building managers also contribute to the issue of managing the behaviour of the public housing residents. Not only does it block access to fire fighting equipment, it can also be considered an obstacle where the locations of the fire fighting equipment are often near the staircase area, which is connected to the main corridor. This issue also has been emphasised by many studies that found the management and maintenance issues are not the main contributors but the mind-set of the residents create challenges in managing the building as the residents (Sulaiman et al., 2016; Hashim, Samikon, Ismail, & Ismail, 2015). The issues caused by furniture and garbage dumping, and vandalism in the common areas such as corridors and staircases proved to be common issues in public multi-storey residential buildings. Lack of maintenance by residents also proved to be an issue that could expose the residents to safety risks. The findings of this study is in agreement with the findings by Ta (2006) where occupants of public residential buildings lacked awareness of how to live in high-rise and found to be ignorant of their rights and responsibilities towards the usage and maintenance of common properties.

5.0 CONCLUSION AND FUTURE RESEARCH

The study concludes that public building depend much on the design of the building and fire fighting equipment to provide maximum safety during the evacuation process. Issue with the maintenance and management due to the cost constrain has created problems to the existing building which believes affecting the evacuation efficiency and exposing the evacuee to the danger. Moreover, low maintenance fees and low public participation also contribute to the safety and maintenance issues of the building. As for management and maintenance, it is somewhat interrelated with cost, whereby poor management could cause high maintenance cost, and similarly, low maintenance fees paid by the occupants could cause difficulty to properly maintain the building. Secondly, the mentality of the resident who has lacked of awareness towards common spaces also believes could affect the evacuation process due to vandalism and indiscriminate garbage dumping as the common properties. Overall, this kind of issue has a direct influence on the safety of the occupant in public housings, especially during emergency situations. Future studies could consider focusing on evacuation safety factors as they will increase occupants' peace of mind, reduce safety risks and help to ensure maximum safety of the occupant during an emergency situation

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