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Article in *Journal of Engineering Project and Production Management* · August 2023

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WELL Building: Criteria for Residential Buildings in a Developing Country

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Project Management

Received November 6, 2022; received revisions March 2, 2023; May 6, 2023; accepted May 9, 2023

Available online August 25, 2023

Abstract: Health, well-being, and productivity are the main notions for WELL buildings. Although the WELL building standard does exist to follow when designing a building, the concepts and elements might differ between developed and developing countries and types of buildings. However, there is a lack of knowledge on WELL building concepts and elements in developing countries and residential buildings. Thus, this study uses Malaysia as a case study to investigate the elements that affect health, well-being, and productivity (i.e., WELL) for residential buildings in a developing country. First, semi-structured interviews with built environment industry professionals and individuals living in multi-story residential buildings were carried out. Then, the interview data were analyzed using the thematic analysis technique to generate concepts and elements of WELL for residential buildings in a developing country. The analysis identified nine WELL concepts for residential buildings: air, water, fire, fitness, comfort, mind, safety & security, community, and maintenance & management. Furthermore, the nine themes consist of 53 building elements. The findings suggest three additional new WELL concepts for residential buildings in a developing country: fire, safety & security, and maintenance & management. This is the first study that evaluates the element of WELL for residential buildings that contribute to the existing WELL building standard within the context of a developing country.

Keywords: Sustainable development, WELL building, health, well-being, productivity, residential buildings, decision making.

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DOI 10.32738/JEPPM-2023-0018

1. Introduction

Economic transformation has led to the growth of housing in urban areas. Urban communities are persistently exposed to health, well-being, and comfort challenges (Okkels et al., 2018; Cirella, 2022). The world is becoming increasingly urbanized (United Nations Population Division). According to the world bank, 77.16 percent of the global population will live in urban areas and cities in 2020. The global life expectancy is increasing, and the world is expected to become a country with an aging population by 2030 (Shared Prosperity Vision, 2030). Global aging population and climate emergency facing our planet results in existing buildings not performing well (Emmitt, 2022). The effect of urbanization showed that the Singaporean elderly are facing loneliness (Wee et al., 2019), while elderly urban residents in Korea are facing social capital dissatisfaction, low self-esteem, and depression (Lee et al., 2019).

Existing standards do not regulate the quality of existing housing. The condition and building performance of housing or residential buildings are vital. A comfortable house is not only a place to live, but its function is more than that in terms of social needs and improving the quality of life of the residents (Kamaruzzaman et al., 2019; Riley et al., 2016). Having inadequate-quality buildings may negatively impact our health, well-being, and productivity. While established assessment methods exist to estimate total housing requirements, no specific assessment has been undertaken to identify incidences of core housing needs within the population (Ismail, 2019).

Housing development should focus on aesthetic design and cover the WELL aspects. Sustainability is an effort to ensure that economic development is aligned with endeavors to preserve the environment and the well-being of society (Shared Prosperity Vision 2030). Building health and wellbeing is a global concern, colored by local context, climate, laws, and habits (Emmitt, 2022). The International WELL Building Institute provides the WELL building standard as a guideline for health, well-being, and productivity. Also, governments, such as the Malaysian government, provide strategies for ensuring good quality housing for all (National Housing Policy, 2018).

Thus, this study aims to investigate the elements that affect health, well-being, and productivity in multi-story residential buildings. The interview was conducted with built environment industry professionals and individuals living in multi-story residential buildings, and the data were analyzed using thematic analysis. The contribution of this study is useful for policymakers, researchers, and industry practitioners in decision making and improving the existing standard.

2. Background

2.1. WELL Residential Building

WELL Residential Building is a building that provides health, well-being, and productivity to the living community. The International WELL Building Institute created the WELL Building Standard as a guideline for organizations to develop building developments that enhance human health and well-being. Several works have investigated the WELL buildings where Potrc et al. (2021) and Labartino et al. (2018) have compared the well-being aspects of WELL building certification schemes to other certifications for residential buildings to find the effectiveness of the scheme. Andargie et al. (2021) analyzed the impact of noise on well-being and productivity in residential buildings.

2.2. WELL Building Concept and Element

Many researchers have identified WELL Building concepts and elements that affect health, well-being, and productivity. As shown in Table 1, Tan and Lee (2022), Awang et al. (2022), Kamaruzzaman and Azmal (2019), and Mirrahimi et al. (2016) investigate well-being criteria for residential building in developing countries. Sanchez et al. (2021), Treichler et al. (2020), Clapham et al. (2018), and Bratt (2002) investigate well-being criteria for residential buildings in other countries. Also, Poirier et al. (2022), Prochorskaite and Maliene et al. (2013), and Gibson et al. (2011) investigate health criteria for residential buildings in other countries.

Table 1. Literature Review of WELL Building Elements

AUTHOR	YEAR	WELL BUILDING STANDARD/ CERTIFICATION	OTHER BUILDING / OTHER COUNTRY	RESIDENTIAL BUILDING / OTHER COUNTRY	OTHER BUILDING / DEVELOPING COUNTRY	RESIDENTIAL BUILDING / DEVELOPING COUNTRY	HEALTH CRITERIA	WELL-BEING CRITERIA	PRODUCTIVITY CRITERIA
Potrc Obrecht et al.	2019	√							
Labartino	2018	√							
Andargie et al.	2021	√		√				√	
Lin et al.	2021		√					√	√
Durrani et al.	2021		√				√		√
Palacios et al.	2020		√				√	√	√
Bae et al.	2017		√				√	√	
Arif et al.	2016		√					√	
Chappells	2010		√					√	
Poirier et al.	2022			√				√	
Sanchez et al.	2021			√			√		
Treichler et al.	2020			√				√	
Clapham et al.	2018			√				√	
Prochorskaite and Maliene	2013			√			√	√	
Gibson et al.	2011			√			√		
Bratt	2002			√				√	
Mansor et al.	2020				√			√	
Riley et al.	2018				√		√	√	
Jamaludin et al.	2016				√			√	
Riley et al.	2016				√			√	√
Ghodrati et al.	2012				√		√		√
Tan and Lee	2022					√		√	
Awang et al.	2022					√		√	
Kamaruzzaman and Azmal	2019					√		√	
Mirrahimi et al.	2016					√		√	
This study	2022					√	√	√	√

Besides that, there are also prior works about WELL building elements for other types of buildings in developing countries. Mansor et al. (2020) and Jamaludin et al. (2016) investigate well-being criteria for office buildings. Riley et al. (2018) investigate health and well-being criteria, Riley et al. (2016) investigate well-being and productivity criteria, and

Ghodrati et al. (2012) investigate health and productivity for office buildings in developing countries. Also, Arif et al. (2016) and Chappells (2010) identified well-being elements for other types of buildings and countries. Lin et al. (2021) identified well-being and productivity elements, Durrani et al. (2021) identified health and productivity criteria, and Bae et al. (2017) identified elements for health and well-being. Palacios et al. (2020) cater to all aspects of WELL by identifying the health, well-being, and productivity in office buildings.

2.3. Study Positioning

In prior works, all authors investigated criteria that affect health, well-being, and productivity for residential buildings. However, no prior work caters to all three categories of WELL investigated for residential buildings. Moreover, there is a lack of direct work on health and productivity criteria for residential buildings investigated in developing countries and a lack of direct work on productivity criteria for residential buildings investigated in other countries. Also, there is limited information on well-being criteria in the developing country context. Therefore, this study investigates health, well-being, and productivity criteria for residential buildings in Malaysia in the context of a multi-story residential building.

3. Methodology

Figure 1 shows the process of research methodology, from developing the interview protocol to analyzing the interview data. The data collection involved interviewing built environment industry professionals involved in designing multi-story residential buildings and individuals living in multi-story residential buildings. The authors used a thematic analysis to analyze the collected interview data.

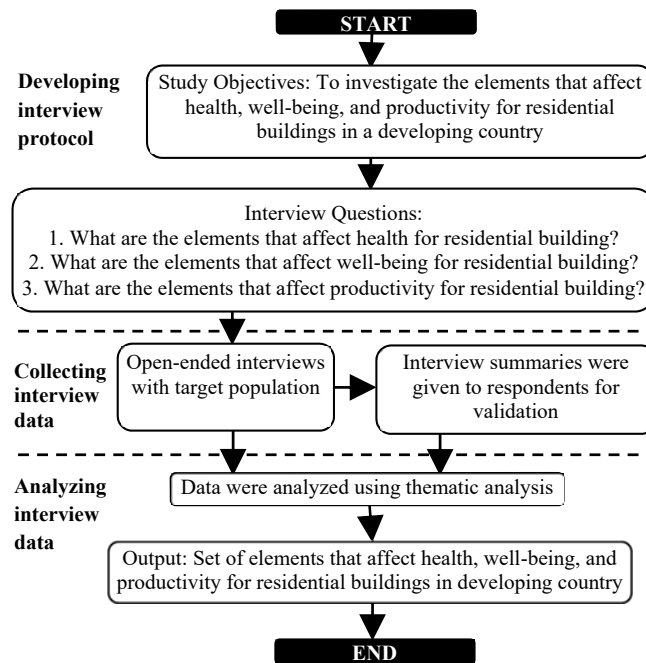


Figure 1. Research methodology

3.1. Data Collection

3.1.1. Semi-Structured Interview Protocol

The qualitative method is used for this study, where an open-ended interview was conducted with built environment industry professionals and individuals living in multi-story residential buildings in Malaysia. Three questions have been asked: 1) What are the elements that affect your health in your house? 2) What are the elements that affect your well-being in your house? and 3) What are the elements that affect your productivity in your house? All three questions are to gather information about the elements that affect health, well-being, and productivity for residential buildings in a developing country. The interviews session were conducted with an open-ended interview to get as much detailed information about the respondent’s answers on WELL’s residential building elements. All the information received through the conversation is recorded by note-taking. The note-taking of the conversation during the interview session will be summarized and sent to the respondents for validation purposes.

3.1.2. Selection of Study Participants

Twenty respondents were selected from different backgrounds to acquire different perspectives. Ten respondents each were randomly selected from built environment industry practitioners and non-built environment backgrounds. The built environment industry practitioners consisted of architects, interior designers and landscape architects. The non-built environment respondents are also randomly selected based on the low-rise type of housing and high-rise type of housing. Low-rise housing is housing that has not more than seven stories, while high-rise housing has more than seven stories.

3.1.3. Respondent Profile

Table 2. List of built environment respondents

Respondent	Designation	Type of Residential
R2	Interior Designer	Low-rise
R6	Architect	Other
R7	Architect/ Interior Designer	Low-rise
R11	Architect	High-rise
R13	Asst. Architect	High-rise
R15	Project Landscape Architect	High-rise
R16	Architect/Interior Designer	High-rise
R18	Govt. Architect	Other
R19	Project Architect	High-rise
R20	Certified Architect	Other

Note: Low-rise – 6 stories & below, High-rise – 7 story & above

Table 3. List of non-built environment respondents

Respondent	Designation	Type of Residential
R1	Resident	High-rise
R3	Resident	High-rise
R4	Resident	High-rise
R5	Resident	High-rise
R8	Resident	Low-rise
R9	Resident	High-rise
R10	Resident	Low-rise
R12	Resident	Low-rise
R14	Resident	Low-rise
R17	Resident	Low-rise

Note: Low-rise – 6 stories & below, High-rise – 7 story & above

Referring to Table 2 and Table 3, the respondent profile of ten built environment practitioners vary. Most of them are from the architecture professions, which have different background levels. Three practitioners are interior designers, and one is a project landscape architect. Some live in multi-residential buildings that provide more information and feedback based on their expertise.

3.2. Data Analysis

This study uses thematic analysis for qualitative data analysis to investigate the elements that affect the health, well-being, and productivity of residential buildings in Malaysia. The approach was also used by Andrew Ebekoziem et al. (2022), Zamani et al. (2022), and Harikrishnan et al. (2021) to analyze interview data. This method was adopted from Braun and Clarke (2006), where the process of thematic analysis consists of six phases, as summarized in Table 4. The following subsections detail those six phases.

Table 4. Six phases of thematic analysis as Adopted from Braun and Clarke (2006)

PHASE	DESCRIPTION
1. Familiarize with the data	The interview data is familiarized and transcribed into written format.
2. Generate initial code	The interview data is reviewed to generate initial codes.
3. Search for themes	The initial codes are reviewed several times to initiate the themes.
4. Review the themes	The initial themes are reviewed to finalize the themes. The initial codes and raw data have also been reviewed to check that the themes are aligned with the objectives.
5. Define the themes	The finalized themes are defined and fully rechecked. Adjustment is required if the theme scope and content cannot be determined.
6. Report of the themes	The developed and categorized themes were reported that aligned with the study objectives

There are six phases of thematic analysis. Firstly, the summary of the interview data of 20 respondents was transcribed a few times to get the initial ideas of the summary. Secondly, every sentence of the summary was analyzed to generate the initial code. Every generated code was then reviewed again before deciding on the potential subtheme. Next, in the third phase, the authors were searching for the subthemes based on the initial codes. The process continues with a review of the themes. All the subthemes based on phase three were grouped to generate the themes. The initial code and raw data have also been reviewed to check that the themes are aligned with the objectives. The fifth phase is to define and name the themes. Naming the new theme is generalized by searching from the built environment context. The authors also have referred to the Well Building Standard to familiarize with the naming of the theme. Lastly (sixth phase) the developed and

categorized themes were reported that aligned with the study objectives. The themes were explained based on the issues and feedback provided by the respondents.

4. Results

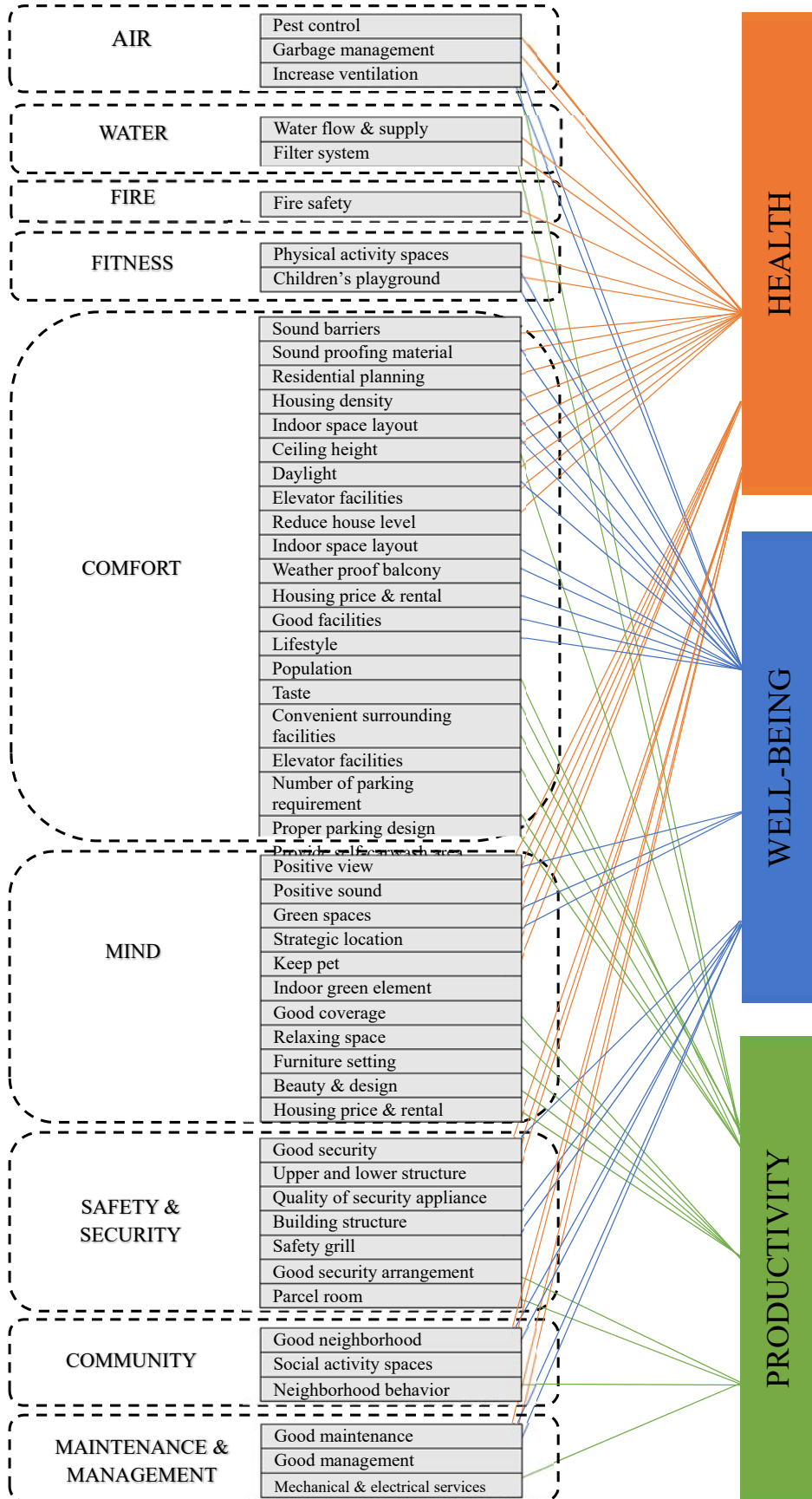
Table 5 and Figure 2 show the overall result of data collection of WELL residential building elements analyzed using thematic analysis. The respondents in Table 2 and Table 3 were interviewed to get information on the elements that affect health, well-being, and productivity for residential buildings in Malaysia.

Table 5. WELL elements for residential buildings in a developing country

THEME	SUBTHEME	H	W	P
Air	1 Pest control	√		
	2 Garbage management	√	√	√
	3 Increase ventilation	√	√	
Water	4 Water flow & supply	√		√
	5 Filter system	√		
Fire	6 Fire safety	√		
Fitness	7 Physical activity spaces	√	√	
	8 Children’s playground	√	√	
Comfort	9 Sound barriers	√	√	
	10 Soundproofing material	√		
	11 Residential planning	√	√	√
	12 Housing density	√	√	
	13 Indoor space layout	√	√	
	14 Ceiling height	√		
	15 Daylight	√	√	
	16 Elevator facilities	√		
	17 Reduce house level	√		
	18 Indoor space layout		√	
	19 Weatherproof balcony		√	
	20 Housing price & rental		√	
	21 Good facilities		√	
	22 Lifestyle		√	
	23 Population			√
	24 Taste			√
	25 Convenient surrounding facilities			√
	26 Elevator facilities			√
	27 Number of parking requirements			√
	28 Proper parking design			√
	29 Provide self-carwash area			√
Mind	30 Positive view	√	√	
	31 Positive sound	√		
	32 Green spaces	√	√	
	33 Strategic location	√	√	
	34 Keep pet	√		
	35 Indoor green element	√		
	36 Good coverage			√
	37 Relaxing space			√
	38 Furniture setting			√
	39 Beauty & design			√
	40 Housing price & rental			√
Safety & Security	41 Good security	√	√	
	42 Upper& lower structure	√		
	43 Quality of security appliance	√		
	44 Building structure		√	
	45 Safety grill		√	
	46 Good security arrangement			√
	47 Parcel room			√
Community	48 Good neighborhood	√	√	
	49 Social activity spaces	√	√	
	50 Neighborhood behavior			√
Management	51 Good maintenance	√	√	√
	52 Good management	√	√	√
	53 M&E services			√
		30	24	21

Note: H = Health; W = Well-being; P = Productivity

Figure 2. WELL concepts and elements for residential buildings in a developing country



4.1. Elements that Affect Health in Residential Buildings

Table 6 shows the overall result of data collection of WELL residential building elements analyzed using the thematic analysis. There are nine concepts identified as the themes and 30 elements identified as the subthemes. The details of the new concept and new elements of WELL are articulated in the discussion section.

Table 6. Elements that affect health for residential buildings in a developing country

THEME	SUB-THEME	DESCRIPTION	SUPPORTING STATEMENT	
Air	1	Pest control	Avoid and manage facilities that allow undesirable insects and pests	There is no pest when living in a higher level of a multi-housing unit. Residents are less harmful to diseases like Aedes. (R1)
	2	Garbage management system	Systematic garbage collection system and well design of garbage area	The garbage disposal area is too close to the block but not well maintained. The council does not pick up garbage every day. So, the smell of garbage can get into the house because of sitting on the 1st floor. (R17)
	3	Increase ventilation	Increase air circulation in indoor housing space	A house that has large openings with fixed windows for ample daylighting. Operable windows and doors are for ventilation. Ample light and ventilation reduce the suffocating feeling. (R20)
Water	4	Water supply	Good pressure of water supply	The water supply is sufficient, and the flow of water is good. (R1)
	5	Filter system	Filter system for clean water supply	Clean water can prevent you from being infected by dangerous diseases. (R2)
Fire	6	Fire safety	Housing follows fire safety regulations	Every house should have a fire extinguisher to avoid the risk of fire. Each of the residential units is provided with one fire extinguisher. (R3)
Fitness	7	Physical activity spaces	A space that promotes exercise and sports facilities	Residential buildings need to have common facilities such as a swimming pool, exercise room, jogging, and green area. These facilities are important for health facilities because usually, we go home, time takes a lot from parking to the elevator and to the entrance of the house. Every day, our travel distance is a lot where it can have a mental effect. (R15)
	8	Children's playground	A space that promotes exercise and sports facilities for children	Nature of children who like playing. Children's playgrounds become one the important elements for children. The playground should be safe for children, and it should be hidden from the main road and parking area. (R7)
Comfort	9	Sound barriers	Method or device that reduces unwanted or loud noise from the surrounding environment	The house is located in the center of Kuantan and next to a shopping mall. The situation is quite noisy and annoying when cars are crowded entering the shopping mall area. (R8)
	10	Soundproofing material	Building material that has high thermal mass and acoustic that reduce unwanted noise from outside the house	The resident thinks of a residential with some noise reduction system or soundproof where we cannot hear people running or jumping from the upstairs housing unit. (R4)
	11	Residential planning	Planning of outdoor spaces and facilities that are safe, private, and hygienic	Living in the city will face some noise pollution, especially during pick hour when people go and back from work. The housing block should be designed where the house entrance does not face the road. (R7)
	12	Housing density	Number of units per block	The house has only four floors, and one block has eight units of houses. The building blocks are connected by block stairs. Each staircase only connects two houses, left and right. So, it feels more private and less compact. (R10)
	13	Indoor space layout	Indoor space planning that creates privacy for the housing members	Family houses will usually have many visitors. A good layout needs a sense of privacy, especially the bedroom space. The room door cannot be accessed by the direct living area. The kitchen area needs to be secluded from the main area. (R16)
	14	Ceiling height	Provide ideal ceiling height for well air circulation	High ceilings are good because they can be well ventilated. Therefore, the occupants do not feel suffocated sitting in the house. (R16)
	15	Daylight	Ample daylight for a bright indoor environment and energy-savings	Daylight is also necessary indoors because we do not have to install lights 24 hours a day. Apart from saving electricity, the house also feels less hot because the Malaysian weather is hot. (R16)
	16	Elevator facilities	Provide elevator facilities for all types of multi-story residential buildings	Multi-story housing without elevators is only set on houses with a maximum of 5 stories and is usually low-cost housing. Families living on the 1st floor may have no problems. However, difficulties are faced by families living on the upper floor, especially families with small children. (R2)
	17	Reduce house level	Mezzanine floor design ideas for reducing house level	The design that has the lower ground and ground floor start at level 2 is an example of a good design because people who want to go to the upper floor can reduce one floor to climb the stairs. The design also depends on the site contour. (R7)
Mind	18	Positive view	Beautiful scenic outdoor environment such as building skyline and green view for a tranquil feeling	Next to the building, there is a shopping mall, and the balcony of the house facing the shopping mall gives a good view. (R5) Residents can feel the outdoor environment for tranquility. (R16)
	19	Positive sound	Sounds that give a tranquil feeling	Also, hearing the train sound gives a positive sound to the mind. (R1)

Table 6. Elements that affect health for residential buildings in a developing country (continued)

THEME	SUB-THEME	DESCRIPTION	SUPPORTING STATEMENT	
	20	Green spaces	Outdoor green spaces and landscape	A beautiful landscape complimenting a jogging track can relieve the stressful mind. (R20)
	21	Strategic location	Locations that are near high facilities, less traffic, and easy access	The location of residential buildings is normally in the city center, where the density of the area is very high. Some people live on the outskirts of the city center even if it is far a bit from their workplace. Somehow, they feel relieved when passing and having less busy and peaceful areas after coming back from work. Also, the less busy area has less pollution. (R20)
	22	Keep pet	Keep pets inside the house as a hobby	Many residents will defend their pets to get rid of boredom, but they need to take care of their pets by just putting them in the house to not disturb other neighbors. (R16)
	23	Indoor green element	Plant indoor plants inside the house	Interior layouts should also create a green element. The balcony space plays a role because the residents can plant trees and make a small garden in the balcony space. (R11)
Security & safety	24	Good security arrangement	Provide a 2 or 3-tier type of security	For good security, Access cards are used for parking and elevator. However, on the emergency stairs, there is no access card. CCTV is also available for surveillance control. (R9)
	25	Upper & lower structure	Aware of upper tenant and lower tenant	When living in a multi-story house, we have to be aware of the upper and lower structures. A common problem is a leaking problem. (R15)
	26	Quality of security appliance	Material or security appliances which are not easily broken	Sitting downstairs requires extra security because there are two entrances: the main entrance and the entrance from the balcony. The main entrance type is a nice-durable type. Balcony doors of relatively low-grade quality. The door has a good grade/security lock to prevent thieves. (R17)
Community	27	Good neighborhood	Friendly neighbors and keep interacting with each other	The community has to live like it used to be, where people always interact with each other. The community communicates less with neighbors, especially those living in multi-story houses. (R18) Some people need a neighborhood to talk which is good for their mental health. So, follow each other's choices as well. (R11)
	28	Social activity spaces	Shared space for the community that promotes social interaction and activities	Facilities such as a gym, swimming pool, community area, and part of the landscape need to be provided because these facilities are shared facilities. When they share, there will be an interaction between the residents in the housing area. (R11)
Management	29	Good maintenance	Provide regular maintenance services	Elevators should always be in good service. If the person living on the top floor will face a problem if the elevator is broken (R19)
	30	Good management	Manage the housing block and area by providing clear rules and regulations to follow	The use of the card is good for security, but problems arise if the card is left behind or lost (R19)

4.2. Elements that Affect the Well-Being of Residential Buildings

Table 7 summarizes the themes and subthemes of elements that affect the well-being of residential buildings. There are nine categories: air, fire, fitness, comfort, mind, safety & security, community, and maintenance & management are identified to be the themes. Of the eight themes, there are 23 subthemes, and the details of the new concept and new elements of WELL are articulated in the discussion section.

Table 7. Elements that affect well-being for residential buildings in a developing country

THEME	SUBTHEME	DESCRIPTION	SUPPORTING STATEMENT	
Air	1	Garbage management system	Systematic garbage collection system and well design of garbage area	rubbish bin rooms should also be provided on every floor to make it easier for residents to dispose of rubbish. (R16)
	2	Increase ventilation	Increase air circulation in indoor housing space	Staying in an upper-level house can have better ventilation due to stronger winds. The house has a cooler indoor environment than the landed house. (R1)
Fitness	3	Physical activity spaces	A space that promotes exercise and sports facilities	Residential buildings need to have common facilities such as a swimming pool, exercise room, jogging, and green area. These facilities are important for health facilities because usually, we go home, the time takes a lot from parking to the elevator and to the entrance of the house. Every day, our travel distance is a lot where it can have a mental effect. (R15)
	4	Children's playground	A space that promotes exercise and sports facilities for children	Nature of children who like playing. Children's playgrounds become one the important elements for children. The playground should be safe for children, and it should be hidden from the main road and parking area. (R7)

Table 7. Elements that affect well-being for residential buildings in a developing country (continued)

THEME	SUBTHEME	DESCRIPTION	SUPPORTING STATEMENT	
Comfort	5	Sound barriers	Method or device that reduces unwanted or loud noise from the surrounding environment	
	6	Residential planning	Planning of outdoor spaces and facilities that are safe, private, and hygienic	
	7	Housing density	Number of units per block	
	8	Daylight	Ample daylight for a bright indoor environment and energy-savings	
	9	Indoor space layout	Indoor space planning that creates privacy for the housing members	
	10	Weatherproof balcony	Balcony design that avoids excessive heat and rain	
	11	Housing price & rental	The ratio of housing price and rental set based on market demand and location	
	12	Good facilities	An indoor residential area that provides facilities that create pleasure and convenience	
	13	Lifestyle	Surrounding facilities of the residence that meet the lifestyle, well-being, and religious need	
	Mind	14	Positive view	Beautiful scenic outdoor environment such as building skyline and green view for a tranquil feeling
		15	Green spaces	Outdoor green spaces and landscape
		16	Strategic location	Locations that are near high facilities, less traffic, and easy access
	Security & safety	17	Good security arrangement	Provide two or three-tier type of security
18		Building structure	Aware of upper tenant and lower tenant	
19		Safety grill	Material or security appliances which are not easily broken	
Community	20	Good neighborhood	Friendly neighbors and keep interacting with each other	
	21	Social activity spaces	Shared space for a community that promotes social interaction and activities	
Management	22	Good maintenance	Provide regular maintenance services	
	23	Good management	Manage the housing block and area by providing clear rules and regulations to follow	

4.3. Elements that Affect the Productivity of Residential Buildings

A list of themes and subthemes that affect productivity for residential buildings are summarized in Table 8. There are six concepts identified as the themes, and 21 elements are identified as the subthemes. The details of the new concept and new elements of WELL are articulated in the discussion section.

Table 8. Elements that affect productivity for residential buildings in a developing country

THEME	SUBTHEME	DESCRIPTION	SUPPORTING STATEMENT		
Air	1	Garbage management system	Systematic garbage collection system and well design of garbage area	It is better to have a garbage room on every floor, and the housekeeping of the residential building will service the garbage. By having that, people do not have to bring their trash in the lift to the ground floor where the garbage bin is located, as the lift that is crowded with people will be smelled the garbage. (R4)	
Water	2	Water flow & supply	Good pressure of water supply	Water problems that often occur are bothering the residents because it is one of the important resources in daily life. To find another source of water and bring it upstairs is very challenging. (R3)	
Comfort	3	Residential planning	Planning of outdoor spaces and facilities that are safety, privacy, and hygienic	Living in a multi-story house is difficult when buying many things and wanting to move house. So, the elevator position should be close to the parking lot and easy access from the parking area. (R15)	
	4	Population	The capacity of people living in the residence	Demand for multi-story houses in Kuantan is relatively low. On the ground floor of the apartment is a shop lot. Many shop lots are empty due to lack of population. (R14)	
	5	Taste	Choice of residential type leads to market demand	Demand is declining because people prefer landed houses to multi-story houses because the price is cheaper and more convenient. (R14)	
	6	Convenient surrounding facilities	A variety of shops that have long opening hours cater to the local taste and are close to the residential area	It is very convenient if the house is located in the city center because all facilities are nearby. However, the disadvantage is that the residents are exposed to the pollution from vehicles and factories. (R20)	
	7	Elevator facilities	Well-functioning elevator facilities	Physically, an elevator is very necessary for multi-story houses. A well-functioning elevator can increase productivity because there is less waiting and traveling time using the elevator. So far, no lift issue. (R1)	
	8	Number of parking requirements	Provide enough parking spaces and follow building guidelines	Parking is plentiful, and each unit will be able to park individually. The car plate number is written on each parking lot to prevent others from parking incorrectly. (R12)	
	9	Proper parking design	Parking design should follow standards and guideline	Low-cost house parking is usually a type of above-ground parking. For Medium to High-end houses is a type of podium parking. (R6)	
	10	Provide a self-carwash area	Provide the area with a water inlet for carwash purposes	We would love to wash the car on the porch if it is a landed house landed. Should provide one parking area with access water for car washing. (R18)	
	Mind	11	Good coverage	Areas that have high internet coverage and telecommunication signal	Urban areas always have an advantage in terms of Wi-Fi and internet coverage. The coverage is always not much any problems. Good coverage is needed to perform productivity tasks. (R7)
		12	Relaxing space	Relaxing spaces that have a scenic view and green environment for mental healing	As working from home, sometimes the feeling stuck and stressed came. Ample space for relaxing is needed. This residential building only has one balcony for relaxing. (R1)
13		Furniture setting	Arrangement of furniture and type of furniture	Furniture setting and complete furniture add-on for productivity work from home. (R16)	
14		Beauty & design	Complete settings of interior design	Some people are willing to live in an expensive house with a complete furniture setting and fully furnished. An exclusive interior can impact the mood and be close to the floor. (R19)	
15		Housing price & rental	The ratio of housing price and rental set based on market demand and location	People who have a choice will not want to live in a cheap apartment house because of bad management. (R19)	
Security & safety	16	Good security arrangement	Provide a 2 or 3-tier type of security	Guard needs to help when the sensor on the gate does not work properly. This causes time-consuming for the drivers because they have to wait a long time to enter the residential area and difficulties for the guard. (R3)	
	17	Parcel room	Provide space or room with security for incoming delivery parcels	Design to be thought of for post-pandemic. Regular mailboxes are provided for all units at the edge of the elevator. For post-pandemic, we have to provide a locker room for parcels because more and more people are ordering online. (R15)	
	18	Neighborhood behavior	Friendly neighbors and keep interacting with each other	Foreigner attitude is bad and sometimes quarrelsome; the management will take action by terminating their rental contract. (R9)	
Management	19	Good maintenance	Provide regular maintenance services	Residence facilities are well maintained. There is weekly cleaning on the house, and they are very punctual. Good maintenance is needed to keep the facilities well maintained and give comfortability to the residences. (R12)	
	20	Good management	Manage the housing block and area by providing clear rules and regulations to follow	Management will review the tenancy agreement every year to know who the current tenant is. (R9)	
	21	M&E services	Provide regular maintenance for M&E services	Regular service for water and electricity is a must to avoid any problems. If there is a water pressure issue, maintenance needs to repair. (R16)	

5. Discussion

WELL, housing should assist living facilities that give comfort and happiness. There are ten concepts of the WELL standard listed in Figure 3 below. This study found three new WELL concepts for residential buildings in a developing country.: fire, safety & security, and maintenance & management. The following subsections discuss these three new concepts and their associated features.

5.1. Fire

The fire concept has one element, which is fire safety. R3, R6, R8, and R9 mentioned the element of fire safety needed for a healthy residential building. Fire safety is one of the criteria that should be considered during the design stage of the project. In Malaysia, fire safety and regulation follow the Uniform Building by Law (UBBL). R3 and R8 said there should be a fire extinguisher for every house for fire safety purposes. In addition to safety purposes for residential buildings, the smoke alarm also needs to be checked regularly.

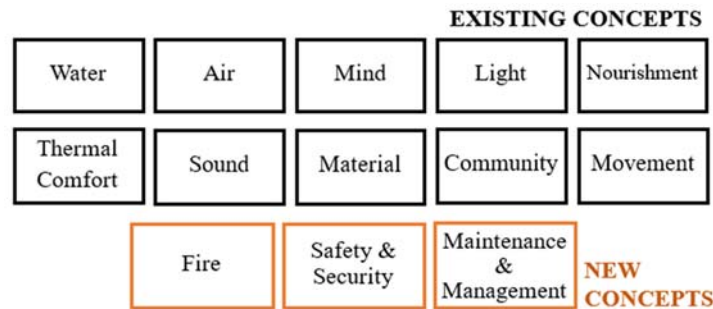


Figure 3. Existing and new WELL concepts for residential buildings

5.2. Safety & Security

The safety & security concept has seven elements. Houses need security and safety to give people safety and a healthy environment. For the safety & security concept, the three elements that affect health are good security, upper & lower structure, and quality of security appliance. The elements that affect well-being are building structure and safety grill. For productivity, the elements are good security arrangements and a parcel room.

Good Security. R9, R13, R14, R17, and R19 were identified as good security elements for healthy residential buildings. Security safety assistance is needed during an emergency (Awang, 2020). R1, R5, R6, R8, R10, R11, R12, R13, and R16 suggested that good security elements are needed for an appropriate well-being environment for residential buildings. Safety environment where the residential security alarms have been activated and are functioning (Awang, 2020).

Upper & lower structure and Building Structure. R15 suggested the upper & lower structure elements. Leaking problems can always happen in residential buildings, increasing moisture in an indoor environment. Increased moisture can lead to an unhealthy environment. When the leaking problem happens, the upper and lower structure need to be aware. R6 identified the building structure element. "It is necessary to take into account the structure of the building when the landscape is in the middle" (R6).

Security appliance and Safety grill. R17 suggested the quality security appliance element. Relatively, the quality of security appliances in multi-story residential buildings is low for affordable houses. High-end residential types might have different security levels. R7 also suggested the safety grill element. "Balcony area design should have safety for children, for example, adding grill at the balcony area" (R7).

Good Security arrangements. R3, R7, and R15 were identified as good security arrangement elements that are needed for a productive Residential Building. A residential area should have a security arrangement minimum is two-tier security. Two-tier security has an access card at the security boom gate and an access card to enter the lift lobby from the car park. For three tiers, there is an additional access card from the lift before entering the corridor to the apartment. R7 and R15 agree that housing needs a guard and a gated house for security.

Parcel Room. R3, R15, and R16 identified parcel room elements. During a pandemic, many people need to shop online. There are a lot of parcels delivered and no proper place to receive them. Guardhouse and the regular mailbox are not enough places to receive those parcels. R15 suggested that the parcel room or bigger locker room for the parcel be thought of for post-pandemic design.

5.3. Maintenance & Management

The maintenance & management concept has three elements: good management, good maintenance, and M&E services.

Good Management. A multi-story residential building is a strata title and is usually managed by management. A residential building facility will maintain by the management for giving regular maintenance works. Good maintenance practice is important to avoid discrepancies in any building services. A good management element was identified by R19. R11 and R12 also identified good maintenance elements. Buildings that are constantly painted and well maintained are hygienic (Awang, 2020).

Good Maintenance and M&E Services. R9, R10, R13, R16, and R19 were identified as good maintenance elements. Good maintenance and management increase satisfaction among the residents and create a happy environment (Awang, 2020). Mechanical and electrical is also part of maintenance work which caters to the water and electricity component. R16 was identified M&E services element. "Regular service for water and electricity is a must to avoid any problem arise. If there is a water pressure issue, maintenance needs to repair" (R16).

5.4. Contributions and Implications

The contribution of this study is useful for policymakers, other researchers, and industry practitioners in decision-making and improving existing standards.

5.4.1. Theoretical Implication

Theoretically, the findings of this study contribute to the existing WELL-building standard on WELL residential building elements within the context of a developing country. This study has new findings that added to a new concept: fire, safety & security, and maintenance & management. The three new concepts have been added to the existing well-building standards: Fire, which caters to health and well-being issues. The safety & security concept cater to health, well-being, and productivity issue. Lastly, the Maintenance & management concept also cater to health, well-being & productivity issue. In terms of academics, the findings of the WELL concept and element for residential buildings can be used for continued research, and the methodology can be adopted in other research with different types of buildings or countries.

5.4.2. Practical Implication

From a practical perspective, the result of WELL concepts and elements also benefits the industry. Building owners and practitioners can use the result to make early decision-making during the design stage for building development. This understanding of WELL concepts and elements also provides insights that may guide decision-makers to improve the building design, reducing any negative impact on health, well-being, and productivity.

5.4.3. Managerial Implication

There are no policies or building guidelines for WELL elements in Malaysia and developing countries. Therefore, the result of the WELL concepts and elements found in this study provides an essential list for the government to develop a framework for WELL residential buildings. This study's findings also are useful for policymakers in developing and enhancing existing housing standards and the body of knowledge for developers, designers, and residents. Furthermore, the result increases awareness of the top management of built environment-associated companies, including developers, which leads them to apply in decision-making. As a result, an organization will become more proactive, forward-looking, and aware of health, well-being, and productivity issues.

5.5. Limitations and Future Research Directions

This study has identified WELL concepts and elements for multi-story residential buildings. Despite having the list of WELL concepts and elements for residential buildings, the result may need to add further for other types of buildings. Also, the location of the building selected is in Malaysia country. Other developing countries may have different context that may provide different results. Therefore, the result can be applied to other countries with additional adjustments. Future research can identify the importance of the different WELL concepts and elements in other developing countries by using this result.

6. Concluding Remarks and Recommendations

There is less attention to WELL housing research, policy, and development in developing countries. Thus, this study aims to investigate the elements that affect health, well-being, and productivity in residential buildings. The interview was conducted with built environment professionals and individuals living in multi-story residential buildings, and the data were analyzed using thematic analysis.

Based on the thematic analysis, nine concepts and fifty-three elements are identified that affect health, well-being, and productivity for multi-story residential buildings. The authors also identified three new concepts: fire, security & safety, and maintenance & management.

Based on the new concepts found, Malaysia faces many issues with safety and security concerns. First, more than one-tier security is needed, especially for multi-story residential buildings. Maintenance and management issues always happen in multi-story residential buildings where the residents are not satisfied with the services provided. Lastly, most residents are not aware of fire safety protection for fire issues. It should be the role of management to inform residents about fire safety and the guidelines in a residential area.

Acknowledgments

The authors are thankful to the built environment industry professionals and individuals living in multi-story residential buildings industry practitioners that participated in the interview sessions. The authors are also grateful to the editors and the reviewers for their insightful comments for improvement and accepted this paper for publication.

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Salma Husna Zamani contributes to conceptualization, methodology, data collection, data analysis and writing-original draft preparation. Dr. Rahimi A. Rahman contributes to manuscript editing, supervision, project administration, and funding acquisition. Dr. Liyana Mohamed Yusof contributes to manuscript editing and supervision. All authors have read and agreed with the manuscript before its submission and publication.

Funding

The Ministry of Higher Education Malaysia had funded the Fundamental Research Grant Scheme (FRGS/1/2019/TK08/UMP/02/6) (University reference RDU1901200) for this research.

Institutional Review Board Statement

Not applicable.

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