The analysis of health aspects in housing type 45, Panorama Indah residence, Pekanbaru

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Abstract. Healthy housing is one of the needs that must be completed in order to support the householders to obtain an optimal degree of welfare for their living. The aim of this research is to determine how far the housing type 45, Panorama Indah Residence, Pekanbaru, qualified as a healthy house according to the Directorate General of Human Settlements, Department of Public Works of 1986. The criteria of a healthy house are divided into four (4) aspects, namely: amenities, health, building intensity, and affordability. The parameters of a healthy house, particularly health aspects, include adequacy of lighting, ventilation, and the supply of clean and drinking water; the disposal of household waste water, rain drainage, and household waste; also all parts of the house, including floors and walls, must not be humid, and be unaffected by pollution from dirty water and air. This research used synchronising the regulations method with the real condition by conducting a direct field survey and was analysed by design document. The results of this research indicated that the housing type 45 has not met all the demands of a healthy house requirement, particularly the health aspect. This included the lighting, lack of ventilation and unavailable trash cans in the area of the housing.

1 Introduction

Pekanbaru, as the capital city of Riau Province, has increasingly grown with a total area of 632.26 km² and, the entire population of 950,571 people according to the Central Bureau of Statistics (BPS) Riau Province data record in 2013. The high increasing number of population in certain areas will bring a demand for a high number of residences as well. Therefore, land and housing become two of the most important needs in achieving the well-being of human life.

A proper house consists of an interrelated set of structures, including room, garden, and nearby area and which is used as a place to live and to develop as a family [1]. Moreover, a healthy house is a place for a family to have shelter and to develop physically, mentally and socially as a result that all family members can work productively.

In specific, the criteria of a healthy house can be seen from various regulations based on APHA (American Public Health Association), Minister of Health decision RI No.829/Menkes/SK/VII/1999 [2] and based on the Directorate General of Human

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Settlements, Department of Public Works in 1986 [3]. The criteria are divided into four aspects: amenities, health, building intensity and affordability.

The housing located on Jalan Sopyono, Pekanbaru, was one of the housing developments constructed by PT. Damba Griya Harmoni in 2015. Realistically, several aspects of the housing type 45 have still not met the demand of a healthy aspect requirement according to the Housing Directorate General of Human Settlements of the Ministry of Public Works of 1986 [3] which are, lighting, insufficient ventilation and unavailability of trash cans.

Therefore, in this research, the researchers would like to discuss health aspects following the requirements of the healthy house based on the Directorate General of Human Settlements, Department of Public Works of 1986.

2 Literature review

2.1 Definition of term

Housing is a group of houses that function as a place to live or a place that is equipped with environmental infrastructure [1]. A house is an essential infrastructure in life, mainly for those who have a family. Thus, planning a house should be built to fulfill the needs and customs of each householder, including being sheltered from rain, heat, or any climate and safety disturbances that may occur during life. In general terms, a house is a human-made building that has been used for a certain period of time [4].

2.2 The importance and the requirement of a healthy house

A healthy and prosperous house will foster a peaceful, safe and organized atmosphere. A simple house can be formed into a healthy house with the result that it could prevent householders from contracting illnesses that may emerge in the future. A house has three (3) essential meanings for human life, a place for shelter, a place to thrive, and a place for the family activity [5].

The first important meaning of a house for human life is as a place to shelter, which is to protect themselves from natural disturbances and other distractions so that families can live with a sense of safety and peace. The second important meaning of a house for human life is a place for development; in other words, a house serves as a place to unwind, to hang out and foster a sense of kinship among family members, as well as a shelter and to save belongings. Also, a house is also a social status symbol. The third important meaning of a house for human life is a place for family activity, which means that a house is a place for organizing life and to liven up the family. A house must fulfill the biological needs, such as eating, studying, etc. and also fulfill nonbiological needs, such as being close to a family member and neighbor.

The Directorate of Housing at the Directorate General of Human Settlements, the Ministry of Public Works of 1986 [3] affirmed that building a house must fulfill the following health requirements such as aspect of amenities, aspect of health, aspect of building intensity and aspect of affordability.

2.2.1 Aspect of amenities

In order for the household to live comfortably and efficiently perform activities, the house needs to provide an adequate room and suitable size of rooms for householder whereby, according to UNCHS (United Nations Commissions for Human Settlements), the width of

floor needs to be 12 m^2 per person, there is an adequate room arrangement, and decoration and color should be matched along with a green garden. This should be arranged as needed.

2.2.2 Aspect of health

The parts of the house that affect health should be well prepared, in particular, adequate room lighting, adequate ventilation, adequate clean water and/ or drinking water supply, disposal of household wastewater, disposal of rain drainage, disposal of household waste, and all parts of the house, including floors and walls, should not be humid, and be unaffected by pollution from dirty water and dirty air.

2.2.3 Aspect of building intensity

The interrelated set of the structure of a house must ensure safe construction and building materials, including the strength of the building's construction, to withstand both internal and external side-effects (wind, rain, solar heat, earthquake and others). The use of building materials should ensure durability, ease of maintenance and the use of refractory materials (for combustible parts) and waterproof materials (for wet parts).

2.2.4 Aspect of affordability

A healthy house does not have to be big, magnificent, luxurious and expensive, but a modest house that is built directly or gradually, following the householder's financial capability and follows the construction requirements of a healthy house. Therefore, in building a house, there is a need to prepare a sufficient cost under the householder's financial capability.

2.3 Healthy house requirement particularly in health aspect

Based on the Directorate of Housing at the Directorate General of Human Settlements of the Ministry of Public Works of 1986, the health aspects consist of: adequate lighting, adequate ventilation, adequate clean water and/or drinking water supply, disposal of rain drainage, disposal of household waste, all parts of house including floors and walls, should not be humid, and should be unaffected by pollution from dirty water and air.

3 Methodology

This research is located in Panorama Indah Residence, Pekanbaru, specifically at E block in housing type 45. Panorama Indah Residence is situated in Jalan Hangtuah Gang Sopyono, Pekanbaru.

This research uses assessment based on the regulation of Directorate General of Human Settlements, Department of Public Works of 1986 and also the data taken by using a measuring tape.

The primary data is obtained directly from the research objective. Data consist of what was found in the field, such as the area of the house, floors, ventilation, window, doors and the availability of wastewater drainage arrangements and other items that are included in the research objective.

The secondary data was obtained from the company's documents about the build, such as drawing data, and from the Directorate General of Human Settlements, Department of Public Works of 1986 [3].

Specified population in this research is a house that applies the requirement of a healthy house in Pekanbaru. The taken sample is the requirement of a healthy house, especially in terms of health aspects, which are adequacy of lighting, ventilation, and supply of clean and drinking water; the disposal of household wastewater, rain drainage and household waste; also, all parts of the house, including floors and walls, must not be humid, and be unaffected by pollution from dirty water and air. All of which should be applicable in housing type 45, Panorama Indah Residence, Pekanbaru.

4 Results and discussion

4.1 Lighting adequacy

According to the applicable regulation about the health aspects of a house, the minimum natural lighting for a healthy house is 12.5% from floor areas. This research found three rooms that did not fulfill the minimum requirement, i.e., bedroom 1, bedroom 2 and kitchen so that it needs an expansion of window area to organize the natural lighting. The result and solution for adequate natural lighting can be seen in Table 1 and Fig. 1.

Table.1. The result and solution of natural lighting.

Name of room	Floor's width (m ²)	Minimum standard width of window holes (m ²)	Existing width of window holes (m ²)	Solution of window holes width (m ²)
Bedroom 1	9.00	1.13	1.08	1.16
Bedroom 2	9.00	1.13	1.08	1.16
Kitchen	6.00	0.75	0.37	0.77
Dining room & guest room	16.50	2.06	3.82	3.82

Fig. 1. The differences between the existing, the minimum standard, and the analysis in adequate of natural lighting.

Artificial lighting in this objective already follows the requirement that it uses lighting which is as appropriate to the room function. The result can be seen in Table 2.

Table 2. The result and solution of artificial lighting.

Component	Condition based on review	Analysis	Standard
Terrace, bedroom	Identified	100 lux	100 lux
Living room, bathroom	Identified	100 lux	100 lux
Guest room, kitchen	Identified	300 lux	300 lux

4.2 Adequacy of air circulation

Adequacy of air circulation is divided into natural and artificial air circulation. The applicable regulation explains that the minimum of natural air circulation is 10% from floor areas. Moreover, the solution for the natural air circulation in the room is to enlarge the width of the ventilation area. This can be seen in Table 3 and Fig. 2.

Table 3. The result and solution of natural air circulation in room.

Name of room	Floor's width (m ²)	Minimum standard width of window holes (m ²)	Existing width of window holes (m ²)	Solution of window holes width (m ²)
Bedroom 1	9.00	0.90	0.31	0.97
Bedroom 2	9.00	0.90	0.31	0.97
Kitchen	6.00	0.60	0.26	0.65
Dining room, guest Room	16.50	1.65	0.75	2.07
Bathroom	2.59	0.26	-	0.27

Fig. 2. The differences between the existing, the minimum standard, and the analysis in adequate of natural air circulation.

4.3 The supply of clean and drinking water

The result of this research was to obtain that adequacy of clean and drinking water in this house has fulfilled the requirements, which are that the water must be colorless, odorless and tasteless. The available source of water in this house was from an artesian well with a pump machine capacity of 33 liter/minute so that the necessity of water for householders can be fulfilled with average water usage of 150-200 liters/person/day.

4.4 The disposal of household waste water

The disposal arrangement of household wastewater in this house was completed according to the requirement, as can be seen by the disposal of grey water and black water. The disposal of grey water from the house was funneled through polyvinyl chloride (PVC) pipe with 4 inch diameter to the infiltration well, then streamed to environmental drainage of the housing so that the grey water drainage did not pollute the environment. Thus, the regulation of the disposal of household wastewater, especially for grey water, is fulfilled. The disposal arrangement for black water could be seen by the availability of a septic tank tub and the control of it as specified by regulations whereby it has a tub for decomposition and overflow for the dirty liquid and also has a control hole. As per the regulation of Indonesia national standard, the dimension of the tub is for five people, i.e., 0.75 m width, 1.5 m length, and 1.5 m high.

4.5. The disposal of rain drainage

The disposal of rain drainage in this house used square open-channel with 20 cm width and 20 cm high around the bottom of the roof. The use of this open-channel could have anticipated erosion of surface soil, muddy yard and some diseases which are caused by the growth of mosquito larvae in puddles. The adjustment for the house rain drainage disposal had followed the requirement, as could be seen by the availability of the rain drainage.

4.6 The disposal of household waste

The disposal of household waste in this house did not meet the requirement because a trash can was not available. The average household waste is about 1-3 liter/person each day, so that, with four family members in the house and the waste supposedly taken out by the garbage man every three days, the house needed a trashcan with a 36 liter capacity and a cover in order to not create pollution caused by the smell of the garbage.

4.7 Humidity

The applicable regulation applied is that all parts of the house such as walls, floors, etc., must not be humid as a result of seepage from outdoors or not being in accordance with the building material. The object of this research fulfilled the requirement with walls 20 cm high from floor to the ground and the floor covered by tiles, which can prevent seepage from the ground. Also, the wall used pairs of bricks with 1:2 of space, so the house will be free from humidity.

4.8. Unaffected by pollution from dirty water and air

Based on the regulation, a house must not be located near an industrial/ factory area, the drainage of the household wastewater must be well-organized, streamed and used a closed-channel so that it won't cause any pollution in the environment. In the object of this research, the drainage of wastewater to sewerage on the edge of a road is drained with a closed-channel, and the house is located in a residential area and far from industrial/factory areas; therefore, this research object fulfilled this requirement too.

5 Conclusions

In this study, the application of a healthy house in housing type 45, Panorama Indah Residence, Pekanbaru, was based on regulations by the Directorate General of Human Settlements, Department of Public Works of 1986 was done $\pm$ 70% from eight existing aspects. House requirements for a minimum of natural lighting of 12.5% from floor area, minimum natural air circulation of 10% from floor area, the supply of clean and drinking water, the disposal of grey and black water, the disposal of rain drainage, and the location of the house in a residential area correspond to the regulations protecting the impact on its environment and can be applied on large or small houses. Therefore, these will fulfill the health aspects in a house in an attempt to create a healthy and comfortable residential atmosphere.

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