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Research Article

Dwelling Units Improvement Using the General Guidelines for Healthy Simple House in Kalisari Timur Fishermen Village in Surabaya

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Abstract: Kalisari Timur fishermen village area in Surabaya is one of the settlements in the city of Surabaya which is located in the coastal area and the majority of the population work as fishermen. The economic condition of the population of this area is still low and it impacts to the environment and the condition of the dwelling units, that still not quite feasible in accordance with the Indonesia's general guidelines for healthy simple house. This paper aims to identify existing problems in the majority of the population dwelling units and to provide solutions to improve the condition of the dwelling area.

The research begins with the survey directly to the Kalisari Timur fishermen village to collect the data such as pictures (photographs) to determine the physical condition of the dwelling unit and its environment. Further interviews were conducted with local leader using questionnaires that have been provided previously to know more clearly about the problem. Once the entire contents of the questionnaire have been answered, the next step is to make a percentage of the quantitative benchmarks to draw a conclusion from the condition of the Kalisari Timur fishermen village as a whole.

According to the general conclusion, the dominant issues in this area was the dwelling units that are not in accordance with the general guidelines for healthy simple house. The last step to do is to provide solutions on improving dwelling units in the area based on general guidelines for healthy simple house.

Keyword: dwelling unit improvement, healthy simple house, fishermen village

INTRODUCTION

The city of Surabaya is the capital of East Java Province in Indonesia that is located on the waterfront and has coastal areas. Those coastal areas are spread along the north coast to the east coast of Surabaya. The majority of people in this area work as fishermen, both fishing at sea and fishing ponds. Kalisari Timur fishermen village area in Surabaya eventually became the location that has been chosen for the application of the principle of sustainable development and improvement of dwelling units based on general guidelines for healthy simple house.

The purpose of the general guidelines for healthy simple house is to answer the needs of decent and affordable housing and also to meet the requirements of comfort, safety, and health within the scope of the potential regional heterogeneity, especially the potential of building materials, cultural, and physical characteristics of the region. General guidelines for healthy simple house aims to accelerate the achievement of the provision of decent and affordable houses by low-income people, very low, and informal groups, whether made in bulk and through NGOs.

Based on healthy simple house zoning map, which is intended as a healthy dwelling units in the city of Surabaya itself is a permanent dwelling unit which had walls made of conblock. In the Kalisari Timur fishermen village, most residential units are still not meet the general guidelines for a healthy simple house, seen from the number of dwelling units that still form the semi-permanent dwelling unit uses simple materials like bamboo (gedek) and hazardous materials such as zinc and asbestos. In addition, most residential units in the fishing village is also still not have a good lighting system, air cooling system, ventilation, sanitation, and support facilities.

Therefore, this paper tries to provide and explain the corrective measures that can be taken to improve the condition of existing housing units to fit with what the general guidelines for the healthy simple house determined.

EXPERIMENTS DESIGN AND SETUP

Healthy Simple House Definition: Healthy Simple House by *Depkimpraswil* (2002) is a house built using building materials and simple construction but it meets the needs of minimal standards of health, safety, and comfort, to consider and take advantage of local potential includes physical potential as building materials, geology, and local climate and socio-cultural potential as the local architecture and way of life.

Basic Rule of Healthy Simple House:

The Minimum Requirements (Performance) and Space (Outside-in): Space requirements per person calculated on the basis of human activity in the house. Activities include sleeping, eating, working, sitting, bathing, washing, cooking, and other space. From the results of the study, the space requirement per person is 9 m² with an average altitude calculation ceiling is 2.80 m. Healthy simple house allows residents to live healthy and carry out activities of daily living decently. Minimum requirements of space needs to pay attention to some of the provisions as follows:

- Area requirement of person
- Area requirement per person of families
- Building area requirement per person of families
- Land area requirements per unit buildings¹

Further details can be seen in **Table 1**.

Table-1: Needs Minimum Area of Land and Buildings for Healthy Simple House

Standart per person (m2)	Area (m2) for 3 persons				Area (m2) for 4 persons			
	House Unit	Area			House Unit	Area		
		Minimum	Effective	Ideal		Minimum	Effective	Ideal
(Threshold) 7,2	21,6	60,0	72-90	200	28,8	60,0	72-90	200
(Indonesia) 9,0	27,0	60,0	72-90	200	36,0	60,0	72-90	200
(International) 12,0	36,0	60,0	---	---	48,0	60,0	---	---

Source: *Departemen Pemukiman dan Prasarana Wilayah Republik Indonesia (2002)*

RECOMMENDATIONS FOR SPACE OF HOUSES

- Design of space: Living in the house should be arranged to function as a living room, family room, dining room, bedroom, kitchen, shower room/laundry/toilet, a children's playground that is located apart from one another. Spacious living at least 9 m² per person, ventilation openings is more than 11% of the living space. Furthermore, the parameters that must be considered in the design of the house are: residential density especially the bedroom, lighting primarily from the sun, air cooling, types of flooring, wall type, and the type of fuel used in the household.
- Density residential bedroom: Spacious bedrooms at least 9 m² and is not recommended to use more than two people to sleep in one bedroom, except children under 5 years old.
- Density residential: One family consists 5 people, minimum house size is 50 m². For bedrooms required minimum floor area of 3 m² / person and to prevent the transmission of disease (example: respiratory disease) the distance between the edge of the bed with one another minimum of 90 cm.

Health and Comfort Requirements: House as a place that meets the requirements of health and comfort is influenced by 3 (three) aspects, lighting, vaporization, air temperature, and humidity in the room. These aspects are the basis or the principle of planning a healthy and comfortable house.

Lighting: The greatest potential to be used is natural lighting during the day. Lighting that referred is the use of bright sky, with the following conditions:

- Weather is sunny and cloudy.
- Activities room gets enough light.
- Activities room gets light distribution evenly.

Quality of natural lighting during the day which came into the room is determined by:

- ✓ Activities that require the power of vision (eye).
- ✓ The length of time the activities that require the power of vision (eye).
- ✓ Levels or gradations of roughness and smoothness of work.
- ✓ Skylight minimum is 1/10 of the floor area of the room.
- ✓ Direct sunlight can enter the room a minimum of one hour per day.
- ✓ Effective light can be obtained from 08.00 am to 04.00 pm.¹

Vaporization: The air is a basic human need to breathe throughout his life. The air will be very influential in determining the comfort of house building. Leisure will give freshness to the occupants and creates of a healthy, if air change and air flow occurs continuously through the rooms, and opening in a wall or partition dividing areas for ventilation.

In order to obtain the fresh air in the room with natural vaporization way, it can be done by giving or holding cross ventilation with the following conditions:

- Vaporization opening at least 5% (five percent) of the total floor space.
- The air flow in the same volume of air flowing out of the room.
- Incoming air is not coming from kitchen smoke or odor bathroom/toilet.

Especially for vaporization of kitchen and bathroom/toilet, which requires electrical-mechanical auxiliary equipment such as blower or exhaust fan, must meet the following requirements:

- ✓ The opening vaporization not interfere with the surrounding buildings.
- ✓ The opening vaporization not interfere with indoor activities in the building such as: living room, bedroom, and working room.¹

Temperature and Humidity: The house was declared healthy and comfortable, if the air temperature and humidity of indoor air in accordance with the normal human body temperature. Air temperature and humidity of the room was very influenced by vaporization and lighting. If there is less of vaporization, it will make the room feel cramped or stuffy and high humidity will cause the room.

To set the temperature and normal humidity to the room and residents in performing activities, need to pay attention as follows:

- Vaporization balance between the volumes of air in and out.
- Adequate lighting in the room.
- Avoid furniture that covers most indoor floor space.¹

RECOMMENDATIONS FOR HEALTH AND COMFORTABLE HOUSES

- **Lighting:** To obtain sufficient light during the day, required extensive glass windows minimum of 20% of floor space. If less liberal placement window, glass tile can be installed for all types of light to kill germs.
- **Air Cooling:** To enable a smooth change of air vents wide minimum required fixed 5% of floor space and when coupled with wide holes that can include other air (crack, doors, windows, bamboo hole and so on) to about 10% of floor space. Incoming air should be clean air and not air containing dust or odor.
- **Animal Borne Diseases:** No rats, cockroaches, or animal carriers/vectors of disease lodged in the house.
- **Greening Program:** One of the greening program in Indonesia is by encouraging more fruit planting program in the pot (*tabulampot*). Over the program, other than indirectly to support the greening program can also produce products that are useful and can be enjoyed by the residents themselves.

MINIMUM SAFETY REQUIREMENTS

Structure: Generally, the construction of the roof, walls and sub-structure of the house should be sturdy, rigid, and strong enough to bear its own weight, wind loads and seismic loads. General Guidelines for

Healthy Simple House by *Depkimpraswil* (2002), a minimum needs of security and safety needs in a simple house structure consists of :

Sub-structure: The sub-structure works to continue building loads include the weight of its own to the ground, giving stability to the building in order to not collapse and is the liaison construction of the building on the ground. Sub-structure system that is used on healthy simple house is a system of local sub-structure made from stone materials or without reinforced concrete. Other sub-structure material can be stone, brick, and concrete. Sub-structure material must be watertight to prevent water sewage into the ground. The sub-structure must be located on the hard ground.

Frame Building: Wall frame of houses made of reinforced concrete structures. There are homes with a half order of reinforced concrete and half of the wood frame. For making frame building, recommended using reinforced concrete. The entire wooden house, both for frame and building walls and the sub-structure are made of full woods.

Easel Frame: Healthy house generally use simple gable with wooden easel frame which is strong and durable. Especially to the wall with construction pair, can use easel frame using a surrounding side wall which is equipped with a ring-beam reinforced concrete construction.

Angle of the roof must comply with the provisions of the corner based on the type of roofing, in accordance with the specifications issued by the manufacturer or considerate of the comfort of the inside.

Component

Roof: The roof serves to retain heat, dust, and rain water. Roof covering should be a flat plane and angle of the roof depends on the type of roofing material used (see the table 2). The rooftop of house with a 10 m high or more must be equipped with lightning rods.

Table-2: Roofing Materials and Angle of the Roof for Healthy Simple House

Roofing Materials	Angle of the Roof (X°)
Palm Fiber	45°
Coarse Grass	45°
Tile Roof	30°
Cement Asbestos	18°
Shingle Wood Iron	25°
Zinc Roof	15°

Source: *Departemen Pemukiman dan Prasarana Wilayah Republik Indonesia (2002)*

- **Ceiling:** Ceiling serves to reduce incoming solar radiation into the house. Ceiling height at least 240cm. With the current global warming, high ceilings greatly affect the temperature inside the house, other than that, ceiling should be easy to clean and not prone to accidents.
- **Walls:** The walls serve to resist wind and dust and is not transparent. Materials may include brick walls, brick, bamboo, or wooden planks. The walls are equipped with means of ventilation for air circulation setting. Special for bathroom wall and the sink must be watertight and easy to clean. The walls must be sufficiently rigid, resistant to earthquakes.
- **Window and Door:** The windows and doors serve as a vent, a circulation of fresh air, the entry of light, and also used as a circulation between spaces. The best location of the ventilation opening is same with wind direction with a large opening at least 1/9 spacious floor space.

- **Floor:** Floors should be dry, not humid. Flooring materials must be watertight and easy to clean. Coating materials such as floor tiles, terrazzo, porcelain, and ceramics. Floor height at least 10 cm of the house garden and 25 cm of the road.
- **Building Materials:** As the business of the provision of healthy simple house, building materials should come from the region itself to fit the climatic conditions and this will greatly affect the cost of maintenance and the cost of shipping building materials. Indonesia, the tropics, has two seasons with plenty of sunshine and rainfall that are beneficial to health. However, the air temperature can reach 30° C and the air humidity is very high, which is about 80%. To adjust the condition of the house with a tropical climate and to support the health of occupants of the house, then the criteria of good material is:
 - Can hold water but have pore so it can breathe to deliver air and gas from the outside in and vice versa.
 - An electrical insulator and not a conductor electromagnetic.

Another important thing to note is building materials must be made of materials that can release substances that may endanger the health or can be the growth and development of micro-pathogenic organisms. Almost every building material can deliver and keep moisture in the form of water or steam. This ability depends on the pore structure (type, shape, and pore size). The smaller the pores of building materials more power to suck the water, and the larger pores filled with water more easily. This means that water can get into the building materials via gravity (example: by a leaky roof), the wind pressure (example: on the edge of a wall or roof exposed to high winds), by capillarity (the cracked plaster walls or soil moisture through trasraam that is not waterproof). Excess moisture in the humid tropical climate will grow gray fungus (*Aspergillus*) that affect occupant health due cause allergic bronchitis and asthma. Along with the development of technology, now comes a variety of new building materials. However, we should pay attention to the effects on human health as its users. Natural building materials are relatively safe for your health, but did not rule out a natural material processing using hazardous chemicals. Building materials are generally classified as follows:

Table-3: Building Class Materials

Class	Building Materials	Sample Materials
Natural Building Materials	Anorganic : natural stone, clay	Stone, pebble, sand, limestone
	Organic : woods, bamboos, leaves, grass	Various wood, bamboo, sago palm, coarse grass
Artificial Building Materials	Burn Materials	Brick, roof tile
	Fuse Materials	Glass
	Forge Materials	Conblock, concrete brick
	Chemicals	Plastics, papers, paint
Metal Building Materials	Precious Metals	Gold, silver
	A Half Precious Metal	Mercury, nickel, cobalt
	Iron Metal	Ron, steel
	A Half Iron Metal	Aluminum, cupreous, bronze

Source: *Lembaga Manusia dan Bangunan Unika Soegijapranata Semarang*

Asbestos materials are widely used as the roof of the house, especially for a simple house. However, the content of asbestos can cause health problems such as asbestosis disease, it is already well known among

health practitioners and health environment. Asbetosis is a chronic disease resulting in difficulty breathing and a death. In Indonesia, the regulation of the circulation of asbestos is still unclear. While waiting for the regulation about the distribution and the use of asbestos, there are simple ways to reduce the levels of carbon gas in the room, by designing a good ventilation in the house by the method that was described above.

RECOMMENDATIONS FOR PHYSICAL BUILDING HOUSES

- Building materials are not made of materials that can release substances that can be harmful to health. Building materials are not made of materials that can be growth and development of pathogenic microorganisms.
- The roof serves to retain heat, dust, and rain water. Roof covering should be a flat plane and angle of slope of the roof depends on the type of roofing materials used. House with a height of 10 meters or more must be equipped with lightning rods.
- The roof should have a saddle shape and wear tiles cover material that is not harmful to health. Form gable and the ceiling can neutralize the heat coming through the roof of the house so the weather is not too hot in the house, it should also be given a ceiling.
- The walls serve to withstand wind and dust, and is not transparent. The walls are equipped with means of ventilation for air circulation setting. The bathroom walls and washing facilities must be watertight and easy to clean.
- We recommend materials suitable for the walls are red brick, white brick, and wooden planks thick enough so that it can withstand wind gusts. Do not use semi-permanent harmful materials to health such as zinc and asbestos. According to the simple common sense guidelines drawn up by *Dinas Pekerjaan Umum Republik Indonesia*, the type of dwelling unit fit for healthy houses in East Java is using a conblock wall.
- Window and door serves as a vent, the fresh air and sunshine as well as circulation. The location of the vent that is both in line with the wind. Area of permanent natural ventilation openings at least 10% of floor space. While the vast hole window at least 20% of the floor area.

CONCLUSION

Based on the reviews, interviews, and surveys at residential locations Kalisari Timur fishermen village, it can be concluded that dwelling units conditions are still not in accordance with the general guidelines for healthy simple house, where the main problems in their residential dwelling units are still used simple materials (bamboo and wood) and hazardous materials (zinc and asbestos) that can damage the health of the occupants. But the interview with the local chairman discovered incompatibility with the facts on the ground. From the methods that have been done, it was discovered some suggestions for Kalisari Timur fishermen village's dwelling units improvement using general guidelines for healthy simple house.

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