The Influence of the Physical Environment of Flats on the Residents’ Health (A Study Case of Flats in Jatinegara Barat, Jakarta, Indonesia)

Wedmaerti¹, a and P Junadi¹, b

¹ Urban Development Studies, School of Strategic and Global, University of Indonesia
Jakarta, Indonesia

a wedmaerti@yahoo.com; b pije01@gmail.com

Abstract. The increasing number of population and urbanization in the city of Jakarta has led to greater land requirements for housing and settlements. Meanwhile, the amount of available land is increasingly limited with higher prices. Construction of simple rental flats (Rusunawa), especially for low-income communities, is one of the housing provision policies by the Provincial Government of Capital Special Region of Jakarta. The development of Rusunawa is expected to improve the quality of settlements. The better quality of the housing environment is expected to improve the health of the Rusunawa residents. This research was conducted in Rusunawa Jatinegara Barat. The purpose of this study was to analyze the influence of the physical environmental conditions of Rusunawa Jatinegara Barat on health. The research approach used is a cross-sectional method. Primary data was obtained from questionnaires distributed to 225 families living in Rusunawa Jatinegara Barat. The selection of respondents was done by using proportional random sampling. The variables examined include physical environmental conditions (independent variables) and occupant health (dependent variables). Data is processed using statistical programs. The results showed that there was no improvement in the health of residents of Rusunawa Jatinegara Barat.

1. Introduction

The high rate of urbanization in Jakarta makes an increase in housing needs for the community. The government's inability to provide housing for the community has been felt since 1950 [1]. But in its development until now, the government still has not been able to meet housing needs for the community. The state is responsible for providing decent and affordable housing for the community [2]. One of the housing problems in Jakarta is an environmental problem where the housing conditions have not met the standards. As a result, there are various health problems and an increase in the incidence of environmental-based diseases. Ten biggest diseases in Jatinegara Sub District are dominated by diseases related to environmental problems [3]. Cases of ARI in 2015 ranked first as many as 83,691 cases or 42.3% [4]. In 2015, in Jakarta, there were 48 locations of simple flats with an area of 133.14 Ha consisting of 182 blocks and 18,326 residential units [5]. Some health requirements for simple flat buildings include air conditioning system requirements, lighting system requirements, requirements for drinking water and sanitation systems, and requirements for trash bins, garbage storage and waste management [6].
2. Materials and Method

2.1. Materials
Healthy housing must meet three requirements, namely (a) Physical requirements which include the availability of clean water facilities, sanitation, waste and waste water management; (b) Biological requirements that required that the housing be free from insects / rodents; and (c) Social requirements that required the residents have healthy behavior [7]. Health requirements for residential houses include physical, chemical and biological conditions [8]. Environmental health includes several aspects, namely drinking water supply, wastewater management, waste management, prevention of disease vectors, prevention of soil pollution, management of hygienic food, prevention of air pollution, etc. [9]. A healthy environment which gets enough sunlight, has a source of clean water, has good drainage, has clean air quality, is free of garbage and a foul odor, is free from potential noise is to provide a physically and spiritually healthy human life [10]. Poor environmental quality will lead to the development of environment-based diseases, namely diseases that are affected by the environment and population. Some types of environment-based diseases are ARI, diarrhea, skin diseases, DHF, etc. [11]. Factors that affect housing health are (a) building quality, including: building materials, construction of buildings and house plans; (b) Utilization of buildings, such as the density of occupants which exceeds the established standards; and (c) Maintenance of buildings, such as maintenance of floor cleaning, sanitation and clean water facilities [12]. House conditions that tend to be narrow can make unhealthy homes which filled with various sources of disease. People living in poor neighborhoods have a higher incidence of infectious diseases than residents in good settlements [13]. There are four factors that influence public health status, namely heredity (genetic), health services, behavior and environment (physical, socioeconomic, cultural) [14]. Environmental factors are the first most influential factor. Health services also determines the process of recovery, prevention and treatment of diseases. Health care facilities are one of the socio-economic and cultural factors that play a role in preventing disease [15]. Environmental health is influenced by people's behavior both as a policy determinant and as a result group [16]. Unhealthy living environment and behavior can be a factor that supports the onset of illness [17]. A disease is basically the result of an interactive relationship between humans and their behavior and the habits with their environment. Environment-based disease is a disease that occurs in a group of people who are related to one or more components of the environment in which the community lives or moves [18]. Poor housing and settlements would cause health problems, including: (a) The occurrence of transmission of infectious disease, both family members and others. Infectious diseases such as skin diseases and ARI or diseases caused by insects and mice such as diarrhea and dengue fever. (b) Environmental pollution. (c) The emergence of social problems related to interactions between residents [19].

2.2. Research Method
The research design used was cross-sectional. The location of the research is on 512 units of flats which include Tower A and Tower B of Rusunawa Jatinegara Barat. The population was all standard residential unit with 512 respondents. The number of samples was 225 respondents. The sampling technique used was proportional random sampling. Research variables include the independent variable, which was the physical environmental condition of Rusunawa Jatinegara Barat and Dependent Variable, which was the residents' health. Data analysis was done by using computer program and statistical programs to obtain the results of univariate analysis and bivariate analysis. Bivariate analysis was done by using Kendall Tau (τ) correlation test.

3. Results and Discussion

3.1. Results
From the figure 1, 2, and 3 it can be seen that the research is located in Rusunawa Jatinegara Barat, on Jl. Jatinegara Barat, East Jakarta. The land area of Rusunawa Jatinegara Barat is 7,460 m². This flat is occupied by people, programmed from the normalization of Ciliwung River.

![Figure 1. Rusunawa Jatinegara Barat Map and Situation](image)

![Figure 2. Rusunawa Jatinegara Barat Side View](image)

![Figure 3. Rusunawa Jatinegara Barat Over View](image)

### Table 1. The Facilities in Rusunawa Jatinegara Barat

| Floor | Facilities |
|-------|------------|
| Ground | Mosque, public open space, green house, security office, parking area, market place. |
| 1st Floor | 2 units of special flats, management office, public open space, playground, Early Childhood Education Programs, library, health clinic |
| 2nd Floor | Market place, Integrated Health Service Post, cooperation, organization rooms, Hall, public open space |
| 3rd s/d 16th Floor | 518 units of standard flats |

Source: Jatinegara Barat Flats Service Unit, 2018

From the table 1, it can be seen that Rusunawa Jatinegara Barat consists of 16 floors, has a capacity of 520 residential units, consisting of 518 standard units and 2 special units for persons with disabilities. Standard residential units are spread from the 3rd floor to the 16th floor. All standard residential units are type 30. The number of residents in April 2018 was 2,150 people [20]. The dominant sex of the respondents is women (60.4%). The dominant respondent's marital status was married (96.4%). The dominant respondents' age was between 25 to 40 years (49.3%). The religion of respondents was Moslem (99.1%). The dominant level of education of the respondents was high school (37.8%). The dominant respondent's occupation was private employee (20.9%). The dominant amount of the expenditure per month was between Rp. 1,000,000, - up to Rp. 2,500,000 (52.4%). The average number of adult residents in one residential unit was 3.18 with a minimum number of 1 person and a maximum number of 7 people. While the average number of children in one residential unit was 1.39 with a minimum number of 1 person and a maximum of 4 people. The dominant number of occupants per residential unit was 4 to 5 people.

3.1.1. Description of Physical Environment. From the figure 4, it can be seen that 64.4% respondents consider the ventilation conditions to be good. 32% of respondents considered the ventilation condition was still bad because there were no permanent openings. Observations in the field obtained extensive ventilation which was ± 8,145 m². 91.1% of respondents considered the condition of the kitchen ventilation was good. From the observations in the field, it can be seen that the kitchen was equipped with a window and exhaust fan but there was no permanent opening. The exhaust fan was rarely used by residents because it used electricity and was considered to increase the cost of electricity payments. 89.8% respondents considered that lighting conditions in residential units were good. From the observations in the field, it can be seen that most of the residential units (65.8%) had bright lighting. 71.6% respondent considered that the condition of the density of residents was good. The bedroom measured 2.55 m x 2.125 m with an area of 5.42 m² where one bedroom was used by 2 or more people (84.4%).
71.1% of respondents considered that the condition of the refill water they consumed was good. So that the drinking water could be said to have fulfilled the applicable requirements. From the observations in the field, it can be seen that for the drinking water the residents did not utilize tap water. 58.7% of respondents considered that the condition of clean water was good. While 26.7% of respondents consider that the condition of clean water was still bad. 83.6% of respondents considered that the trash bin they used were good. From the results of observations in the field, it can be seen that the majority of respondents had trash bins that were not watertight and not closed. It can be said that the condition of the trash bin had not met the applicable requirements. 50.7% respondents considered that there were no animals that could transmit diseases. While 46.7% of them complained about the presence of infectious animals in the form of tomatsect insect attacks. 92.4% of respondents considered that the food processing area they used was good. From the observations in the field it can be seen that most residential units had clean food management, but it was not closed (71.6%). So that it can be said that the condition of food management had not met the applicable requirements. 64% of respondents considered that the condition of clean water facilities at public facilities was good. Whereas 23.1% considered that clean water conditions were still poor. 77.8% of respondents consider that the condition of the sewerage was good. Most residents said that there was rarely a leak in the dirty water pipe or clogged pipe. Some respondents complained about the grease trap condition. Respondents considered that the conditions of handling garbage disposal and temporary garbage shelter were good, (71.6%). Garbage from residential units was taken twice a day by cleaning services. The majority of residents considered waste management to be good. 73.8% of respondents considered that the condition of the solid waste disposal facility was good. Solid waste treatment uses Sewage Treatment Plant (STP). STP suctioning is carried out regularly once in three months. STP conditions can be considered quite good because there is no visible physical overflow or out of STP and no odor around STP. 80% of respondents considered the condition of health clinic facilities was good. The clinic consists of general polyclinic and dental polyclinic. 52.4% of respondents considered the condition of sports facilities to be good. While 35.1% assumed that the condition of sports facilities was still bad. Rusunawa Jatinegara Barat did not have sports facilities because the limited land area.

3.1.2. The Description of the Resident’s Health.
From Figure 5 above, it can be seen that the disease suffered by residents in the flat in the past year was dominated by ARI, followed by diarrhea, skin diseases and dengue fever. Likewise, the disease suffered by residents before moving to Rusunawa Jatinegara Barat was also dominated by ARI, followed by diarrhea, skin diseases, and dengue fever. Occupational health criteria are divided into two, namely good and bad. The results showed that more than half of the respondents were in the good health category (79.6%). Recapitulation of the relationship between the indicators contained in the variables of physical environment condition and the residents’ health can be seen in the following table.

Table 2. Relationship between variables of physical environment condition and the residents’ health

| No. | Variables               | Sig. Value | R Value | Information                        |
|-----|-------------------------|------------|---------|------------------------------------|
| 1   | Ventilation             | 0.0001     | 0.345   | There is low and positive correlation |
| 2   | Clean water             | 0.009      | 0.166   | There is low and positive correlation |
| 3   | Trash bin               | 0.001      | 0.228   | There is very low and positive correlation |
| 4   | Clean water facility    | 0.030      | 0.140   | There is very low and positive correlation |
| 5   | Waste management        | 0.0001     | 0.328   | There is low and positive correlation |
| 6   | Solid waste management  | 0.0001     | 0.267   | There is low and positive correlation |
| 7   | Health clinic facility  | 0.001      | 0.222   | There is low and positive correlation |

Source: The researcher’s data processing

3.2 Discussion

From the data obtained in the field, it can be seen that the respondents responded with good value (72.95%) and very good value (12.59%) to the physical environment. Thus, it can be said that 85.54% of the physical environment according to the residents had good conditions. However, if it is related to health regulations, there were several physical environmental conditions that did not meet the requirements, namely the absence of permanent openings, the density of the residents that exceeded the standard, the trash bin in each unit which was not in accordance with the standard, the food processing area which had not met the standards, and there were no sports facilities. Every building of simple flats must have permanent openings [21]. Therefore, even though the area of ventilation was >10% of the floor area, but because there were no permanent openings, the ventilation conditions could be said to not meet the applicable requirements. The condition of the kitchen ventilation can be said not to meet the applicable requirements but because there was no permanent opening. The entrance light area was at least 15-20% of the floor area. The total entrance light was 4.72 m². Therefore, it had met the extensive requirements of the defined light entrance. The average number of residents in Rusunawa Jatinegara Barat was 4 to 5 people in one residential unit. When referring to the standard of a healthy house, the size of the sleeping area did not meet the requirements of a healthy house, which was >8 m², which caused the density of the residents to exceed the fixed standard. One of the principles of organizing flats is health principle [22]. Every building construction must guarantee the technical reliability of buildings, one of which is in terms of health [23]. In addition, buildings must also be adjusted to the location designated in zoning regulations, and city design. One of which is in accordance with the conditions of the Rusunawa Jatinegara Barat location. In accordance with the governor's regulation No. 27 of 2009, it explained that one of the requirements for the construction of a flat is to be in the area of environmental rejuvenation and new development. Rusunawa Jatinegara Barat was located right on the edge of the Ciliwung river. The river boundary line in an urban area is at least 30 meters from the river bank [24]. So, from the aspect of location, it can be said that Rusunawa Jatinegara Barat did not meet the requirements. The disease suffered by residents in the flat in the past year was dominated by ARI, followed by diarrhea, skin diseases and dengue fever. Likewise, the disease suffered by residents before moving to Rusunawa Jatinegara Barat was also dominated by ARI, followed by diarrhea, skin diseases, and dengue fever. The frequent
occurrence of ARI can be caused by several things including the condition of the physical environment, namely the absence of permanent openings in the residential unit. The high density of the residents also affected the occurrence of ARI.

4. Conclusion
From the perspective of the residents, most of the physical environmental conditions of Rusunawa Jatinegara Barat were already good. However, when viewed from the applicable regulations, the physical environment conditions had not met the applicable standard because it was built in an area that was not in accordance with its designation. In addition, there were several indicators that did not meet the requirements. The health conditions of the residents were getting worse in cases of ARI. Whereas in cases of diarrhea, skin diseases, and dengue fever, the residents' health was getting better. There are seven indicators that have a relationship with health, namely ventilation, clean water, trash bin, clean water facilities, waste management, solid waste management, and health clinic facilities. Overall, it can be said that there was no improvement in the health of the residents of Rusunawa Jatinegara Barat.

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