

THE RELATIONSHIP OF PHYSICAL QUALITY OF THE HOUSE WITH THE COMFORT LEVEL OF OCCUPANTS OF THE HOUSE IN DENSE AREA

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Article Info

Article history:

Received August 10, 2022

Revised August 11, 2022

Accepted January 01, 2023

Keywords:

Lighting

Temperature

Humidity

Occupants Comfort Level

ABSTRACT

The Relationship of Physical Quality of The House with The Comfort Level of Occupants Of The House In Dense Area.

Socially, housing is a fundamental necessity for every individual. As the population in Keraton Subdistrict, Martapura District, continues to grow, the layout and environmental conditions of settlements, characterized by closely arranged buildings, impact the comfort of residents. Habitable living spaces must fulfill health and comfort criteria, influenced by lighting, temperature, and humidity. This research aims to explore the relationship between these factors and residents' comfort levels in densely populated areas. Conducted as an analytical cross-sectional study, the research involved 96 households selected through purposive sampling. Data collection relied on a questionnaire assessing residents' comfort levels, with statistical analysis employing the Sommers's correlation test. Findings revealed an average lighting intensity of 58.38 Lux, an average temperature of 28.3 °C, and an average humidity of 72% among respondents. Approximately 48 individuals (50%) reported being comfortable living in dense residential areas. Statistical analysis indicated a significant relationship between lighting and residents' comfort levels, while no significant correlation was found between temperature and comfort. However, humidity showed a notable association with residents' comfort. Recommendations for the public include enhancing indoor lighting, regulating temperature, and optimizing humidity levels through daily ventilation through window openings. This approach facilitates better airflow, thereby improving the overall comfort of household occupants. Further research could delve into additional factors influencing residents' comfort and explore alternative strategies to enhance living conditions in densely populated areas. Ultimately, this study underscores the importance of considering environmental factors in urban planning to ensure residents' well-being and comfort.

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INTRODUCTION

The increasing number of urban residents and increasingly limited land for housing means that residents have no other choice but to live in residential areas where population and building density continues to increase ^[1]. A house as a place to live that meets health and

comfort requirements is influenced by 3 aspects, namely lighting, temperature and humidity in the room [2]. A house with low lighting, high temperature and humidity causes the house to become damp and hot, which can cause disease [3].

Adequate lighting can prevent Asthenopia (eye fatigue). On the other hand, insufficient lighting does not cause eye disease but causes eye fatigue. Eye fatigue is caused by stress that occurs on visual function [4]. According to the Decree of the Minister of Health of the Republic of Indonesia No.1077/MENKES/V/2011 concerning indoor air sanitation, a temperature in the house that is too low will cause hypothermia, while a temperature that is too high can cause dehydration. Meanwhile, good humidity in the house is between 40-60% [5].

Keraton Village, Banjar Regency, has a high level of residential density. Judging from the data on the population which reached 14,382 people with an area of 31 Ha/m², the population density results reached 467 people/Ha. This situation, based on SNI 03-1733-2004, is categorized as very dense population density. Keraton Village is a settlement where the buildings are arranged in rows or close to each other, the distance between the buildings and the environmental conditions vary. This is one thing that affects the comfort of the occupants of the house. The house cannot get adequate natural lighting due to limited windows, the room becomes dark and unhealthy due to the lack of natural lighting, which causes a decrease in wall temperature and a decrease in air temperature and then an increase in humidity which can cause respiratory problems such as asthma, allergies and coughs. Handayani's research (2016) states that people's perceptions regarding thermal comfort in houses in densely populated settlements feel a little disturbed by thermal conditions, namely the temperature and humidity in the house, which means people feel less comfortable. Based on the description above, this research aims to determine the relationship between lighting, temperature and humidity in a house and the comfort level of residents in densely populated residential areas.

MATERIALS AND WAYS OF RESEARCH

The type of research used is observational, analytical in nature, aimed at proving whether or not there is a relationship between lighting, temperature and humidity in a house and the comfort level of residents of dense residential housing. The research design used is a Cross-Sectional Study where the independent variables in this study are lighting, temperature and humidity, while the dependent variable is the comfort level of the occupants of the house.

The research was carried out in Keraton Village, Martapura District from January to April 2022, with a population of all permanent houses in Keraton Village totaling 2,876 houses. Meanwhile, the research sample size was 96 houses, determined using the Slovin [6] formula calculation as follows:

$$n = \frac{N}{1 + N(d^2)} = \frac{2.876}{1 + 2.876(0,1^2)} = 96 \text{ houses}$$

Information :

n = Number of Samples

N = Total Population

d = Precision value (accuracy) of 90%

The sampling technique used was Purposive Sampling [7] where the results of the calculation of this sampling technique were 43 houses in RT 27, 31 houses in RT 25 and 22 houses in RT

24. Data were collected using questionnaires and measurements carried out in the house in the living room, guests and bedrooms on sunny days from 10.00 to 15.00 WITA. The data obtained were analyzed descriptively based on the Republic of Indonesia Minister of Health Decree No.829/Menkes/SK/VII/1999 concerning housing health requirements. Lighting meets the requirements if it ranges between 60 -100 Lux and does not meet the requirements if <60 or >100 Lux. The temperature meets the requirements if the measurement results range between 18oC – 30oC and does not meet the requirements if the measurement results are <18oC or >30oC. Humidity meets the requirements if the measurement results range between 40-70% and does not meet the requirements if <40% - >70%{8}. The interval assessment of occupant comfort level was found to be uncomfortable with an interval of 16-43, quite comfortable with an interval of 44-71, comfortable with an interval of 72-99, and very comfortable with an interval of 100-128. is the chi-square test based on the degree of confidence (CL) = 95% with α set at 0.05 ($\alpha = 5\%$).

RESULTS OF RESEARCH AND DISCUSSION

The results of measuring lighting inside houses in Keraton Village in 2022 can be seen in the following table:

Table 1. Frequency Distribution of Lighting Intensity in the House

No	Lighting Intensity	Frequency	%
1	Not eligible	68	70.83
2	Qualify	28	29.17
	Total	96	100

Table 1 shows that the largest percentage of houses that do not meet the lighting requirements is 68 houses (70.83%), while the average lighting measurement value is 58.28 Lux, with the lowest measurement value being 34 Lux and the highest measurement value being 89 Lux. Based on observations of activities inside the house, most household members can still carry out activities without using artificial lighting during sunny days. In cloudy weather, some houses must use artificial lighting to make work or activities easier for residents inside the house. The reason why a lot of house lighting does not meet the requirements is because the houses in the Keraton Village area are close together. In addition, the distance between adjacent buildings increases the chance of roof eaves blocking each other. This results in increasingly limited lighting, so that the intensity of natural lighting in the residence also decreases. The impact of lighting that does not meet the requirements can cause eye fatigue ^[9], good lighting that meets the requirements will help us in doing our work and make us feel comfortable ^[10].

Table 2. Frequency Distribution of Temperature in the House

No	Temperature	Frequency	%
1	Not eligible	16	16.7
2	Qualify	80	83.3
	Total	96	100

Table 2 shows the temperature conditions inside the house. Based on the measurement results, the largest percentage of houses that meet the requirements is 80 houses (83.3%) with the average temperature measurement results in the house being 28.3°C. The lowest

value for temperature measurements in the house was 20.7°C and the highest value was 33.7°C. Factors that influence whether many respondents' houses meet the requirements are that the temperature of the house depends on the season and local geographical conditions. The air temperature inside the house is influenced by the air temperature outside the house {11}.

Table 3. Frequency Distribution of Humidity in the House

No	Humidity	Frequency	%
1	Not eligible	66	68.75
2	Qualify	30	31.25
	Total	96	100

Table 3 shows the humidity conditions in the house, the highest percentage measurement results are houses that do not meet the humidity requirements, namely 66 houses (68.75%), with the average humidity measurement value being 72%, the highest value for humidity measurement in the house is 86 % while the lowest value of humidity measurement is 51%. The respondent's house in the densely populated residential area of Keraton Subdistrict has quite high humidity levels. During the day, strong radiation from the sun causes swamp water to evaporate. This is in accordance with the characteristics of Keraton Village, especially RT 27, 25 and 24 which are wetland or swamp areas. Inappropriate air humidity will cause various diseases, fatigue, reduced concentration, trembling and reduced muscle strength [12].

Table 4. Frequency Distribution of Home Occupants' Comfort Levels

No	Comfort Level	Amount	%
1	Uncomfortable	8	8.33
2	Quite Comfortable	38	39.59
3	Comfortable	48	50
4	Very comfortable	2	2.08
	Total	96	100

Table 4 shows the comfort level of most respondents, namely that they feel comfortable living in dense residential areas RT 27, 25 and 24 Kelurahan Keraton. Based on the questionnaire assessment scores, it shows that 50% of the total number of respondents stated that they felt comfortable living in dense residential areas and the average comfort value was 71.23, while the minimum value for the comfort assessment was 38 and the maximum value was 108. Comfort is a condition where individual basic human needs have been fulfilled. Fulfilling comfort can lead to feelings of well-being in the individual [13]. From the data obtained based on respondents' statements, they felt comfortable because they were used to living in that environmental condition, in this case it could be said that respondents felt comfortable because they had lived in that area for a long time.

Table 5. Analysis of the Comfort Level of Home Occupants Based on the Intensity of Lighting in the House

No	Lighting	Comfort Level								Total	
		Uncomfortable		Quite Comfortable		Comfortable		Very comfortable			
		qty	%	qty	%	qty	%	qty	%	qty	%
1	Not eligible	6	6.25	32	33.34	28	29.17	2	2.08	68	70.84
2	Qualify	2	2.08	6	6.25	20	20.83	0	0	28	29.16
	Total	8	8.33	38	39.59	48	50	2	2.08	96	100

Table 5 shows that 70.84% of lighting in the house does not meet the requirements, most feel quite comfortable (33.34%). The results of the Sommers's correlation test showed $p = 0.036 < \alpha = 0.05$, so H_0 was rejected. This means that there is a relationship between lighting and the comfort level of residents of houses in densely populated residential areas in RT 27, 25 and 24 Keraton Subdistrict in 2022. One way of comfort can be achieved with natural lighting, sunlight is very useful for human life, especially in killing disease bacteria, viruses, and mushrooms [14]. The impact of a dense environment, the distance between houses that are close together and the existence of open space becomes very small. Many residences have lighting intensity below standard, so that conditions inside the house become dark and activities are disrupted due to insufficient light.

Table 6. Analysis of the Comfort Level of Home Occupants
Based on Temperature in the House

No	Temperature	Comfort Level								Total	
		Uncomfortable		Quite Comfortable		Comfortable		Very comfortable		qty	%
		qty	%	qty	%	qty	%	qty	%		
1	Not eligible	1	1.04	9	9.37	6	6.25	0	0	16	16.66
2	Qualify	7	7.29	29	30.20	42	43.75	2	2.08	80	83.34
	Total	8	8.33	38	39.59	48	50	2	2.08	96	100

Table 6 shows that of the 16.67% of house temperatures that do not meet the requirements, most feel quite comfortable. The results of the Somers'D correlation test showed $p = 0.243 > \alpha = 0.05$, so H_0 was accepted, meaning there was no relationship between the temperature in the house and the comfort level of residents of houses in dense residential areas in RT 27, 25 and 24, Keraton Village, Martapura District 2022. Most residents feel comfortable living in a house with a temperature that meets the requirements, meaning that temperature conditions have nothing to do with the comfort level of the residents of the house. A hot room temperature can cause a psychological reaction from a person, thermal comfort that changes outside of normal conditions to a person's condition, be it physical discomfort (sweating), fatigue quickly, lack of oxygen so they become sleepy easily, or mental discomfort such as the emergence of various kinds of negative suggestions for the person. occupants of room [15].

Table 7. Analysis of the Comfort Level of Home Occupants
Based on Humidity in the House

No	Humidity	Comfort Level								Total	
		Uncomfortable		Quite Comfortable		Comfortable		Very comfortable		qty	%
		qty	%	qty	%	qty	%	qty	%		
1	Not eligible	7	7.29	28	29.16	30	31.25	0	0	65	67.70
2	Qualify	1	1.05	10	10.42	18	18.75	2	2.08	31	32.30
	Total	8	8.33	38	39.59	48	50	2	2.08	96	100

Table 7 shows that of the 67.70% humidity in the house that does not meet the requirements, most feel comfortable (31.25%). Meanwhile, of the 32.20% humidity in the house that meets the requirements, most feel comfortable (18.75%). The results of the Somers'D correlation test showed $p = 0.032 < \alpha = 0.05$, so H_0 was rejected, meaning that there was a relationship

between humidity in the house and the comfort level of residents of houses in dense residential areas in RT 27, 25 and 24, Keraton Village, Martapura District 2022. Dense residential areas RT 25 and 24 have relatively high humidity levels. During the day, strong radiation from the sun causes evaporation of swamp water. During the rainy season, most of the houses in RT 25 and 24 Kelurahan Keraton are inundated by swamp water because the majority of houses in this settlement use wooden materials, where this material is a fast conductor of moisture, because wood has pores that can absorb water content so that the conditions in the house become worse. damp, plus heat radiation from the sun that hits directly on the roof sheathing which provides a high feeling of heat into the room. However, the majority of residents stated that they still felt comfortable with the condition of their homes.

CONCLUSIONS AND RECOMMENDATIONS

The conclusions obtained from this research are: lighting intensity with the largest percentage is houses that do not meet the requirements, namely 68 houses (70.83%), temperature with the largest percentage is houses that meet the requirements, namely 80 houses (83.3%), humidity with the largest percentage is houses Those that did not meet the requirements were 66 houses (68.75%). The results of the questionnaire assessment showed that 50% of the total number of respondents felt comfortable living in dense residential areas and the average comfort value was 71.23. Most of the lighting in a house that does not meet the requirements feels quite comfortable (33.34%), meaning there is a relationship between lighting and the comfort level of the occupants of the house. There is no relationship between the temperature in the house and the comfort level of residents of houses in dense residential areas in RT 27, 25 and 24, Keraton Village, Martapura District 2022, while the majority of humidity in houses that do not meet the requirements feel comfortable (31.25%). Based on the results of the Somers'D correlation test, this means that there is a relationship between humidity in the house and the comfort level of residents of houses in dense residential areas.. Study further by comparing the comfort level of residents in dense residential areas and other types of settlements as well as with different variables such as wind speed and type of building construction can be done in order to get a better picture of the comfort level of residents in other residential areas.

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