Urban settlements quality in Kotabaru Village, Gondokusuman Subdistrict, Yogyakarta City

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Abstract. This research was conducted around the Code River, especially in Kotabaru Village, Gondokusuman Subdistrict, Yogyakarta City. The purpose of this study is to examine the characteristics of urban settlements and analyze their quality. The data collection method was carried out by using the multistage random sampling method. This sampling technique was carried out in two stages, namely classifying and selecting samples randomly. Data processing was done by scoring method using Sturges’ rules. Quantitative data analysis was carried out using descriptive statistics, while qualitative data analysis was carried out by explaining the results of data processing in depth. The results showed that most of the houses had poor accessibility, poor physical building conditions, good environmental sanitation, and residential environment characteristics with moderate conditions. This study also found that the quality of settlements in the study area with poor, moderate, and good classes was 30.43%, 50%, 19.57%, respectively. Indicators that lead to poor quality of settlements include accessibility, number of health facilities, land area per person, distance of clean water sources from fecal dumps, road width, and tree cover.

Keywords: Settlements quality, urban settlements, Kotabaru Village, Housing, Settlement Characteristics

1. Introduction
Settlement areas, are part of the environment outside protected areas, either in the form of urban areas or rural areas that function as a dwelling or residential environment and a place for activities that support life and livelihoods [1]. Settlements are part of a residential environment that has more than one housing unit that has facilities and infrastructure, public facilities and has supporting activities for other functions in urban or rural areas. There are three types of settlements, namely urban settlements, urban-rural settlements and rural settlements.

Urban areas always experience population agglomeration and the development of various economic, educational, political, and cultural activities. Cities emerge and evolve from the coalescence and symbiotic interaction of infrastructures, people and economic activities [2]. Urban settlements tend to have problems around land use [3]. The rapid pace of global urbanization has driven the demand for housing to grow rapidly. Urban areas have a strong appeal such as having more job opportunities than rural areas [4].

Urban settlements develop dynamically along with the increase in population due to growth and migration [5]. The increasing population has resulted in the high need for land for housing and the provision of settlement facilities and infrastructure [6]. The high population pressure on land has implications for the emergence of various problems regarding settlements. The increasing population in urban areas should be accompanied by the development of good facilities and infrastructure and the improvement of existing urban structures so that various problems of urban settlements and a decrease in the ability of infrastructure services in urban areas can be avoided [7].

Yogyakarta City is the capital of the Special Region of Yogyakarta, so it has a great appeal for residents outside the city. Total population of Yogyakarta City in 2019 reached 431,939 people [8]. The population of Kotabaru Village in 2019 was 2,853 people, which is the highest number in the last 5 years. High levels of migration and births have resulted in greater population pressure on land. One of
the reasons for the continued increase in population is the high in-migration. This incoming migration is due to a large number of universities in the city of Yogyakarta.

Urban settlements quality depends on the quality of infrastructure and proper management. System services such as drainage, sanitation, sewerage, drinking water services, gas, waste disposal, and fuel for cooking, may be a physical infrastructure that are basic to keeping up the quality of the urban environment [9]. The quality of settlements should be such that fulfills least wellbeing guidelines and great living standard, but should also be affordable to all categories of households [10]. The problem of settlement quality is caused by an imbalance in the ability of residents to build a place to live according to proper standards and to protect the environment [11]. Therefore, it is necessary to study the quality of settlements in Kotabaru Village.

This study aims to determine the characteristics of urban settlements and the quality of urban settlements in the study area. This research is expected to have two benefits at once, namely theoretical and practical benefits. The theoretical benefit of this research is as a means of developing geographic science, especially settlement and urban geography regarding the quality of settlements, and as reference material for further research. The practical benefits are used as consideration for the government in the field of settlement development planning and urban development in making policies regarding urban settlements.

2. Methods and materials

2.1 Data collection

This research was conducted in Kotabaru Village because the region is categorized as an urban area that is also traversed by the Code River. Most of the land in Kotabaru is used for built-up areas. The settlements in Kotabaru are very dense and close to the river. This study used primary data and secondary data. Primary data were collected by direct interviews with the community with a questionnaire guide. Secondary data, such as satellite imagery, area, and population, were collected by downloading the required data from the websites of the relevant agencies.

The sampling technique used is multistage random sampling. The basis for selecting this technique is a large and heterogeneous population, where there are 860 households in Kotabaru. Multistage random sampling was carried out in two stages. The first stage of the population was grouped based on the hamlets (Rukun Warga/RW). Kotabaru has 5 RW. Then, one cluster was drawn and one RW was chosen, namely RW 05. The second stage was random sampling, where the number of samples was obtained from the calculation of Isaac and Michael. The validity test was done by using Corrected item-total Correlation (CITC). The reliability test was carried out using the Alpha Cronbach method. The formula for calculating the number of samples using the Isaac and Michael method is as follows:

\[ s = \frac{\lambda \cdot N \cdot P \cdot Q}{d^2(N-1)+\lambda \cdot P \cdot Q} \]

where, \( s \) is number of samples, \( N \) is number of population, \( P \) is true odds (0.5), \( Q \) is wrong odds (0.5), \( d \) is 0.05, and \( \lambda \) is Chi-Square, where the value is based on the degree of freedom and the degree of error. In this study, the degree of freedom is 1 with an error rate of 10% which means the value is 2.706.

2.2 Data processing

The data was processed by inputting the results of observations and interviews into Microsoft Excel for scoring. The scoring of each aspect was based on the points that have been asked in the questionnaire. The total points were added together to obtain a total settlement quality score. The total settlement quality score was then used to classify the quality of the settlements for each house. Classification was done according to the Sturges’ rules with 3 classes. Classification was carried out aimed at determining which houses have poor, moderate, and good quality settlements. The following formula is used for the classification of the Sturges’ rules by determining the lower and upper limit.
Interval value = \frac{\text{maximum value} - \text{minimum value}}{\text{number of classes}}

Upper limit = \text{maximum value} - \text{interval value}
Lower limit = \text{minimum value} + \text{interval value}

2.3 Data analysis
The unit of analysis in this research was household. Data analysis was carried out quantitatively and qualitatively. Quantitative analysis was carried out by descriptive statistical analysis. Quantitative data was presented in the form of tables, diagrams, or graphs. Qualitative analysis was carried out by explaining the results of data processing in depth.

3. Results and discussion
3.1 Settlement characteristics in the study area
Kotabaru is one of urban villages (kelurahan) located near the Code River, which is a river that divides the city of Yogyakarta into two parts. Kotabaru is located on the east side of Code River. Settlements that are located along the river have the potential to have poor settlement quality. Assessment of the quality of settlements in this study was carried out with 4 parameters, namely accessibility, building physical condition, environmental sanitation, and characteristics of the residential environment. Several studies have assessed urban settlement quality over Chinese cities from the perspectives of living conditions, ecological environments, public service facilities, and social economy development levels [12]. Other recent study measured quality of urban settlements in China from multiple dimensions of the economy, society, and environment [13].

3.1.1 Accessibility
Accessibility is the ease of accessing a destination that can provide a sense of comfort in activities [14]. Accessibility is assessed based on the proximity of the sampled houses to life-supporting infrastructures such as places of worship, educational facilities, and health facilities. The results of the assessment of the accessibility parameters can be seen in Table 1.

| Classification | Score | Quantity | Percentage |
|----------------|-------|----------|------------|
| Poor           | <5.33 | 33       | 71.74      |
| Moderate       | 5.33-6.67 | 7   | 15.22      |
| Good           | >6.67 | 6        | 13.04      |
| **Total**      |       | 46       | 100.00     |

The results showed that 33 out of 46 households had poor accessibility classes. This condition means that the distance from the house to the facilities and infrastructure that support daily life is quite far so that it requires more effort to reach the intended facilities and infrastructure. The closer to various facilities and infrastructure, the better the accessibility. As many as 33 households (71.74%) were in bad class, 7 households (15.22%) were in moderate class and 6 households (13.04%) were in good class. Based on the results obtained, it can be concluded that the majority of the accessibility of houses to health, education, and worship facilities is classified as poor. The indicator with the lowest score is health facilities.

3.1.2 Building physical condition
The physical condition of building is seen from the suitability of the house conditions with the requirements for a healthy house. It was assessed based on the type of physical building, the area of land
for each person, the type of floor, roof, window, ceiling, and electrical power. The results of the building physical condition assessment can be seen in Table 2.

| Classification | Score   | Quantity | Percentage |
|----------------|---------|----------|------------|
| Poor           | <16.33  | 21       | 45.65      |
| Moderate       | 16.33-19.67 | 16   | 34.78      |
| Good           | >19.67  | 9        | 19.57      |
| Total          |         | 46       | 100.00     |

In the research location with a total of 46 samples of houses, there were 21 houses (45.65%) with poor building physical conditions, 16 houses (34.78%) with moderate building physical conditions, and 9 houses (19.57%) with good building physical conditions. Overall, the majority of the buildings were in poor condition. This shows that the community still does not understand well the requirements for a healthy house and the importance of buildings for a comfortable place to live. The indicator with the lowest score was the area of land for each person. This was influenced by the number of residents in one house and the area of the building. The majority of the houses sampled could be occupied by 2 to 4 families for each unit so that the area of land for each person is relatively narrow. Decree of the Minister of Settlements and Regional Infrastructure No. 403/KPTS/M/2002 about General Guidelines for Simple Healthy Houses states that the minimum area for one person to live is 9 m² [15]. Average space requirement per person in simple housing was 11.5 m² with the assumption of 4 people per family, while most respondents in this study had a land area per person <7.2 m² [16]. This indicated that the land area per person in the study area had not met the ideal standard of space per person. Most of the residents’ houses were not terraced, with tiled floors, asbestos or tile roofs, wooden doors, and glass windows.

There are still many types of roofs of the respondents’ houses that use zinc or asbestos. One of the factors affecting slum settlements in Denpasar City is the type of roof of the building in the form of zinc or asbestos [17]. This type of roof absorbs heat easily, making it less comfortable when it is hot outside. Many residents in urban areas use zinc or asbestos roofing types because this type of roof does not require a construction as strong as tile and the price is cheaper than tile.

3.1.3 Environmental sanitation
Sanitation is the creation, maintenance of a condition that can prevent food contamination or problems such as diseases caused by an unhealthy environment, as well as concrete efforts to create a healthy condition [18]. Environmental sanitation was assessed based on sources of drinking water, sources of bathing and washing water, use of defecation facilities, waste disposal sites, distance of clean water sources from fecal dumps, and waste disposal. The results of the environmental sanitation assessment can be seen in Table 3.

| Classification | Score   | Quantity | Percentage |
|----------------|---------|----------|------------|
| Poor           | <15.33  | 4        | 8.70       |
| Moderate       | 15.33-17.67 | 14   | 30.43      |
| Good           | >17.67  | 28       | 60.87      |
| Total          |         | 46       | 100.00     |
The results of the environmental sanitation assessment of settlements in Kotabaru Village showed that from 46 sample houses, 4 houses (8.70%) had poor sanitation, 14 houses (30.43%) had moderate sanitation, and 28 houses (60.87%) had good sanitation. Most of the houses had good environmental sanitation conditions. This could be due to the fact that Kotabaru already has a distribution pipe system to drain water from a well that has good water quality to people's homes. The government has also provided bathrooms and public toilets with conditions that meet the standards for residents who do not have their own bathrooms and toilets. Shared toilets have contributed significantly to expanded sanitation on urban regions. Whereas shared sanitation is frequently the as it were reasonable alternative in densely populated, and low-income urban areas [19]. Public toilets in Kotabaru only shared by two and three households. Toilets that are only shared by two and three households are mostly cleaner, safer, and more private than toilets shared by four or more households [19]. Wastewater has also been well managed by the government, where there is a sewerage drain under the road.

### 3.1.4 Residential environment characteristics

The characteristics of the residential environment were assessed based on the conditions of the road around the neighborhood, the type of road surface, the condition of tree cover, noise levels, air temperature conditions, sun exposure, and the level of comfort in living in a residential area. The results of the assessment of the characteristics of the residential environment can be seen in Table 4.

| Classification | Score | Quantity | Percentage |
|----------------|-------|----------|------------|
| Poor           | <16.33| 12       | 26.09      |
| Moderate       | 16.33-19.67 | 27   | 58.70      |
| Good           | >19.67| 7        | 15.22      |
| Total          |       | 46       | 100.00     |

The results of the assessment of the characteristics of the residential environment showed that of the 46 houses sampled, 12 houses (26.09%) had poor residential environmental characteristics, 27 houses (58.70%) were in the moderate class, and 7 houses (15.22%) had the characteristics of a good residential environment. Most of the houses in the study area had the characteristics of a moderate residential environment. The indicators that have the lowest score are road width and tree cover. The building density in the study area is relatively high with an average road width of about 0.5 m – 1 m. Residential roads are only in the form of small alleys, which can only be passed by one motorbike or only pedestrians can pass it. The width of the road in the research area is very narrow so that local residents' vehicles are usually parked in front of the mosque which is located on the edge of Jalan Krasak. Settlements in urban areas are generally dense, so there is not enough land to provide standard environmental roads [20], the characteristics of residential buildings in Kampung Braga have high density, the distance of the buildings is close to each other and only separated by roads with a width of 0.5 m – 1 m [21]. According to the Regulation of the State Minister for Public Housing of the Republic of Indonesia Number 25 of 2011 about the Implementation of Low-Cost Housing, environmental roads for pedestrians or two-wheeled motorized vehicles are at least 2-3.5 meters wide for the road body, 0.5 – 0.75 meters for the road shoulder and has a road benefit area (damaja) between 360 – 450 cm [22]. The tree cover condition also scores low because there are very few trees. Trees are only found on the edge of Jalan Krasak, while residential areas that are not on the side of the road have absolutely no trees. Residential environments in urban areas generally have low vegetation cover because the available space is used for houses or urban infrastructure. Most of the green open spaces in urban areas have been converted into urban infrastructures such as road networks, office buildings, shopping centers, and new residential areas [23]. The settlements in the study area are very dense and some houses do not get
sufficient sunlight. Even with these uncomfortable environmental conditions, residents still feel very comfortable living in their homes.

3.2 Settlements quality
The results of the identification of the settlements quality in the study area with 4 parameters including accessibility, building physical condition, environmental sanitation, and characteristics of the residential environment, were divided into 3 classifications, namely good, moderate, and poor. The four parameters contain indicators that were asked of the respondents. Each indicator was based on the Regulation of the Minister of Public Works for Housing and Settlement Areas Number 14 of 2008.

| Classification | Score | Quantity | Percentage |
|----------------|-------|----------|------------|
| Poor           | <55   | 14       | 30.43      |
| Moderate       | 55-62 | 23       | 50.00      |
| Good           | >62   | 9        | 19.57      |
| Total          |       | 46       | 100.00     |

The results of the assessment of settlement quality can be seen in Table 5. There are 14 houses (30.43%) in poor class, 23 houses (50%) in moderate class, and 9 houses (19.57%) in good class. Most of the houses were categorized into moderate class. This shows that the people in the study area have already paid attention to the aspects of an ideal residential environment so that bad environmental quality is not created. The results of this study are similar to the results of research in Kotagede District (Yogyakarta City), which is also an urban area. These results indicated that most of the houses have moderate settlement quality with a percentage of 42.32% [24].

4. Conclusion
Assessment of settlement characteristics in Kotabaru was carried out with four parameters, namely accessibility, physical condition of the building, environmental sanitation, and characteristics of the residential environment. Based on the results of the study, it can be concluded that most of the houses in the study area had poor accessibility, poor physical building conditions, good environmental sanitation, and moderate residential environmental characteristics. The quality of settlements in the study area was 30.43% in poor class, 50% in moderate class, and 19.57% in good class. Indicators that cause poor quality of settlements include the accessibility of health facilities, the area of land for each person, the distance between clean water sources and the final disposal site for feces, the roads width, and the condition of tree cover.

This study also concluded that there are several indicators that lead to poor quality of settlements. Based on the conclusions in this study, it can be used as reference material or material for consideration for the government in the field of settlement development planning and urban development to overcome settlement problems. In order for this research to be useful, it is deemed necessary to carry out further research because this research only limits the quality of settlements. Further research is needed on the factors that most influence the quality of settlements so that it helps policymakers to consider solutions to the settlement problem. In further research, the parameters that determine the quality of settlements can be added.

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