



The Relationship Between Socioeconomic Status and Public Perception of Waste Management and the Quality of Environmental Sanitation in Makassar District, Makassar City

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Abstract: This study aims to analyze socioeconomic status, public perceptions of waste management, and environmental sanitation quality in Makassar District, Makassar City, as well as examine their relationships. The research used an ex post facto survey method with a proportional cluster sampling technique, involving 323 households. Data were collected through Likert-scale questionnaires and documentation, then analyzed using descriptive and inferential statistics (simple and multiple linear regression) with SPSS 26.0. The results show that socioeconomic status, public perception, and environmental sanitation quality are all in the moderate category. Partially, socioeconomic status has a positive and significant relationship with environmental sanitation quality, contributing 23.9%, while public perception contributes 2.10%. Simultaneously, both variables have a positive and significant effect with a total contribution of 23.4%. In conclusion, improving environmental sanitation quality requires simultaneous efforts through socioeconomic empowerment and strengthening public awareness of waste management.

Keywords: Community perception; Environmental sanitation quality; Socioeconomic status; Waste management

Introduction

Environmental sanitation is one of the key determinants in achieving public health status. Based on data from the World Health Organization (WHO) in 2017, Indonesia ranked third among countries with the poorest sanitation, after India in first place and China in second (WHO & UNICEF, 2019). The World Bank Water Sanitation Program (WSP) even placed Indonesia second globally among countries with poor sanitation, where approximately 63 million people do not have access to toilets and still practice open defecation in rivers, seas, or on open land (Pagar, 2018). This condition indicates that sanitation issues in Indonesia remain a serious challenge that requires special attention from various stakeholders.

Makassar City, as one of the metropolitan cities in Indonesia, also faces complex sanitation problems. Data on sanitation in Makassar show that there are still

deficiencies in urban sanitation management, particularly in waste management (Mirnawati et al., 2025). Makassar District, located approximately ± 3 km west of Makassar City, with a population of 57,426 and a population density of 31,553/km² (BPS, 2023), is one of the areas requiring special attention. Based on preliminary observations, the quality of sanitation in this area is still suboptimal, particularly in terms of housing conditions, wastewater disposal systems, and waste management facilities. Although the Makassar City government has initiated the “Kota Ku” program to address sanitation, environmental, and waste-related needs, its implementation has not yet been able to comprehensively resolve these issues.

Environmental sanitation problems, particularly in waste management, are closely related to socioeconomic factors. Socioeconomic status, which includes education level, type of occupation, and income level, is strongly associated with environmental sanitation quality.

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Education plays an important role in shaping public knowledge and awareness regarding proper sanitation. Studies by Rahmayani (2019) and Putri et al. (2025) indicate that education level significantly influences knowledge, which in turn affects environmental management behavior. Communities with lower education levels tend to have limited understanding of the health impacts of poor sanitation, leading to inadequate sanitation practices.

In addition, occupation type is an important indicator in determining social status and access to resources. Individuals with formal employment tend to have better access to information and greater opportunities to participate in sanitation programs organized by the government or community organizations. In contrast, those working in the informal sector often face limitations in accessing information and sanitation-related facilities.

Income level, as an economic indicator, also significantly affects environmental sanitation quality. Zuhro et al. (2024) explain that individuals with higher income levels tend to have better access to adequate sanitation facilities, such as clean water, proper toilets, and effective waste management systems. Conversely, low-income communities often prioritize basic needs, resulting in limited access to proper sanitation.

In addition to socioeconomic factors, community perception of waste management plays a crucial role in determining environmental sanitation quality. Perception is a cognitive process that influences how individuals understand and respond to environmental issues. Positive perceptions encourage pro-environmental behaviors, such as proper waste disposal, waste segregation, and active participation in waste management programs. On the other hand, negative or indifferent perceptions can worsen environmental sanitation conditions.

A well-maintained sanitation environment significantly contributes to improving public health and well-being. The availability of proper sanitation services helps prevent disease transmission and enhances quality of life. In the long term, preventive approaches in sanitation management are considered more effective and efficient than curative approaches, while also supporting sustainable development (Prasanti et al., 2019; Rizqiyana et al., 2026; Thawani et al., 2018).

The novelty of this study lies in the integrated analysis of socioeconomic factors (education, occupation, and income) and community perceptions of waste management within a single simultaneous analytical model to examine their influence on environmental sanitation quality in densely populated urban areas. Previous studies generally examined these variables separately, focusing either on socioeconomic determinants or on community perceptions alone. This

study combines both dimensions to provide a more comprehensive explanation of sanitation quality.

Another novelty is the specific focus on Makassar District, an urban area characterized by high population density and complex sanitation challenges. This contextual focus provides empirical evidence that is more relevant to urban sanitation management in rapidly growing metropolitan regions.

This research is important for several logical reasons. First, sanitation problems in densely populated urban areas directly affect public health through increased risks of infectious diseases and environmental pollution. Second, understanding the combined influence of socioeconomic status and community perceptions is essential for designing effective sanitation interventions, because infrastructure improvements alone may not succeed without behavioral and perceptual changes within the community. Third, the findings of this study can support local governments and policymakers in developing targeted, evidence-based sanitation programs that are more responsive to the social and economic conditions of the community. Finally, improving environmental sanitation quality contributes not only to public health but also to sustainable urban development and the achievement of broader development goals.

Based on the above explanation, it is important to examine the relationship between socioeconomic status and community perceptions of waste management with environmental sanitation quality. A comprehensive understanding of these relationships is expected to serve as a basis for formulating more effective intervention strategies to improve environmental sanitation quality. Therefore, this study is conducted under the title: "The Relationship between Socioeconomic Status and Community Perceptions of Waste Management on Environmental Sanitation Quality in Makassar District, Makassar City."

Method

This study employed an ex post facto design using a survey approach. The purpose of this research is to analyze the relationships among variables without providing any treatment or manipulation to the variables under study. The variables in this research include socioeconomic status, perceptions of waste management, and environmental sanitation quality in Makassar City.

The research was conducted in Makassar District, Makassar City, over a period of six (6) months. The research design is correlational, aiming to determine the relationship between independent and dependent variables. The relationships among variables in this study are illustrated in Figure 1.

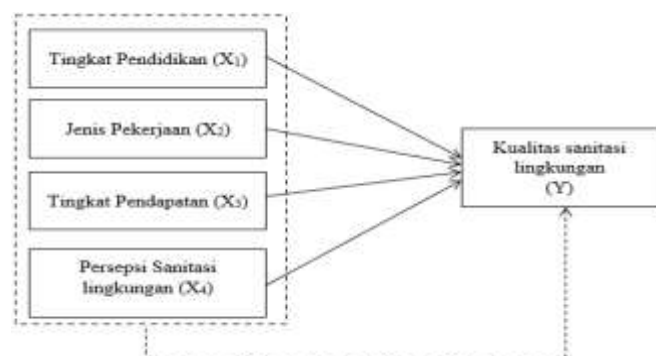


Figure 1. Research design

The population of this study consists of all residents living in Makassar City. Specifically, the research focuses on several sub-districts in Makassar District with high population density, such as Bara-Baraya Selatan Sub-district with 4,932 households, along with other areas with similar characteristics. Based on administrative data from Makassar District in 2024, the total number of households in this area is 338 RT distributed across 14 sub-districts with a total of 65 RW.

The sampling technique used was proportional cluster sampling. According to Ahmad et al. (2021), this technique involves several steps, including determining the population, defining clusters, determining the sample size, allocating samples proportionally, and selecting respondents. In this study, clusters were selected based on areas with high population density and diverse socioeconomic backgrounds, namely Maricaya, Bara-Baraya Selatan, Maccini Parang, and Maccini. The sample size was determined using the Issac and Michael table in Juliandi et al. (2014) with a 5% margin of error, resulting in a total sample of 323 households. The number of samples in each cluster was determined proportionally using the formula:

$$n = \frac{\text{number of population in cluster}}{\text{total population}} \times \text{total sample} \quad (1)$$

Based on this calculation, the sample distribution is as follows: Maricaya (41 households), Maccini (86 households), Maccini Parang (75 households), and Bara-Baraya Selatan (121 households). The unit of analysis in this study is the head of the household (father/mother) representing each household.

The variables in this study consist of independent and dependent variables. The independent variables include education level (X_1), type of occupation (X_2), income level (X_3), and perception of waste management (X_4), while the dependent variable is environmental sanitation quality (Y). Education level is defined as the highest level of formal education completed by the respondent, categorized as no elementary school completion, elementary school, junior high school,

senior high school, and higher education (Shantini, 2016). Occupation refers to the main activity that generates income, such as civil servants/military/police, employees/entrepreneurs, housewives, and others. Income level is defined as the average monthly income of respondents, categorized into five groups based on BPS (2023).

Perception of waste management is defined as the community's view regarding waste management, including waste reduction and handling. The instrument was developed based on Law No. 18 of 2008 and policies from the Ministry of Environment and Forestry (KLHK, 2022), consisting of 30 Likert-scale items. Meanwhile, environmental sanitation quality refers to the condition of sanitation facilities and community behavior, including access to clean water, toilet facilities, waste disposal systems, and community participation. The instrument was developed based on the EHRA approach, PPSP, and Riskesdas (2021), as well as Regulation of the Minister of Health No. 3 of 2023.

The research procedure was carried out in several stages. The preparation stage included problem formulation, literature review, preliminary observation, instrument validation, and obtaining research permits. The implementation stage involved sample selection and data collection through questionnaires and documentation. The next stage was data analysis using appropriate statistical techniques, followed by the conclusion stage based on the analysis results.

Data collection techniques in this study included questionnaires, documentation, and interviews. Questionnaires were used to collect primary data using a closed-ended format with a Likert scale. Documentation was used to obtain secondary data related to sanitation conditions and research activities. Interviews were conducted with relevant institutions such as the environmental agency, spatial planning office, and public health centers to obtain supporting information.

The research instrument consisted of a closed-ended questionnaire comprising several parts: one item for education level, one item for occupation, one item for income, 30 items for waste management perception, and 30 items for environmental sanitation quality. The scale used was a Likert scale ranging from 1 to 5 with both positive and negative statements.

Data analysis was conducted using SPSS version 26.0 with a significance level of 0.05. The analysis included descriptive statistics to describe the general condition of the variables and inferential statistics to test hypotheses and relationships among variables. Classical assumption tests included normality testing using Kolmogorov-Smirnov (Ghozali, 2018), linearity testing (Sugiyono, 2021), and multicollinearity testing using the Variance Inflation Factor (VIF) (Ghozali, 2018).

Hypothesis testing was carried out using correlation analysis to determine the strength of relationships among variables (Sugiyono, 2021) and multiple linear regression analysis to examine the effect of independent variables on the dependent variable using the equation:

$$Y = a + b_1X_1 + b_2X_2 + e \quad (2)$$

In addition, the F-test was used to determine the simultaneous effect of independent variables on the dependent variable (Ghozali, 2018), the t-test to determine the partial effect of each independent variable (Ghozali, 2018), and the coefficient of determination (R^2) to measure the model's ability to explain the variation in the dependent variable (Ghozali, 2018).

Result and Discussion

Description of Community Socioeconomic Status in Makassar District, Makassar City

The results of the descriptive analysis show that the socioeconomic status variable has a mean value of 6.00, a median of 6.00, a mode of 7.00, a standard deviation of 2.26, a minimum value of 2, and a maximum value of 10. These results indicate that the variation in community socioeconomic status is at a moderate level, with a tendency toward the middle category. Based on the frequency distribution, 179 respondents (55.42%) are in the moderate category, 85 respondents (26.31%) are in the low category, and 59 respondents (18.27%) are in the high category. Therefore, it can be concluded that the socioeconomic status of the community in Makassar District is generally in the moderate category.

Description of Community Waste Management Perception

The descriptive analysis shows that the waste management perception variable has a mean value of 57.86, a median of 58.00, a mode of 55, a standard deviation of 8.19, a minimum value of 34, and a maximum value of 94. This indicates that community perceptions of waste management vary considerably. Based on the frequency distribution, 131 respondents (40.56%) are in the moderate category, 80 respondents (24.77%) in the low category, 74 respondents (22.91%) in the high category, 22 respondents (6.81%) in the very high category, and 16 respondents (4.95%) in the very low category. Thus, overall, community perceptions of waste management are in the moderate category.

Description of Community Environmental Sanitation Quality

The descriptive analysis shows that the environmental sanitation quality variable has a mean value of 70.28, a median of 72, a mode of 76, a standard

deviation of 9.55, a minimum value of 43, and a maximum value of 92. This indicates that the environmental sanitation quality of the community is at a moderate level with relatively high data variability. Based on the frequency distribution, 112 respondents (34.67%) are in the high category, 106 respondents (32.82%) in the moderate category, 63 respondents (19.50%) in the low category, 30 respondents (9.29%) in the very low category, and 12 respondents (3.72%) in the very high category. Overall, the environmental sanitation quality of the community ranges from moderate to high.

Relationship between Socioeconomic Status and Environmental Sanitation Quality

The results of the simple linear regression analysis show that the relationship between socioeconomic status (X_1) and environmental sanitation quality (Y) is expressed by the equation $\hat{Y} = 57.818 + 2.07X_1$. The regression model is significant, as indicated by an F-value of 100.658 with a significance level of 0.000 (< 0.05), meaning that socioeconomic status has an effect on environmental sanitation quality. The correlation coefficient (r) of 0.489 indicates a moderate positive relationship, while the t-test result of 10.033 with a significance of 0.000 confirms that the relationship is statistically significant. The coefficient of determination (R^2) of 0.239 indicates that 23.9% of the variation in environmental sanitation quality is explained by socioeconomic status, while the remaining 76.1% is influenced by other variables not included in this study.

Relationship between Waste Management Perception and Environmental Sanitation Quality

The simple linear regression analysis shows that the relationship between waste management perception (X_2) and environmental sanitation quality (Y) is expressed by the equation $\hat{Y} = 60.396 + 0.171X_2$. The model is significant, with an F-value of 7.047 and a significance level of 0.008 (< 0.05), indicating that waste management perception affects environmental sanitation quality. The correlation coefficient (r) of 0.147 indicates a very weak positive relationship, while the t-value of 2.655 with a significance of 0.008 confirms statistical significance. The coefficient of determination (R^2) of 0.021 shows that only 2.10% of the variation in environmental sanitation quality is explained by waste management perception, while 97.9% is influenced by other factors.

Relationship between Socioeconomic Status and Waste Management Perception on Environmental Sanitation Quality

The multiple linear regression analysis shows that the relationship between socioeconomic status (X_1) and waste management perception (X_2) on environmental

sanitation quality (Y) is expressed by the equation $\hat{Y} = 57.37 + 2.06X_1 + 0.01X_2$. The regression model is significant, as indicated by an F-value of 314.830 with a significance level of 0.000 (< 0.05). The multiple correlation coefficient (R) of 0.239 indicates a positive relationship between the independent variables and the dependent variable. The t-test results show that X_1 is significant ($t = 9.557$; $\text{sig} = 0.000$), while X_2 is not significant ($t = 0.146$; $\text{sig} = 0.884$). The coefficient of determination (R^2) of 0.239 indicates that 23.9% of the variation in environmental sanitation quality is explained by both independent variables, while 76.1% is influenced by other factors outside the study. Meanwhile, the Adjusted R^2 value of 0.234 indicates an effective contribution of 23.4%.

Discussion

Description of the Socioeconomic Status of the Community in Makassar District, Makassar City

Based on the descriptive analysis in this study, the socioeconomic status of the community in Makassar District, Makassar City is predominantly in the moderate category. This is evidenced by statistical data showing a mean value of 6.00 and a median value of 6.00, with a score range between 2 and 10. Of the total 323 respondents, more than half, namely 179 individuals (55.42%), fall into the moderate socioeconomic category. Meanwhile, the rest are distributed into the low category with 85 individuals (26.31%) and the high category with 59 individuals (18.27%). These figures indicate that demographically, the levels of education, employment availability, and income of the community in the area are relatively stable within the middle class, which serves as an initial basis for evaluating how they perceive and manage environmental cleanliness.

The dominance of the middle socioeconomic class is highly relevant in explaining waste management and environmental sanitation conditions in the field. Socioeconomic status is a key predictor of how much household resources can be allocated for sanitation infrastructure, such as proper waste bins, wastewater disposal systems, and regular sanitation fees. Middle-income communities generally already possess basic literacy regarding environmental cleanliness; however, they often face financial constraints in implementing advanced independent waste management systems in densely populated urban areas. Therefore, describing socioeconomic status is not merely a presentation of demographic data but also an identification of the community's capacity to create healthy environmental sanitation.

The relevance of middle socioeconomic status to household environmental management capacity aligns with the findings of Amaliyah et al. (2024), which revealed that socioeconomic level is a determining factor

as well as a major risk factor in household waste management practices. Their statistical test showed a p-value of 0.000 with a Prevalence Ratio (PR) of 2.668. This indicates that lower-income groups are 2.6 times more likely to have poor waste management systems compared to higher-income groups (Amaliyah et al., 2024). This finding strengthens the interpretation that 55.42% of Makassar District residents in the "moderate" category are highly dependent on financial stability to maintain good sanitation quality.

Furthermore, the direct impact of socioeconomic status on waste generation and cleanliness management is supported by Suryawan et al. (2022), who found that socioeconomic conditions, particularly income level, have a linear effect on household waste production. Their study showed that middle- to high-income communities produce up to twice as much waste as low-income groups. This aligns with the condition in Makassar District, where the dominance of the middle class (55.42%) indicates relatively high purchasing power, which requires more intensive waste management systems to maintain environmental sanitation quality (Rosmawati et al., 2024).

The interconnection between economic capacity and sanitation is further reinforced by Kasrudin et al. (2021), who found a positive and significant correlation between socioeconomic status and Clean and Healthy Behavior (PHBS). Their study reported that 63% of middle- and high-income individuals were able to build proper sanitation facilities and routinely manage waste disposal at Temporary Waste Disposal Sites (TPS). In conclusion, the moderate socioeconomic status of 179 respondents in Makassar District is a determining variable that strongly influences their waste management perception. This economic stability serves as the primary foundation for achieving optimal environmental sanitation conditions.

Description of Community Perception of Waste Management in Makassar District, Makassar City

Based on the descriptive statistical analysis, community perception of waste management in Makassar District is predominantly in the moderate category. Of 323 respondents, the largest group, 131 individuals (40.56%), falls into the moderate perception category. Additionally, 80 respondents (24.77%) are in the low category, 74 respondents (22.91%) in the high category, 22 respondents (6.81%) in the very high category, and 16 respondents (4.95%) in the very low category. The mean score is 57.86 with a standard deviation of 8.19. Overall, these results indicate that community understanding and perception of waste management remain at a moderate or neutral level.

The "moderate" perception category indicates that the community has basic cognitive awareness of the

importance of proper waste disposal. However, this understanding has not fully developed into comprehensive perceptions regarding advanced waste management practices, such as waste segregation, the 3R principle (Reduce, Reuse, Recycle), or the long-term environmental impacts of waste accumulation. This neutral perception is often caused by limited environmental education or inadequate waste management infrastructure, which leads the community to perceive waste management as solely the responsibility of sanitation authorities.

This finding aligns with Windiari et al. (2022), who found that 53.33% of respondents were in the neutral perception category, while the rest had low perceptions regarding waste management. They concluded that this condition is caused by insufficient environmental education at the community level, particularly at the neighborhood level (RT) (Windiari et al., 2022). This confirms that the 40.56% moderate perception in Makassar District reflects a common pattern of stagnation in environmental awareness in urban areas.

Furthermore, Hazah et al. (2022) demonstrated that perception significantly influences community participation in environmental management, with a significance value of $0.00 < 0.05$ and an R Square of 0.467. This means that 46.7% of waste management performance is influenced by community perception. Similarly, Salbilillah et al. (2023) found a regression equation $\hat{Y} = 33.8 + 0.58X$, showing that each increase in positive perception improves environmental behavior by 0.58 points. These findings emphasize that the moderate perception level in Makassar District represents a critical “yellow alert” condition requiring intervention through education and infrastructure improvement.

Description of Environmental Sanitation Quality in Makassar District, Makassar City

The descriptive statistical analysis shows that environmental sanitation quality in Makassar District tends to be positive but with relatively varied distribution. Of 323 respondents, the largest group is in the high category (112 individuals or 34.67%), closely followed by the moderate category (106 individuals or 32.82%). Meanwhile, 63 respondents (19.50%) are in the low category, 30 respondents (9.29%) in the very low category, and 12 respondents (3.72%) in the very high category. Overall, more than 67% of respondents fall within the moderate to very high categories, indicating relatively adequate sanitation conditions.

However, the mean value (70.28) is lower than the median (72.00), indicating a left-skewed distribution. This suggests that although most respondents have good sanitation conditions, a small group with very poor sanitation (minimum score 43) lowers the overall

average. This indicates inequality in sanitation infrastructure, including access to proper toilets, drainage systems, and waste management facilities.

This condition aligns with Pratiwi et al. (2025), who found that 99.80% of households in urban areas already use septic tanks, and 83.01% regularly dispose of waste through official services. However, Sekarningrum et al. (2023) found that only 30.2% of residents actively separate waste, and only 5.6% process organic waste independently. This shows that while infrastructure is relatively available, behavioral quality remains limited.

Relationship Between Socioeconomic Status and Environmental Sanitation Quality

Regression analysis shows a positive and significant relationship between socioeconomic status and environmental sanitation quality, expressed by the equation $\hat{Y} = 57.818 + 2.07X_1$. The model is significant with an F value of 100.658 and $p = 0.000 (< 0.05)$, indicating that socioeconomic status influences sanitation quality.

The correlation coefficient ($r = 0.489$) indicates a moderate positive relationship, while the t-test value of 10.033 ($p = 0.000$) confirms significance. The coefficient of determination ($R^2 = 0.239$) shows that 23.9% of sanitation quality variation is explained by socioeconomic status.

These findings are consistent with Amaliyah et al. (2024), Suryawan et al. (2021), and Kasrudin et al. (2021), all of whom emphasize the strong role of socioeconomic conditions in shaping sanitation behavior and environmental quality.

Relationship Between Waste Management Perception and Environmental Sanitation Quality

The regression equation $\hat{Y} = 60.396 + 0.171X_2$ indicates a positive relationship between perception and sanitation quality. The model is significant ($F = 7.047$; $p = 0.008 < 0.05$), although the effect size is relatively small.

The correlation coefficient ($r = 0.147$) indicates a very weak positive relationship, and $R^2 = 0.021$ shows that only 2.1% of sanitation quality is explained by perception. Despite the small contribution, perception remains statistically significant. This is supported by Salbilillah et al. (2023), Wulandari et al. (2025), and Sutiani et al. (2026), who confirm that perception significantly influences environmental behavior, even though its contribution is often limited without supporting infrastructure.

Relationship Between Socioeconomic Status and Perception on Environmental Sanitation Quality

Multiple regression analysis shows that socioeconomic status and perception jointly influence environmental sanitation quality, expressed by $\hat{Y} =$

$32.901 + 0.705X_1 + 2.669X_2$. The model is significant ($F = 50.186$; $p = 0.000$).

The Adjusted R^2 value of 0.234 indicates that 23.4% of sanitation quality is explained by both variables, while 76.6% is influenced by other factors. However, partial tests show that socioeconomic status is significant ($p = 0.000$), while perception is not significant ($p = 0.884$) when analyzed simultaneously. This phenomenon is supported by Izzati et al. (2024), Heriyanti et al. (2025), and other studies showing that economic capacity is often more dominant than perception when both variables interact in determining sanitation behavior.

Conclusion

This study concludes that environmental sanitation quality in Makassar District, Makassar City is influenced by both socioeconomic status and community perception of waste management, either individually or simultaneously. Descriptively, the community's socioeconomic status is predominantly in the moderate category (55.42%), indicating a relatively stable middle-class condition. Community perception of waste management is also generally moderate (40.56%), reflecting a basic level of environmental awareness that has not yet fully developed into comprehensive and sustainable waste management behavior. Meanwhile, environmental sanitation quality is generally in the moderate to high category (67%), although disparities still exist among households. Inferential analysis shows that socioeconomic status has a positive and significant effect on environmental sanitation quality ($p < 0.05$), with a moderate correlation strength. This indicates that higher socioeconomic conditions tend to improve access to sanitation facilities and environmental cleanliness. In contrast, community perception of waste management has a positive but very weak effect, although still statistically significant, suggesting that perception alone is not sufficient to strongly influence sanitation quality without supporting infrastructure and economic capacity. Furthermore, the simultaneous analysis confirms that socioeconomic status and perception together significantly affect environmental sanitation quality, although their combined contribution is relatively limited, with most variation explained by other external factors. In the joint model, socioeconomic status emerges as the more dominant predictor compared to perception. Overall, the study highlights that improving environmental sanitation in densely populated urban areas such as Makassar District requires an integrated approach. Economic empowerment plays a primary role in enabling access to sanitation facilities, while strengthening community perception through environmental education is essential to encourage sustainable waste management behavior.

Therefore, effective sanitation improvement strategies should combine socioeconomic development with continuous environmental awareness programs to achieve better and more equitable sanitation conditions.

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