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Implementation of Community-Based Waste Management to Improve Environmental Health in Villages

Utami[1]*, Titis Istiqomah[2], & Lieza Corsita[3]
[1]*Universitas Islam Indonesia Yogyakarta, Indonesia, [2]STIE Mahardhika Surabaya, Indonesia,
[3]Universitas Sains dan Teknologi Jayapura, Indonesia
*Co e-mail: utamitami60@gmail.com[1]

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ABSTRACT

Waste management has emerged as a critical environmental issue, particularly in rural areas where population growth and changing consumption patterns have led to increased waste generation. This research focuses on the implementation of community-based waste management in villages, aiming to understand its impact on environmental health and the factors influencing program success. Utilizing a quantitative analytic approach with a cross-sectional research design, the study surveyed 4,345 family heads, with a sample size of 98 participants.The findings revealed that 54.1% of respondents did not engage in waste management activities. Among these non-participants, 70.4% had low educational attainment (elementary or junior high school). Additionally, 53.1% cited a lack of infrastructure as a barrier to participation, while 64.3% reported poor knowledge of waste management practices.The results indicated that infrastructure availability significantly influences community participation, with a p-value of 0.006 and an odds ratio (OR) of 3.911. Furthermore, knowledge levels were crucial; those with inadequate knowledge were less likely to participate (69.2% did not engage), whereas those with good knowledge showed higher participation rates (63%).Effective waste management is essential for improving environmental health by reducing pollution and disease risks. Therefore, enhancing education and infrastructure is vital to encourage community involvement in waste management initiatives. This study underscores the importance of addressing knowledge gaps and infrastructural challenges to foster sustainable waste management practices in rural communities.

Keywords: *Waste Management Implementation, Knowledge, Infrastructure*

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INTRODUCTION

Waste management is one of the most pressing environmental issues, especially in rural areas. The increasing population and changing consumption patterns in villages have led to an increase in the volume of waste, both organic and inorganic (Afandi et al., 2022; Rapii et al., 2021). Unfortunately, many villages do not have an adequate waste management system, which has a negative impact on the environment and public health. The Central Bureau of Statistics (BPS) noted that more than 60% of villages in Indonesia do not have effective waste management facilities, and most communities still use burning methods or direct disposal to open land (Darmawan, 2020).

The impact of the lack of a good waste management system is seen in various aspects of public health. According to the Indonesian Ministry of Health, uncontrolled waste disposal leads to increased cases of infectious diseases such as diarrhoea, dengue fever, and acute respiratory infections (ARI). Data shows that areas with poor sanitation and inadequate waste management have a higher incidence of diseases, which affects the quality of life of the community.

Community-based waste *management* offers a participatory and sustainable solution. This model prioritises the active participation of the community in sorting, processing and recycling waste. Studi yang dilakukan oleh Pengelolaan sampah berbasis masyarakat telah terbukti efektif dalam mengurangi volume sampah di berbagai negara berkembang, dengan pengurangan mencapai 30% hingga 50%. The World Bank notes that this approach not only helps to address the waste problem, but also empowers local communities to be actively involved in the management of their environment (Laksmi Susanti & Arsawati, 2021; Vergara & Jammi, 2022). The programme also increases environmental awareness and empowers communities through recycling and composting training.

In Indonesia, several villages have successfully implemented community-based waste management systems, one of which is Panggungharjo Village, Bantul, Yogyakarta. Through the Waste Bank programme, the village has reduced waste volume by 40% and created economic value from waste processed into compost and recycled crafts (Masterplandesa.com, 2022; Zum, 2019). This approach also has a positive impact on environmental health by reducing the risk of flooding and soil pollution.

However, there are still many challenges in implementing a community-based waste management system, mainly related to the lack of education, infrastructure support, and commitment from the community itself. Research by Universitas Gadjah Mada (UGM) states that the success of this programme is highly dependent on the support of the village government, easy access to waste processing technology, and active involvement of the community in all stages of management (Febyanti et al., 2022).

In addition, the aspect of public awareness of the impact of waste on health and the environment needs to be improved. Consistent environmental education campaigns and collaboration between the government, NGOs and communities are expected to encourage behavioural changes towards waste management. The Ministry of Environment and Forestry (MoEF) emphasises the importance of integration between environmental education and concrete actions at the local level to effectively address waste issues (Chahyanti, 2024).

This research is expected to make a significant contribution in identifying effective and sustainable community-based waste management models to be implemented in other villages. With

the right approach, not only environmental health will improve, but also the economic well-being of the community through recycling and waste management innovations.

Therefore, this research will focus on the implementation of community-based waste management in villages, to understand its impact on improving environmental health as well as the factors that influence the success of the programme. The results of this study are expected to serve as a reference for the government and related parties in developing sustainable waste management strategies in rural areas.

METHODS

This research approach is quantitative analytic with *cross sectional research* design. The population in this study is all family heads of 4,345 with a sample size of 98 people. quantitative approach will be used to measure environmental health indicators before and after the implementation of the waste management programme.

Data collection techniques included questionnaires, interviews and field observations. Quantitative data analysis used descriptive statistical methods to see the distribution of respondents regarding participation and perceptions of the programme and a chi square test was conducted to see if there was a significant relationship in environmental health conditions before and after the programme was implemented.

This research procedure starts from the preparation stage, data collection, data processing and analysis, and reporting of research results. This study is scheduled to last for 6 months, the research will ensure that all participants provide informed consent before data collection is carried out, and the data obtained will be kept confidential. The researcher will also seek permission from the local village government to conduct data collection in the study area.

RESULTS

1. Respondent Characteristics

The characteristics of respondents based on the variables in the study can be seen in table 1 below:

Table 1. Characteristics of Respondents

Variables	Frequency	Percentage
Waste management		
Not participating	53	54,1
Participate	45	45,9
Total	**98**	**100**
Education		
Low (SD, SMP)	69	70,4
Higher (high school, university)	29	46,9
Total	**98**	**100**
Infrastructure		
Not available	52	53,1
Available	46	46,9
Total	**98**	**100**
Knowledge		

Less	63	64,3
Good	35	35,7
Total	**98**	**100**

Table 1 shows that 53 respondents (54.1%) did not participate in waste management. More than half of the respondents did not participate in waste management, indicating that community participation still needs to be improved.

Respondents with a low level of education (elementary/junior high school) were 69 people (70.4%). The majority of respondents have low education, which may affect their behaviour towards participation in waste management. Respondents who reported no infrastructure availability were 52 people (53.1%). The availability of infrastructure for waste management was also almost evenly distributed, with slightly more respondents reporting the unavailability of infrastructure.

Respondents with less knowledge were 63 people (64.3%). Most respondents have less knowledge about waste management.

2. Bivariate Analysis

a. Influence of Infrastructure in Community-Based Waste Management

The influence of infrastructure in community-based waste management can be seen in table 2 below:

Table 2. Influence of Infrastructure in Community-Based Waste Management

Infrastructure	Community participation				Total		p - value	OR
	Not participating		Participate					
	n	%	n	%	n	%		
Not available	36	63,8	25	25	69	100		
Available	17	31	20	20	29	100	0,006	3,911
Total	53	54,1	45	45,9	98	100		

Based on Table 2, the influence of infrastructure in community-based waste management, it was found that respondents who did not participate in waste management were more likely to come from areas that did not have infrastructure (63.8%). There is a significant influence between infrastructure availability and community participation in waste management with a p-value of 0.006 and an OR (odds ratio) of 3.911, indicating that infrastructure availability increases participation in waste management.

b. The Influence of Knowledge in Community-Based Waste Management

Table 3. Influence of Knowledge in Community-Based Waste Management

Knowledge	Community participation				Total		p - value	OR
	Not participating		Participate					
	n	%	n	%	n	%		
Less	36	69,2	16	30,8	52	100		
Good	17	37	29	63	46	100	0,003	3,838
Total	53	54,1	45	45,9	98	100		

Based on Table 3, the effect of knowledge in community-based waste management, respondents with less knowledge tend not to participate in waste management (69.2%). There is a significant influence between the level of knowledge and participation in waste management, with

a p-value of 0.003 and an OR of 3.838, indicating that good knowledge increases participation in waste management.

DISCUSSION

The results showed that the implementation of community-based waste management in the villages still faces challenges, especially related to community participation, infrastructure availability, and knowledge level. Based on the respondent characteristics data, the majority of the community does not participate in waste management, with 54.1% of respondents reporting not being involved in the activity.

1. Community Participation in Waste Management

Community participation is a key factor in community-based waste management. Based on the theory of *Community-Based Waste Management* (CBWM), active community participation is necessary for the success of waste management programmes (Lagerwall, 2022; Parinduri et al., 2024). However, the results of this study show that less than half of the respondents (45.9%) participated. This could be due to low awareness or motivation to engage in such activities. According to Zaman and Lehmann (2013), low community participation is often caused by a lack of socialisation and government support for waste management programmes (Dien et al., 2023; Marpaung et al., 2022).

The researcher assumes that community participation in waste management is still low due to a lack of awareness and understanding of the importance of waste management. People may not fully understand the negative impact of waste on environmental health, so participation in waste management programmes is not a priority.

2. The Effect of Infrastructure on Participation

The results showed that the availability of infrastructure has a significant influence on community participation in waste management with a p-value of 0.006 and an OR of 3.911. This is consistent with Environmental Behaviour Theory, which states that the availability of adequate facilities or infrastructure can increase the likelihood of individuals to behave pro-environmentally, such as disposing of waste in its place and participating in recycling programs (Tian & Liu, 2022). Therefore, village government efforts to provide infrastructure such as landfills, recycling facilities, and waste collection services need to be strengthened to increase community participation.

We assumed that the availability of supportive infrastructure, such as landfills, recycling facilities, and waste collection services, would significantly increase community participation in waste management. Villages that do not have adequate infrastructure tend to have lower community participation.

3. Community Knowledge Level

Community knowledge also plays an important role in waste management participation. The data shows that respondents with poor knowledge are less likely to participate in waste management (69.2% did not participate). In contrast, respondents with good knowledge participated more (63%). According to the Theory of Planned Behaviour, a person's knowledge and attitudes towards environmental issues strongly influence their intentions and behaviour (Nu'man & Noviati, 2021). Community-based education programmes successfully improve waste management practices, motivate mindset change, and demonstrate the economic potential of waste

through collaboration and hands-on training (Nurhayati & Nurhayati, 2023). More intensive socialisation and education programmes need to be implemented in villages to increase people's understanding of the positive impact of good waste management on environmental health.

The researcher's assumption is that the level of knowledge of the community regarding waste management and its impact on environmental health is closely related to participatory behaviour. People with good knowledge tend to be more actively involved in waste management programmes, while those with less knowledge are less likely to participate.

4. Implications for Environmental Health

Environmental health is highly dependent on an effective waste management system. Poorly managed waste can cause various environmental and health problems, such as water, soil, and air pollution, and increase the risk of infectious diseases. Studies in Nepal show a direct link between inadequate waste management and the prevalence of waterborne diseases such as diarrhoea, typhoid fever and cholera (Rahman et al., 2021). Therefore, the implementation of community-based waste management is not only important to keep the environment clean, but also to protect public health in villages.

Researchers assumed that effective waste management directly contributes to improved environmental health. Villages that consistently implement community-based waste management will experience improved environmental health, as they can reduce pollution and the risk of infectious diseases associated with waste.

CONCLUSIONS

Infrastructure availability, and knowledge level play an important role in the success of community-based waste management in villages. To improve environmental health, integrated efforts between the government, the community, and the private sector are needed to provide adequate infrastructure and increase education and public awareness about the importance of waste management. This study shows that community participation in waste management is still low (45.9%), influenced by infrastructure availability (*p-value* 0.006) and knowledge level (*p-value* 0.003). Communities with good knowledge and access to adequate infrastructure tend to participate more in waste management. Effective waste management improves environmental health by reducing pollution and disease risk. Therefore, improved education and infrastructure are needed to encourage community participation in community-based waste management.

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