

RESEARCH ARTICLE

Effect of Training on Organic Waste Management in Neighborhoods of Pejanggik, Mataram, West Nusa Tenggara

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Abstract

Garbage is solid waste consisting of organic and inorganic substances that outlived their usefulness and must be adequately managed to prevent environmental harm. The amount and types of waste are strongly influenced by the lifestyle and the type of materials we consume, and increasing household income cause an increase in the variety of waste generated. Handling and managing organic waste requires community involvement and successful household organic waste management, contributing significantly to the zero waste program. This study aims to measure the effect of waste management training on knowledge and principles of reducing, reusing, and recycling in waste management. The study was conducted from April to June 2021 in the neighborhoods around Pejanggik, Mataram village, West Nusa Tenggara province. It is a pre-experimental study involving 50 households to analyze the effects of the waste management training provided using a one-group pretest-posttest method. Before the training, knowledge and waste management principles were 22 of 50 respondents and 32 of 50 respondents, respectively. After the provision of training, the increase in knowledge and waste management principles reached 50 of 50 respondents. In conclusion, the training activity shows increased knowledge and waste management principles in households involved. Waste processing with reduce, reuse, and recycle principles can help overcome household waste problems and convert waste into products with increased economic value. Therefore, we recommend that periodic community-based waste management training involving households be held to overcome increased organic waste in households.

Keywords: Knowledge, management, organic waste, waste management

Introduction

The population increase and rapid industrial growth impact the amount and types of waste produced, such as plastic, paper, and packaging products containing B3 (hazardous toxic materials).¹ Population growth in major cities in Indonesia with increasing opportunities to find work and education, affecting the amount of waste produced.² Daily waste production per person is estimated at 2.3 liters, and if the average number of family members per household is 4.5, the daily waste production in the home amounts to 13.5 liters.³ The Mataram City Environmental Service reported that 325 tons of waste were produced daily, with 274 tons going to Kebon Kongok's final disposal site that serves Mataram city and West Lombok regency.⁴

The city of Mataram consists of 6 districts, 50 urban villages, and 297 neighborhoods. Out of the 325 tons of waste produced daily by the town, the Kebon Kongok's final disposal site only received

80% of the trash, with 20% remaining in the households and often left on the roadside. Such areas affected by the accumulation of garbage are Pejanggik village, Mataram district, and Mataram city. The accumulation of organic waste in common living areas resulted in the community taking the most straightforward action to eliminate the waste by burning it. However, burning garbage only provides a temporary solution, and wastes remain accumulated. Moreover, organic waste left behind in common public areas can cause many problems such as environmental pollution, foul odors, road hazard, and health issues.⁴

The lack of public knowledge on household waste management methods causes waste to pile up. Responding to this condition requires knowledge in managing and utilizing organic waste in products with increased values.⁵ To support this movement, collaboration from all parties is needed, including the government, the private sector, and especially the community,

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to form a cross-sectoral partnership to increase community capacity in supporting sustainable development programs and improving the quality of life of the community.⁶

Community participation in household organic waste management can be generated through understanding and skills in processing household waste with the principles of reduce, reuse, and recycle, to reduce waste produced and convert waste into valuable goods.⁷ Providing training in zero waste and 3R training (reduce, reuse, recycle) to groups of households will develop the expertise in processing and utilizing household waste to achieve the goal of zero waste.⁸

Waste is often solid materials that are generated as a byproduct of household and industrial activities or objects that are no longer desirable or have no economic value.⁹ Waste management is regulated by Law no. 18/2008, and waste management efforts can be made using reuse, reduce, and recycle (3Rs). Reuse is an activity of direct use/reuse for the same function or other functions. Reduce is an activity to lessen all activities that cause waste. Finally, recycling is an activity to repurpose waste after being processed/reprocessed.¹⁰

This study aims to measure the effect of waste management training on knowledge and principles of reducing, reusing, and recycling in waste management.

Methods

The study was conducted from April to June 2021 in the neighborhoods around Pejanggik, Mataram village, West Nusa Tenggara province. This study is pre-experimental, aiming to analyze a treatment's results or effects. This study uses a one-group pretest-posttest design. This design did not have a comparison group (control). A total of 50 households are involved using the purposive sampling method with the inclusion criteria for heads of families who did not have a home yard. Data were collected through questionnaires measuring the variables of age, education levels, occupation, and each object of research were observed three times. The questionnaire also includes an organic waste management manual and multiple-choice questions about the knowledge of waste types and organic waste management. This questionnaire was adopted from the previous

research. This study is approved by the STIKes Yarsi Research Ethics Committee in Mataram, West Nusa Tenggara number 12/KEP/STIKES/Y. III/II/2021. For data analysis, interview results were recapitulated and given a score, and categorized as good, sufficient, and poor. Data presented in the form of tables, described by descriptive analysis and the difference in the average value of pre-test and post-test scores will be examined by using the dependent t test (SPSS version 24).

Results

The results of the characteristics of the subjects are shown in Table 1. Based on Table 1, 24 of the respondent's age group is 36–45 years, and 42 of 50 are male. About 30 of 50 subjects finished high school, and 35 of 50 work in the private sector.

During the pretest, the parameters of knowledge about waste and aspects of waste management were measured before an intervention (training/counseling). A summary of the answers of the 50 respondents is shown in Table 2.

Based on the recap of the answers to the questionnaire on the knowledge aspect, the

Table 1 Respondents Characteristics

Characteristics	n=50
Age (years)	
25–35	12
36–45	24
46–55	14
Gender	
Male	42
Female	8
Education	
Junior high school	16
Senior high school	30
College	4
Occupation	
Government employees	4
Private	38
Trade	8
Income (million)	
<1.5	35
1.5–2.5	10
>2.5	5

Table 2 Responses to the Pre-test Questionnaire Aspects of Knowledge and Aspects of Waste Management

Questions	n=50	Questions	n=50
Pre-test questionnaire aspects of knowledge		How many times do you take out the trash in a week?	
The division of waste groups is based on whether or not it decomposes easily		a. Everyday	32
a. Inorganic and organic waste	16	b. Every two days	10
b. Dry and wet trash	12	c. Every three days	8
c. Do not know	10	Do you do waste segregation?	
d. No answer	12	a. Yes	18
Definition of organic waste		b. Not yet	32
a. The garbage from the rest of the kitchen like vegetables	16	Temporary garbage collection at home	
b. Plastic or glass waste	12	a. Crackle/plastic bag	15
c. Do not know	11	b. Simple trash	17
d. No answer	11	c. Land	9
What are the bad effects of garbage on society?		d. Etc.	9
a. Causes pain and disturbs the view	16	Is reusing the container/packaging for the same function?	
b. Shows the low social status	12	a. Yes	12
c. Do not know	13	b. Sometimes	20
d. No answer	9	c. Never	18
What are the positive effects of waste on society?		Do you sell/give waste to those in need?	
a. Can be processed into compost	16	a. Yes	0
b. Does not provide good benefits	12	b. Sometimes	18
c. No	11	c. Never	32
d. No answer	10	Do you use recyclable packaging?	
Another name for organic fertilizer		a. Yes	0
a. Chemical fertilizer	16	b. Sometimes	18
b. Fertilizer produced from the factory	12	c. Never	32
c. Fertilizers sourced from natural ingredients	8	Do you use recyclable and biodegradable products and packaging?	
d. Fertilizer that comes from living things that have died	14	a. Yes	0
Mention the materials used to make organic fertilizer		b. Sometimes	18
a. Plastic waste	10	c. Never	32
b. Drink's cardboard	10	Do you process organic waste into compost?	
c. Fruits' peel/fruits' leftover	16	a. Yes	0
d. Soap water	14	b. Sometimes	18
Pre-test questionnaire aspects of waste management		c. Never	32
How many garbage bags are produced per day?		Is it processing non-organic waste into useful goods?	
a. 1 bag every day	32	a. Yes	0
b. 2-3 bags daily	9	b. Sometimes	18
c. >3 bags daily	9	c. Never	32
When is the right time to take out the trash?			
a. Morning	10		
b. Noon	10		
c. Afternoon	10		
d. Evening	20		

Table 3 Knowledge Distribution and Processing Aspects of the Head of the Family in Organic Waste Management

Variables	Pre-test n=50	Post-test n=50
Knowledge		
Well	16	50
Enough	12	0
Not enough	22	0
Processing aspect		
Well	0	50
Enough	18	0
Not enough	32	0

Table 4 Dependent T Test Knowledge and Processing Aspects of the Head of the Family in Organic Waste Management

Variables	Mean	SD	p
Knowledge			
Pre-test	6.36	3.026	0.000
Post-test	11.04	0.841	
Processing aspect			
Pre-test	7.44	2.022	0.000
Post-test	15.12	1.424	

majority of respondents' answers were in the poor criteria (22 of 50 respondents), and only 16 of 50 respondents were in a good category. It is because elements of knowledge ideally correlate with aspects of waste management.

Based on the waste management aspects in Table 2, the overall assessment recap is in the poor category (32 of 50 respondents) and 18 of 50 respondents sufficient. No answers were found in the good category (0 respondents). However, after training was given to the respondents, significant results were found in the post-test.

Table 3 shows the change in the assessment of knowledge and waste management aspects from pre-test to post-test. Overall, an increase was found in the good category (50 respondents) regarding knowledge and waste management.

After being given the waste management training, all respondents achieved the good category (50 respondents). This organic waste management training activity aims to increase the

understanding of families regarding household waste management to support the zero waste program. In addition, data were analyzed using the dependent t test to assess the difference in the value of the knowledge and waste processing before and after the intervention (Table 4).

The test results in Table 4 show differences in scores before and after the intervention, indicated by the value of $p=0.000$ ($p<0.05$). It means a statistically significant difference in the average value before and after the intervention.

Discussion

Pejanggik village, with a population density of about 9,349, has the potential as one of the areas that highly contribute to the daily waste in Mataram city. There is garbage scattered on the side of the road and unorganized illegal landfills. In general, we found the following situations, the community has not separated wet and dry waste, so it isn't easy to reuse. Wet waste can be recycled into compost, but it will be difficult if mixed with other waste such as batteries, sanitary napkins, or chemical waste. Community participation is still meager. The number of sanitation workers who work to handle waste is much less than the number of office workers and the amount of waste that must be addressed. There was no public awareness to be directly involved in handling waste, as indicated by the dirty environment caused by the accumulation of garbage. The condition of the landfill is limited, and scavengers can only reduce a small part of the waste that comes in daily. Trash is scattered in the final disposal site location because of the limited capacity. The operational costs of transporting waste from the temporary to the final disposal site are continuously increasing.

On the other hand, operational costs are needed to maintain waste transport vehicles. As one of the tourist destinations that impacts increasing waste production daily, this situation requires attention from the community and government. Unfortunately, the local government regulations that regulate waste management have not been found, including sanctions for community violators.

The results of our study show that the level of public knowledge about waste before interventions was in the poor category (22 of 50 respondents). The same thing was observed in the aspect of waste management. 32 of 50 respondents

are in the poor category. It means the problem of poor waste management in the environment of Majeluk Pejangik village, Mataram city, is influenced by the local community's level of knowledge and management behavior.

Based on this information, we provide training and counseling to increase public knowledge, which will ultimately affect their waste management behavior. We conducted mentoring, observation, and evaluation activities thrice from April to May 2021. Starting with providing education about the impact of waste on environmental health and family health, we continued with the practice of separating organic and non-organic waste. We also introduced a simple composting method to increase the utilization of waste. Our observations and evaluations are carried out to see the progress of achievements that all respondents have practiced. We found significant behavioral changes characterized by a much better environment than before the intervention. At the end of June 2021, we again held training to evaluate the achievement of activities and conduct an assessment through posttest. Furthermore, we found significant results, where the knowledge and waste management aspects increased to 100%.

Community-based integrated waste management is one of the solutions that we recommend through the results of this research. This program is a method of approaching waste management based on the needs and demands of the community. These activities are planned, implemented, monitored, and evaluated together with the local community.¹¹ This activity also requires the role of the government and other institutions as motivators and facilitators. The government provides encouragement so that the community is ready to find solutions to the waste problems they face.¹²

Urban waste accumulation has increased significantly every year (2.4%/year), which is not matched by the availability of adequate waste processing infrastructure and facilities, resulting in increased environmental pollution. In addition, the collection-transport-disposal pattern program that has been carried out so far has resulted in the burden of pollution constantly piling up at the location, and the waste management method is not following the required standards.¹³

Community-based waste management also

involves the active role of the general public in managing waste. They start from the stages of stockpiling, collecting, and processing to a final product. Community empowerment programs through organic and inorganic waste management are considered very important and strategic as an effort to develop community-based environments.¹⁴ The goal is not only to reduce the accumulation of waste but also to maximize the role of the community care about the state of the environment. Community empowerment in waste management such as processing organic waste into compost and recycling inorganic waste into reusable tools.¹¹

Several previous studies have reported on the success of family empowerment in waste management. For example, Ruhmawati et al.¹⁵ in Bandung reported that empowerment interventions significantly increased families' knowledge and attitudes toward waste management. Research on waste management was also conducted by Yang et al.¹⁶ in China, Bernardo¹⁷ in the Philippines, Ezparsa et al.¹⁸ in Spain, and Matsuto¹⁹ in several Asian countries.

Public understanding of the 3R concept, namely reuse (reusing used goods that can still be used), reduce (lessening waste production), and recycle (recycle waste so that it can be reused), has increased over the past few years. The concept of 3R is not new. Many of our literature studies have shown the success of introducing the concept to society.²⁰ In contrast, the waste produced by the community was getting higher and piled up in any place.²¹ Illegal and uncontrolled landfills are popping up and mushrooming everywhere. Community participation is needed to manage waste starting from the household so that later the waste disposed of at the landfill has been reduced quite a lot and does not cause piles in the landfill location.²²

The principle of reuse is the reuse of containers/packages for the same function or other functions, utilizing reusable containers/bags, using rechargeable batteries, and selling or giving sorted waste to people who need it.²³ The principle of reducing is to choose products with packaging that can be recycled, avoid using/buying products that produce large amounts of waste, use products that can be refilled, and avoid using single-use materials. The principle of recycling is to choose products/packaging that can be recycled and easily decomposed, for example, processing organic waste into compost

and non-organic waste into valuable goods.²⁴

Research reports that have reported the success of family involvement in waste handling with 3R principles, including Hernawati et al.²⁵ and Ediana et al.,²⁶ concluded that there is a relationship between attitudes and 3R waste management. The empowerment program is hoped to be further improved, so that community groups are fostered in processing the 3R waste. Setianingrum²⁰ provides solutions to some waste problems, including increasing public awareness in sorting waste and maintaining environmental health, raising public awareness in handling waste, and reducing the volume of waste generated from households. Wahyudin et al.⁵ reported that the waste management planning efforts with the 3R approach were able to take 80% of waste, and 20% of the residue was disposed of at the Pasar Dasan Agung Mataram city landfill. Armanda²⁷ examines the planning of household waste processing sites with the 3R principle in the Medan district area, Medan city.

Based on the results of the research that we have done, some of the recommendations we offer are as follows:

Efforts to involve the community in waste management would be a common concern from the sub-district government, the Mataram City Environment Agency, community leaders, and local religious leaders. However, we found that the community was motivated and moved when control, evaluation, and support came from other parties.

Community participation in playing an active role in waste management starts from the household by separating organic waste, inorganic waste, and B3 waste. The sorting of waste will help recycle organic waste into compost while inorganic waste into other forms so that it has economic value and can be used as waste briquettes.

The community should take advantage of existing inorganic waste, which can be recycled to become a source of income for business creativity, including making handicrafts from plastic, paper, cardboard, and wood (a variety of recycled creations).

Most people in Mataram city have plants in their yard, so we recommend making organic fertilizer from waste that can be used for fertilizer needs.

The need for continuous supervision from relevant agencies (government, community leaders, religious leaders) to monitor success in

community-based waste management.

Conclusions

The community partnership program activities to assist the management of organic waste in households are successful, as indicated by the increase in the knowledge and skills of the family heads who have managed household organic waste. However, the evaluation of the training program with the support of community leaders, the government from both the environment of the village and the Mataram City Environment Agency need further improvement.

Conflict of Interest

All authors state whether there was a conflict of interest in this article or not.

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