Miracle Get Journal
Vol. 01, No. 2, May 2024, 37-46
***e*-ISSN: 3047-8839**

The Effect of Education on Waste Management Activities 3R Method (Reduce, Reuse, Recycle) in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City in 2023

Shandy Rizky Bernanda[1]*, Darwel[2], Sri Lestari[3], Wijayantono[4], & Afridon[5]
[1]*Poltekkes Kemenkes Padang, Indonesia, [2]Poltekkes Kemenkes Padang, Indonesia, [3]Poltekkes Kemenkes Padang, Indonesia, [4]Poltekkes Kemenkes Padang, Indonesia, [5]Poltekkes Kemenkes Padang, Indonesia
*Co e-mail: shandyrizky17@gmail.com[1]

Article Information
Received: May 23, 2024
Revised: May 27, 2024
Online: June 29, 2024

Keywords
The 3R Method, Waste, Waste Management

ABSTRACT

The Padang City Environment Agency reported that the city generated an average of 643.76 tons of waste per day in 2021–2022. According to the head of RW 016, residents dispose of waste at the TPS due to limited available land. This study aims to assess the impact of education on 3R (Reduce, Reuse, Recycle) waste management in RW 016, Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City, in 2023. A quantitative descriptive method was used with pretest and posttest assessments to measure knowledge levels. The paired sample t-test was employed for data analysis. The study involved 40 housewives as respondents, and data were collected through field observation and questionnaires. After data processing and analysis using frequency distribution tables, results showed a significant improvement in waste management knowledge after educational intervention. The mean score increased from 29.10 before education to 36.23 after, with a p-value of 0.000, indicating a statistically significant difference. These findings demonstrate that education positively influences 3R-based waste management behavior. To support sustainable waste practices, it is recommended that local government and village authorities provide adequate infrastructure such as segregated waste bins, recycling facilities, and environmentally friendly

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http://doi.org/10.69855/mgj.v1i2.36
https://gpijournal.com/index.php/miracle

INTRODUCTION

Waste management has become a critical global environmental and public health issue due to rapid urbanization, population growth, and changes in consumption patterns. According to the World Health Organization (WHO), waste refers to materials that are no longer used, unwanted, or discarded as a result of human activities and do not occur naturally (Candra, 2016). Poorly managed waste can lead to serious environmental problems, including soil, water, and air pollution, as well as health risks such as the spread of infectious diseases. Therefore, proper waste management is essential to ensure environmental sustainability and improve community health outcomes.

In Indonesia, waste management is regulated under Law Number 18 of 2008 concerning Waste Management, which mandates that every individual is responsible for reducing and handling household waste in an environmentally sound manner. This regulation emphasizes the importance of waste reduction at the source, proper waste handling, and environmentally friendly disposal practices. At the local level, Padang City Regional Regulation Number 21 of 2012 further defines waste management as a systematic, comprehensive, and sustainable activity that includes both waste reduction and waste handling. These policies highlight the government's commitment to addressing waste issues through integrated and sustainable approaches.

One of the most widely promoted strategies in waste management is the 3R concept—Reduce, Reuse, and Recycle. This approach focuses on minimizing waste generation, reusing materials, and recycling waste into valuable products. The 3R method is considered an effective and practical solution for reducing the volume of waste sent to final disposal sites while also providing economic benefits to the community (Sahputra et al., 2018). By implementing 3R practices, communities can transform waste into resources, thereby contributing to environmental conservation and economic empowerment.

Despite these efforts, waste generation in urban areas remains high. Data from the Padang City Environment Agency (2021–2022) show that the city produces an average of 643.76 tons of waste per day. Household waste contributes the largest proportion at 464.15 tons per day, followed by waste from markets (88.60 tons/day), public facilities (40.68 tons/day), commercial centers (20.13 tons/day), offices (14.10 tons/day), residential areas (7.05 tons/day), and other sources (8.05 tons/day). This indicates that household waste is a major contributor to the overall waste problem, making community-based waste management strategies essential.

Previous studies have demonstrated that community empowerment and education play a significant role in improving waste management practices. Research by Dwi Sukma Ryandani (2021) found a significant difference in community knowledge and attitudes before and after the implementation of 3R-based empowerment programs, with a p-value of 0.001. Similarly, a study by Veno Hilvira (2021) revealed that a large proportion of respondents had poor knowledge (60.8%), negative attitudes (64.9%), and inadequate waste handling practices (66.2%), indicating the need for educational interventions. Furthermore, research by Euis Sartika et al. (2022) showed that although around 70% of the community had good knowledge about waste, only about 20% demonstrated proper waste management practices. These findings suggest that knowledge alone is not sufficient; behavioral change requires continuous education and practical engagement.

Lubuk Begalung Sub-district is one of the eleven sub-districts in Padang City, covering an area of 30.91 km² and consisting of 15 villages. One of these is Pagambiran Ampalu Nan XX Village, which has an area of 5.15 km² and a population of 22,426 people in 2022. The village comprises 20 neighborhood units (RW), including RW 016, which has 192 housewives who play a crucial role in household waste management. As primary managers of domestic activities, housewives significantly influence waste handling practices at the household level.

Based on a preliminary survey conducted in September 2023 through observations and interviews with 10 housewives in RW 016, it was found that waste management practices were still inadequate. Most respondents disposed of waste at temporary disposal sites (TPS) through garbage collectors, while some burned waste or disposed of it into nearby rivers. Additionally, none of the respondents practiced waste segregation between organic and non-organic waste. These practices not only contribute to environmental pollution but also reflect limited awareness and knowledge regarding proper waste management.

Further information obtained from the head of RW 016 indicated that most residents are migrants with limited land availability, which restricts their ability to manage waste independently. As a result, they rely heavily on a single garbage collector for waste disposal. This situation highlights both structural and behavioral challenges, including limited infrastructure and insufficient community knowledge about waste management practices.

The existing waste management problems in RW 016 Pagambiran Ampalu Nan XX Village indicate that current practices are not yet optimal and require intervention. The lack of knowledge, absence of waste segregation, and reliance on conventional disposal methods contribute to increased environmental risks and inefficiencies in waste handling. Therefore, educational interventions focusing on the 3R method are needed to improve community knowledge and encourage sustainable waste management behaviors.

Based on the background described above, this study aims to analyze the effect of educational interventions on waste management activities using the 3R method among housewives in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City, in 2023. This study is expected to provide evidence on the effectiveness of education in improving community knowledge and support the development of sustainable, community-based waste management programs.

METHODS

The quantitative approach in this study is used for the process and measurement of knowledge variables by conducting pretests and posttests using a descriptive research design with a Paired Sample T test approach. This research will be conducted in RW 016 Pagambiran Amplu Nan XX Village, Lubuk Begalung Subdistrict, Padang City. This research was conducted from September 2023 to December 2023 including the preliminary survey stage, research implementation and report writing.

Population is the entire object of research or the object being studied. The population in this study was RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City,

namely housewives as many as 192 people. The number of samples in this study using the Slovin formula, from secondary data, namely the total population of RW 016 Pagambiran Ampalu Nan XX Village as many as 192 housewives, based on the sample calculation, a sample size of 66 housewives was obtained as respondents.

There are sample criteria, namely inclusion and exclusion criteria, data collection is collected in the form of primary and secondary data. The instrument used in quantitative research is a questionnaire containing a list of questions addressed to respondents and observation guidelines, namely a list of questions that describe the condition of the object being observed in the form of a checklist table. Data processing is done by computer spss data processing applications starting from editing data (editing), coding data (coding), entering data (entry), cleaning data (cleaning).

Data analysis used univariate analysis and bivariate analysis, carried out to see the number and percentage of each variable of interest. This analysis was used to present data on the state of waste management, the frequency of knowledge before education and after education. Based on this information, measured testing using the Paired sample t test with a p value value <0.05 is expected to see the effect of the 3R method waste management briefing on housewives' information in wasting caretakers in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City in 2023.

RESULTS

1. Univariate Analysis

Univariate analysis was conducted to describe the distribution of waste management practices using the 3R method and the level of community knowledge before and after the educational intervention in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City.

Table 1. Waste Management Using the 3R Method Before Education in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung Sub-district, Padang City in 2023

Variables	f	%
Not Doing	32	48,5
Doing	34	51,5
Total	66	100

Based on Table 1, it can be seen that before the educational intervention, the proportion of respondents who did not implement 3R-based waste management was 32 people (48.5%), while those who had implemented it were 34 people (51.5%). This indicates that prior to education, the implementation of 3R waste management among respondents was relatively balanced, although nearly half of the respondents had not yet adopted proper waste management practices.

Table 2. Waste Management Using the 3R Method After Education in RW 016 Pagambiran Ampalu Village 2023 Nan XX Lubuk Begalung Sub-district, Padang City in 2023.

Variables	f	%

Not Doing	28	42,4
Doing	38	57,6
Total	66	100

Based on Table 2, after the educational intervention, there was an increase in the number of respondents who implemented 3R waste management, reaching 38 people (57.6%), while those who did not implement it decreased to 28 people (42.4%). This finding suggests that education contributed to an improvement in waste management behavior, although the increase was not very large, indicating that other supporting factors may still be needed to optimize behavior change.

Table 3. Knowledge Before Education in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung Subdistrict, Padang City Year 2023

Variables	f	%
Less good	34	51,5
Good	32	48,5
Total	66	100

Furthermore, based on Table 3, the level of knowledge before education showed that the majority of respondents had less good knowledge, with 34 people (51.5%), while respondents with good knowledge were 32 people (48.5%). This finding indicates that prior to the intervention, the respondents' understanding of 3R waste management was still relatively low.

Table 4. Knowledge After Education in RW 016 Pagambiran Ampalu Nan XX Urban Village, Lubuk Begalung Subdistrict, Padang City Year 2023

Variabel	f	%
Less good	21	31,8
Good	45	68,2
Total	66	100

Based on Table 4, after the educational intervention, there was a significant improvement in knowledge levels. Respondents with good knowledge increased to 45 people (68.2%), while those with less good knowledge decreased to 21 people (31.8%). This indicates that the educational program was effective in improving respondents' knowledge regarding 3R waste management.
Overall, the univariate analysis results demonstrate a positive trend, where both knowledge and waste management practices improved after the educational intervention. However, the increase in practice was not as high as the increase in knowledge, suggesting that knowledge improvement does not always directly translate into behavioral change.

2. Bivariate Analysis

Bivariate analysis was conducted to determine differences in waste management and community knowledge about the Effect of Education on Waste Management Activities of the 3R method (reduce, reuse, recycle).

Table 5. Community Knowledge About 3R Waste Management Before And After Education in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung Subdistrict, Padang City in 2023

Community Knowledge	n	Average	Standard Deviation	p-value
Before (pre-test)	66	30,33	7,113	0,000
After (post-test)	66	36,35	2,663	

Based on Table 5, the average knowledge score before the educational intervention (pre-test) was 30.33 with a standard deviation of 7.113. After the educational intervention (post-test), the average score increased to 36.35 with a standard deviation of 2.663. This indicates not only an increase in the average knowledge score but also a decrease in variability, suggesting that respondents' knowledge became more consistent after the intervention.

The statistical test results showed a p-value of 0.000 ($p < 0.05$), which means that there is a statistically significant difference between knowledge before and after the educational intervention. Thus, it can be concluded that the educational program had a significant effect on improving community knowledge regarding 3R-based waste management.

These findings confirm that educational interventions are effective in increasing knowledge, which is an important first step in promoting behavioral change. However, further efforts are needed to ensure that increased knowledge is followed by consistent and sustainable waste management practices in the community.

DISCUSSION

This section discusses the findings of the study regarding the implementation of 3R-based waste management and the effect of educational interventions on community knowledge and practices.

1. 3R Method Waste Management

For the pretest of the 3R method waste management education to housewives with the category of not yet doing, namely 20 respondents (50%) compared to the category of not doing, namely 20 respondents (50%). This happens because housewives have not been counselled about the 3R method of waste management. Meanwhile, for the post-test of waste management education on the 3R method, 23 respondents (51%) did it compared to the category that had not done it, namely 17 respondents (42%). This happened because the housewives had been counselled about the 3R method of waste management so that the 3R method of waste management for the doing category increased compared to the pre-test.

The training method with demonstration and practice has been proven to improve community skills, but this method also has weaknesses, namely requiring a relatively long time and a sufficient number of teaching staff to be able to supervise the practice and adequate infrastructure.

2. Effect of Knowledge Before and After Waste Management Education 3R Method

Based on the results of research conducted in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City, it was found that as many as 17 people with a percentage of 42% of housewives had low knowledge in waste reduction before being given education about the 3R program. when given counseling about the 3R program, the community, especially housewives, experienced an increase in knowledge with a total of 14 people or 42% in the category of poor knowledge, this shows that knowledge affects the way and treatment of housewives, especially in waste management using the 3R method.

A person's knowledge or cognitive is a very important domain for the formation of a person's actions. The better the level of formal education, the better the knowledge about health, so that it will mature the understanding of health knowledge and vice versa, the lower the level of education, the less knowledge about health. Knowledge is a very important domain for changing behaviour. Knowledge is all that humans know about something, including about science, behaviour based on knowledge will be more lasting (long lasting) than behaviour that is not based on knowledge.

3. The Effect of Education on Waste Management Activities Using the 3R Method on Housewives' Knowledge

The statistical test results show that the average value of community knowledge before community empowerment on 3R waste management (pre-test) is 29.10 with a standard deviation of 7.260 and the average community knowledge after community empowerment on 3R waste management (post-test) is 36.23 with a standard deviation of 2.759. The statistical test results show a p-value of 0.000, meaning that there is an effect of community empowerment on 3R waste management in increasing community knowledge in RW 003 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City.

According to Notoatmodjo (2003) knowledge is the result of "knowing" and this occurs after people perceive a certain object. Sensing occurs through the five human senses. Most human knowledge is obtained from the eyes and ears. This increase in knowledge can be driven by the community's interest and curiosity in the material presented, so that respondents can understand the material that has been delivered.

4. Evaluation of the Effect of 3R Method Waste Management Education

At the activity evaluation stage, it is done by evaluating the input and process. Evaluation of inputs is carried out by evaluating the time of implementation, the readiness of tools and media, the completeness of the number of participants participating in educational activities on 3R method waste management. The results of observations during the implementation of empowerment show that the housewives who participated in the 3R waste management activities as a whole were 40 people, and the time for implementing the event for the next activity needs to be increased to maximise empowerment activities.

Evaluation of the process is carried out by observing the learning process taking place, there are obstacles or no obstacles, describing the efficiency, effectiveness, and impact of activities in accordance with the objectives to be achieved either. In general, this activity aims to increase community awareness in waste management through efforts to reduce, reuse, and recycle.

5. Implications for Community-Based Waste Management

The findings of this study have important implications for the development of community-based waste management programs, particularly in urban residential areas with limited infrastructure such as RW 016 Pagambiran Ampalu Nan XX Village. The increase in knowledge and slight improvement in 3R practices indicate that educational interventions can serve as an effective initial strategy for promoting environmental awareness. However, to achieve more substantial and sustainable behavioral changes, education must be integrated with practical support systems.

One of the key implications is the need for the provision of adequate facilities, such as separate waste bins for organic and inorganic waste, recycling centers, and accessible waste collection services. Without these supporting facilities, the community may face difficulties in applying the knowledge they have gained. In addition, the involvement of local leaders, such as RW heads and community cadres, is essential in reinforcing behavioral change through continuous socialization and monitoring.

6. Barriers and Challenges in Implementing 3R Practices

Despite the positive outcomes, this study also identified several barriers that may hinder the optimal implementation of 3R-based waste management. One of the main challenges is the limited availability of land for waste processing, as most residents are migrants with relatively small residential areas. This condition reduces the feasibility of independent waste management practices, such as composting or waste sorting at the household level.

Another challenge is the community's dependence on waste collectors, which tends to encourage a "collect-and-dispose" habit rather than waste reduction at the source. Additionally, behavioral factors such as habits, lack of motivation, and limited awareness prior to the intervention also contribute to the low implementation of 3R practices. These findings highlight that waste management behavior is influenced not only by knowledge but also by environmental, social, and economic factors.

7. Recommendations for Future Interventions

Based on the results of this study, several recommendations can be proposed to improve the effectiveness of future waste management programs. First, educational interventions should be conducted continuously and not limited to one-time activities, in order to reinforce knowledge and maintain community awareness. Second, the use of interactive and practical methods, such as demonstrations and hands-on training, should be expanded to improve skill acquisition and application.

Third, collaboration between local government, environmental agencies, and community organizations is needed to provide supporting infrastructure and policy support. Programs such as

waste banks, recycling training, and incentive-based waste management can further motivate community participation. Finally, future research is recommended to explore long-term behavioral chang

CONCLUSIONS

Based on the results of data analysis, research findings, and discussion regarding the effect of education on waste management activities using the 3R method (Reduce, Reuse, Recycle) in RW 016 Pagambiran Ampalu Nan XX Village, Lubuk Begalung District, Padang City in 2023, it can be concluded that the educational intervention was appropriately designed according to the needs and characteristics of the respondents and contributed to an improvement in community waste management practices. Although the increase in practice was not very substantial, there was a positive trend indicating that education plays an important role in encouraging behavioral change. In addition, there was a significant increase in the level of knowledge among respondents after the educational intervention, where the average knowledge score increased from 29.10 before education to 36.23 after the intervention, demonstrating that the educational media used, such as flip sheet calendars, were effective in enhancing respondents' understanding of proper waste management. Furthermore, the evaluation results indicate that the community has begun to show signs of empowerment, reflected in increased awareness, interest, and willingness to participate in waste management activities both collectively and independently. Overall, educational interventions on 3R waste management have a significant positive effect on improving community knowledge and show potential in influencing behavioral change; however, to achieve more optimal and sustainable outcomes, these efforts need to be supported by adequate infrastructure, continuous assistance, and active involvement from local authorities and community leaders.

ACKNOWLEDGMENT

The author would like to express sincere gratitude to God Almighty for His blessings and grace in completing this study. This research was conducted as a requirement for obtaining an Applied Bachelor's degree in Environmental Sanitation at Poltekkes Kemenkes Padang.

The author sincerely thanks Mr. Darwel, SKM, M.Epid, as the main supervisor, and Mrs. Sri Lestari A, SKM, M.Kes, as the co-supervisor, for their guidance and support. Appreciation is also extended to all parties, including the respondents and the community of RW 016 Pagambiran Ampalu Nan XX Village, for their valuable assistance and cooperation throughout this research.

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