HOUSEWIVES CHARACTERISTICS ON REDUCE, REUSE, RECYCLE (3R) BEHAVIORS OF DOMESTIC WASTE MANAGEMENT: AN EVIDENCE FROM MEDAN, NORTH SUMATERA, INDONESIA

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ABSTRACT

Background: According to the "waste hierarchy" (reduce, reuse, recycle), the most effective means of reducing waste is to prevent waste in the first place (e.g., avoiding products with excessive packaging; consuming fewer products), followed by reusing or finding new uses for items, while recycling is the least effective strategy for reducing waste. While public awareness of waste-related problems is growing and recycling rates are increasing in many countries, there has been less progress in reduce and reuse behaviors. The purpose of this study was to investigate housewives characteristics on reduce, reuse, recycle (3R) behaviors of domestic waste management.

Subjects and Methods: This was a cross-sectional study located in 15 sub-districts in Medan, North Sumatera, Indonesia. A sample of 277 housewives was selected by purposive sampling. The dependent variable was reduce, reuse, and recyle behavior. The independent variables were knowledge and education. The data were collected by questionnaire and analyzed by Chi square test.

Results: As many as 44.4% of housewives had a good understanding of 3R domestic waste management, but only 13.3% of them housewives applied it well. Poor knowledge (OR= 0.54; 95% CI= 0.29 to 0.99; p= 0.063) and low education (OR= 0.55; 95% CI= 0.18 to 1.64; p=0.39) reduced 3R behavior of domestic waste management in housewives.

Conclusion: Poor knowledge and low education reduce 3R behavior of domestic waste management in housewives.

Keywords: domestic waste management, reduce, reuse, recycle, housewives

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BACKGROUND

The Global Waste Management Goals (GWMO) initiated and launched a program to reduce waste generation substantially in 2015 through prevention and the 3R (reduce, reuse, recycle) movement by 2030 as one of its main goals (Wilson and Velis, 2015). Indonesia has adopted 3R activities starting from the household level as stated in the Government Regulation of the Republic of Indonesia number 81 of 2012 concerning household waste and waste similar to household waste. The government does this to reduce waste generation and environmental burden.

The Ministry of Environment and Forestry stated that the increase in landfill waste in Indonesia had reached 175,000 tons/day, or the equivalent of 64 million tons/year (Baqirah, 2019). This means an increase in waste products every year and requires good management.

Medan City is one of the most densely populated cities in North Sumatra, the increase in population greatly affects the amount of waste. The residents of Medan City produce 5,616 m³/day or 2,000 tons/day of waste, not all of which is transported by officers from the Temporary Shelter (TS) to the Final Shelter (Medan City Sanitation and Parks Office, 2016). Currently, almost all waste management ends in the Final Shelter (FS), causing the burden of the FS to be very heavy, the capacity of the FS is no longer able to accommodate waste, and finally, it is still left in households (Suwerda, 2012).

Reducing waste generation at the FS can be pursued by applying the 3R (Reduce, reuse, recycle) system. The 3R system, Reduce, Reuse, and Recycle, is a waste management system that is oriented towards preventing waste generation, minimizing waste by reusing goods that can still be used, recycling waste into something useful and implementing environmentally friendly waste disposal. Reduce or waste reduction is an effort to reduce the waste generation in the source environment and can even be done before waste is generated (Ahmadi, 2017). Reduce is an effort to reduce waste from its source by changing the consumptive lifestyle to be economical or efficient (Bouanini, 2013). These activities include carrying a bag or pouch when shopping, preferring to use a handkerchief instead of using tissue, buying products that can be refilled, or not buying single-use products. Reuse is reusing materials or materials so they don't become waste, for example, using the empty side of the paper for writing, reusing used drink bottles, reusing plastic shopping bags from stores and so on (William, 2005). Meanwhile, the recycling process includes collecting, separating, and processing waste with productive value, such as inorganic fractions (paper, metal, plastic, glass), which can be recycled into other materials after processing. Recycling activities include utilizing and processing used tires into flower pots, processing leftover patchwork into blankets or foot mats, processing organic waste into compost and so on (William, 2005).

Housewives are the spearhead who, in their daily lives, deal directly with activities that cause waste. Besides that, housewives can play an effective role in influencing and providing positive values to all members (Zuhroh, 2020). Housewives have an important role in waste management because most of the waste is generated by household activities. Therefore, housewives have to know how to manage waste properly.

The results of research by Setyowati and Surahma (2012) found that around 80% of householders dispose of plastic waste around their homes and burn the plastic waste, and 75% of household workers who work as farmers are often seen carrying drinks using bottles of mineral water. As many as 60.8% of household members have bad behavior, and 39.2% have good behavior towards plastic waste management.

Waste management can reduce waste, waste management that relies on waste reduction and handling.

Waste reduction can be made by limiting waste generation, recycling and reusing waste, or 3R (Reduce, Reuse, and Recycle). Therefore, it is necessary to have household waste management carried out by the community, especially housewives, to reduce the volume of waste. Community participation, especially housewives, is important in managing waste independently through 3R solutions in Medan City. This study aims to analyze waste management with the 3R principle by Housewives in Medan City to reduce the volume of domestic waste.

SUBJECTS AND METHOD

1. Study Design
This was a cross-sectional study. The population was housewives who lived in 15 sub-districts in Medan, North Sumatra, Indonesia. 277 housewives were selected by purposive sampling. Housewives were divided into three categories based on age, generation X (who are over 40 years old), generation Y (who are between 25-40 years old), and generation Z (aged 18-24 years), according to Stewart et al. (2017).

2. Study Variables
The dependent variable was 3 R's Behaviour. The independent variables were knowledge and education about reduce, reuse, and recycle.

3. Operational Definition of Variables
Reduce behavior was an effort reducing waste activity include carrying a bag or pouch when shopping, preferring to use a handkerchief instead of using tissue, buying products that can be refilled or not buying single-use products.

Reuse behavior is reusing materials or materials, so they don't become waste, for example, using the empty side of the paper for writing, reusing used drink bottles, reusing plastic shopping bags from stores and so on.

Recycle behavior is the recycling process that includes collecting, separating, and processing waste with productive value, including utilizing and processing used tires into flower pots, processing leftover patchwork into blankets or foot mats, and processing organic waste into compost and so on. Knowledge was information received by housewives about 3 R action.

Education is the education level of housewives from elementary school to college divided into two categories elementary until middle is one category, then college to be higher education.

4. Study Instruments
Study instruments use a questionnaire that contains questions about respondent characteristics, 3R knowledge, the behavior of reducing, reusing and recycling. Statistical data analysis was conducted to see the frequency and percentage analysis and used Chi-Square.

5. Analysis Data
Univariate analysis was conducted to show the frequency distribution of sample characteristics. The bivariate analysis was carried out using chi-square test.

RESULTS

1. Univariate Analysis
Characteristics of housewives including age, education, monthly income, knowledge, and housewives'

actions in waste management with 3R principles can be explained in the Table 1.

Table 1 showed that the number of subjects with the highest percentage by age was the 26 -40 years group (46.6%), followed by the over 40 years old group (44.4%) then the below 25 years group (9%). The age range was 20 – 71 years. The largest percentage of low education level until the middle was (89.2%). The results of the analysis based on the monthly income obtained the largest percentage of income below the regional minimum wage in Medan city, Rp. 3,222,500 was 81.9%. The lowest income was IDR 1500,000 per month and the highest was IDR 10,000,000 per month. The largest percentage was found that 55.6% of housewives have poor knowledge about the application of the 3 Rs in Raging domestic waste, especially plastic. Knowledge with a very low percentage included: reduction of waste at source (42.8%), use of paper waste (36%), and waste segregation (33%). Only 20.9% of housewives carry out the 3R action. This could be due to the lack of knowledge about 3R waste management.

Table 1. Sample characteristics (categorical data)

	Frequency (n)	Percentage (%)
Age (years)		
> 40	123	44.4
26-40	129	46.6
< 25	25	9.0
Education		
Low education	247	89.2
Higher education	30	10.8
Monthly income		
< Regional Minimum Wage in Medan	227	81.9
≥ Regional Minimum Wage in Medan	50	18.1
Knowledge		
Good	123	44.4
Poor	154	55.6
3R action		
Yes	58	20.9
No	219	79.1

2. Bivariate Analysis

Table 2. Relationship between housewives education and knowledge with 3 R action

Variables	Categories	3R action		OR	95% CI	p
		Yes	No			
Education	Low education	54 (21.9%)	193 (78.1%)	0.55	0.18-1.64	0.397
	Higher education	4 (13,3%)	26 (86.7%)			
Knowledge	Good	19(15.4%)	104 (84.6%)	0.54	0.29-0.99	0.063
	Poor	39 (25.3%)	115 (74.7%)			

Table 2 showed as many as 44.4% of housewives had a good understanding of 3R domestic waste management, but only 13.3% of them housewives applied it well. Poor knowledge (OR= 0.54; 95% CI= 0.29 to 0.99; p= 0.063) and low education (OR= 0.55; 95% CI= 0.18 to 1.64; p= 0.39) reduced 3R behavior of domestic waste management in housewives.

3. Questionnaires Results
Reduce
The following were the 3R components, namely reduce, in Table 3 below

it can be seen that subjects have taken actions to reduce but the percentage was still low, reduce actions with the largest percentage carried out were using used towels and old bed linen which are cut into small pieces to be used as rags (97.8 %), avoiding the purchase of products or items that are less necessary (82.7%) and reducing the use of single-use materials (68.6%) while the minimal action taken is refusing plastic bags when shopping (39.7%).

Table 3. Reduce action by housewives in Medan city

Questions	Yes		No	
	n	%	N	%
Do you bring a shopping basket when going shopping?	179	64.6	98	35.4
Do you avoid using single-use materials?	190	68.6	87	31.4
Do you prefer to use your own container (foldable cup) when buying drinks?	178	64.3	99	35.7
Do you save and reuse the plastic containers of the items you buy?	166	59.9	111	40.1
Do you use unused/misprinted paper as notes?	160	57.8	117	42.2
Do you use old towels and old sheets that are cut into small pieces to be used as washcloths?	271	97.8	6	2.2
Do you avoid buying unnecessary products or items?	229	82.7	48	17.3
Do you prefer buying used clothes over buying new ones?	132	47.7	145	52.3
Do you prefer to use a handkerchief instead of a tissue?	177	63.9	100	36.1
Do you refuse to use plastic bags when shopping?	110	39.7	167	60.3

The results of further analysis obtained that a total of 140 subjects (50.5%) had implemented the reduced action, and 137 people (49.5%) had not implemented it. This was in line with the poor understanding of waste management. The role of the mother as a waste manager is very important, housewives often carry out the involvement of managing waste in the household. Women can carry out waste management activities to contribute social capital and human capabilities (Widiyanto et al., 2020). The results of Ahmadi M (2017) research conducted on housewives in Tehran found that

only 26% of the subjects participated in reducing at home. Previous studies have shown that almost a 20% reduction in waste generation can be made by choosing product packaging with the right design, durable with a larger volume (Ramachandra, 2011). The first option in the waste hierarchy was strict waste prevention by implementing waste reduction strategies at the source. This is the "avoid waste" prevention principle. Waste prevention is closely related to increasing waste production, methods of manufacturing design changes such as reducing packaging, and influencing consumers

to demand bigger products and less packaging (Bouanini, 2013).

Table 4. Reuse action by housewives in Medan city

Questions	Yes		No	
	n	%	N	%
Don't you use plastic straws when drinking?	173	62.5	104	37.5
Are you reducing the use of single-use materials?	183	66.1	94	39.9
Do you carry bags/pouches when shopping?	178	64.3	99	35.7
Do you use old tires and old plastic bottles for plant pots?	166	59.9	111	41.1
Do you avoid burning plastic waste?	147	53.1	130	46.9
Do you reuse plastic waste such as making crafts, or as liquid containers?	152	54.9	125	45.1
Do you have a Tumblr/non-disposable water bottle and take it with you when you travel?	251	90.6	26	9.4
Do you have non-disposable food boxes, cutlery (spoons, forks, straws)?	235	84.8	42	15.2
Do you use clean paper waste for packaging such as for wrapping kitchen spices, and so on.	182	65.7	95	34.3
Do you use trash cans and plastic containers for other functions (flower pots/makeup containers/accessories storage)?	161	58.1	116	41.9

Reuse

Based on Table 4, the reuse action with the highest percentage carried out by subjects was having a tumbler/non-disposable drinking bottle and taking it when travelling (90.6%), followed by having a food box, eating utensils (spoon, fork, straw). Disposables (84.8%), and reduce the use of single-use materials (66.1%). The results of the further analysis found 52.7% of subjects do reuse. The act of reuse was better than recycling because the item does not need to be reprocessed. In addition to environmental considerations, sensitive reuse schemes can have important social and cultural benefits (UNEP, 2003). Reuse can be done by repairing, selling, or donating these items to charities and community groups to reduce waste and reuse bottles (drinks) or plastic shopping bags from stores (Williams, 2005). Waste management activities at the reuse stage can be carried out through a process of selecting waste from each house, such as separating and classifying waste according to its type, making it easier for activities to manage and sort waste that can be sold directly or processed first. Examples of waste that can be sold directly include aqua bottles, paper from paper and cardboard to cardboard to be collected and then sold to existing stalls (Eprianti, et al, 2021).

Recycle

Table 5. Recycle action by housewives in Medan city

Questions	Yes		No	
	n	**%**	**n**	**%**
Do you collect plastic waste and turn plastic waste into souvenirs?	234	84.5	43	15.5
Do you process non-organic waste into useful products such as handmade goods or industrial products?	113	40.8	164	59.2
Do you make compost from household waste such as vegetable scraps?	116	41.9	161	58.1
Do you make crafts out of paper pulp?	58	20.9	219	79.1

Based on Table 5, it was found that the recycle action taken by subjects with a larger percentage was to collect waste from plastic materials, turning plastic waste into souvenirs 84.5%, this can be done because the plastic waste collected will be more valuable than being thrown into a landfill or burned and can produce money. The act of recycling that has the least percentage is making skills from the paper pulp (20.9%). Study subjects who do recycling are 60.3%. Economic needs that can be met become a motivation for housewives to recycle. Factors related to economic needs are one of the factors that motivate housewives to recycle (Buana, 2016). Housewives are aware that by doing recycling, reusing waste after undergoing a processing process can reduce waste from generation sources, efforts are needed to reduce waste from upstream to downstream, one of which was recycling (Dwiyanto, 2011).

DISCUSSION

Among 277 housewives the highest percentage by age was 46,6%, and low education was 89.2 %. As many as 44.4% of housewives had a good understanding of 3R domestic waste management, but only 20.9% of them housewives applied it well. Only 13.3% of housewives with high education carry out waste management 3R.

Waste management with the 3R principle by housewives is very minimal. This happens due to low education so it affects knowledge. The application of 3 R waste management can be improved by providing information and education to them.

Setyawati's research (2013) in Keradenan village found that around 56.8% of respondents had poor knowledge of 3R waste management among housewives. Poor knowledge about waste was influenced by lacking information and community outreach activities. A high level of understanding was needed to implement the 3R movement. An understanding of the 3R waste management in Sukaluyu Village shows that 85% of the community has good knowledge of waste management. However, some thought that waste management should be carried out by the local government (Lia et al., 2021).

Chi-square test showed no significant relationship between the education level of housewives (p= 0.397) and knowledge (p= 0.063) with waste management 3 R behavior. This means that higher education does not guarantee that housewives implement

the 3R's waste management properly. The following is a breakdown of the knowledge and actions of housewives in implementing the 3Rs. Housewife's knowledge with a very low percentage included: reduction of waste at source (42.8%), use of paper waste (36%), and waste segregation (33%).

Knowledge did not always contribute positively to changes in one's behavior so good knowledge does not necessarily guarantee good behavior (Azwar, 2011). Higher education did not guarantee good waste management behavior. This was due to a lack of awareness of waste management, lazy and unwillingness to be bothered with waste problems (Issabela et al., 2020). Hikmah and Ruing's research (2020) found that waste from people's homes is piling up, awareness to reuse used goods that can be used was still low, and people were still not trying to reduce waste and recycle waste so that it can be used.

The result shows that housewives in Medan city who carry out reduce actions as many as 140 people (50.5%), reuse actions as many as 146 people (52.7%), carry out recycling actions as many as 167 people (60.3%), from 277 housewives who did the 3R as many as 58 people (20.9%). Reducing actions that were commonly taken are using used towels and old bed linen, which are cut into small pieces to be used as washcloths, avoiding the purchase of unnecessary items, and reducing the use of single-use materials. Common reuse actions were to have a non-disposable tumbler/drink bottle taken when traveling while Recycle was commonly used to collect

waste from plastic materials to turn it into souvenirs.

The inhibiting factor was the more dominant factor owned by housewives to reduce, reuse, and recycle, especially those related to the lack of awareness and knowledge to carry out 3Rs, which causes 3R-based waste management cannot be carried out properly (Buana, 2016).

This study concluded that 44.4% of housewives have good knowledge of 3Rs waste management, but only 20.9% do it well, amount 13.3% from high education apply good waste management. Chi-square test showed that there was no significant relationship between the education level of housewives (p= 0.397) and knowledge (p= 0.063) with waste management 3 R behavior.

It is necessary to carry out mentoring activities for housewives to increase knowledge and skills in 3R waste management at the household level establish cross-sectoral collaboration in community empowerment, especially housewives in waste management. The local government can provide rewards and punishments for villages that implement the 3 Rs.

CONFLICT OF INTEREST

We have no conflict of interest to declare. We attest to the fact that all Authors listed on the title page have contributed significantly to the work, have read the manuscript, attest to the validity and legitimacy of the data and

its interpretation, and agree to its submission.

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