Effects of mentoring housewives assistance on the ability to sort waste in sub-district of Panakukkang, Makassar

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Abstract. Waste sorting is separating one type of waste from another. In 2016, the amount of waste in Makassar reached 4,183.41 m³/day, while the amount handled was 3,962.63 m³/day. This study was conducted in 53 families of Sinrijala Village, Panakukkang District, Makassar with 48 housewives in order to evaluate the effects of mentoring housewives on the ability to sort waste using quasi-experimental research with a pretest-posttest non-randomized control group design. The results before mentoring showed that, in the experimental group, there was one respondent (4.20%) who sorted waste, while 23 respondents (95.80%) did not sort the waste. In the control group, there were two housewives (8.30%) who sorted the waste in contrast to 22 respondents (91.70%) who had never sorted the waste before. After being guided, 10 respondents of the experiment group (41.70%) sorted the waste. In the control group, two respondents (8.30%) sorted the waste. Statistical test obtained Z = -3.000 and p-value of 0.003. Therefore, it is concluded that there is an effect of mentoring on waste sorting. For further studies, it is recommended to study the practice of recycling waste into goods of economic value.

1. Introduction

The World Health Organization says that waste is something that is not used, not liked, or something that is thrown away that comes from human activities and does not happen by itself [1]. Garbage is a direct consequence of life; therefore, it can be said that garbage has arisen from human life. The emergence of waste along with human activities, starting from the business of taking natural resources as raw materials, continuing to materials that are ready for energy, semi-finished materials for goods and service activities in consuming these goods to achieve the welfare of human life [2]. Garbage is one of the biggest problems in urban areas in Indonesia [3]. Urban areas are one of the areas that are vulnerable to environmental problems. The high population and dense community settlements make urban areas require good urban planning management. One of the environmental problems in urban areas is waste. A large number of residents causes the high generation of waste generated every day [3].

According to Law Number 18 of 2008 concerning waste management, it is explained that waste is a national problem therefore its processing needs to be carried out in a comprehensive and integrated manner from upstream to downstream in order to provide economic benefits, health for the community, and safe environment, and which can also change people's behavior (Ministry of Environment, 2008) [4].

According to Jembeck (2016), Indonesia is ranked second in the world for the marine plastic waste producer, reaching 187.2 million tons after China, which reached 262.9 million tons. The Philippines
ranks the third, which produces marine plastic waste reaching 83.4 million tonnes, followed by Vietnam, which reaches 55.9 million tonnes, and Sri Lanka, which reaches 14.6 million tonnes per year [5].

Indonesia is the fourth most populous country in the world with 255,993,674 people [6]. The large population with various activities has an impact on increasing waste piles. Along with population growth, changes in consumption patterns and people’s lifestyles also increase the number of waste piles, types, and diversity of characteristics of waste. Until 2015, the number of increased waste piles in Indonesia has reached 175,000 tonnes/day, or the equivalent of 64 million tonnes/year [7].

According to the data from the Regional Environmental Agency of South Sulawesi Province, the amount of waste generation is 4,423,013 kg/day with a population of 8,342,047 people [8]. According to the data from Department of Parks and Sanitation of Makassar City, 2016, Makassar is the tenth-largest city in Indonesia according to its population, which is 1,449,401 people (Indonesian Population Census Data, 2016) [9]. In 2016, the amount of waste produced in the city of Makassar reached 4,183.41 m³ / day, while the amount of waste handled was 3,962.63 m³ / day. In the fruit season, the higher volume of waste can be doubled. The largest amount of waste was contributed by high-population areas such as Rappocini District of 460.69 m³, Panakkukang District of 403.13 m³, and Manggala District of 312.52 m³. From these data, it can be seen that the volume of waste entering the Makassar City landfills final disposal site (TPA) is still quite large, far from the target of reducing waste which is one of the total waste production per day [10].

Households are the largest waste producer at 84%, in addition to institutional waste producers (hospitals, offices, and other agencies). Most of the household waste is organic waste, such as kitchen waste, flour residue, vegetable scraps, fruit peels, and leaves. One of the efforts to solve the waste problem is to carry out waste management which is usually carried out with the 3R principle (reduce, reuse and recycle). The 3R principle is the main principle of managing waste from its source, through various steps that can reduce the amount of waste disposed of in TPA [11]. The main step is sorting it from the source. According to Aswadi (2011) [12], the key to success and waste management lies in sorting it out. Without segregation, waste processing becomes difficult, expensive, and has a high risk of polluting the environment and endangering health. Sorting is separating one type of waste from another. Minimum separation can manage two types of waste such as organic and inorganic waste [13].

Waste segregation is more effective at the level of the source of waste generation (e.g., household) because the components of waste at the source level, especially for inorganic types of waste, still possess pure properties or have not been mixed and contaminated with other waste. The composition of the waste tends to be homogeneous and it also makes it easier to collect certain types of waste needed for recycling, with the goods in good condition. At the final stage in the waste management system, this waste sorting activity can also help reduce the volume of waste that must be transported to the TPA [14].

The waste management system through sorting is also contained in government regulation number 81 of 2012 concerning the management of sorting household waste. Article 17 (1) states that the sorting is done by everyone at the source of the waste [15]. The results of research conducted by Bambang (2011) stated that Community-Based Household Waste Management in Sambiroto Semarang, has been successfully implemented with the 3R principle (Reduce, Reuse, Recycle) through the waste sorting process. The applied model is able to reduce the volume of waste disposed of by up to 70 percent [16].

According to the information obtained from the initial data collection in Sinrijala Village, Panakkukang District, there were 5 Hamlet and 15 neighbourhood with a population of 4,221 people at the end of January 2018 with a male population of 1,999 and a female population of 2,222. Based on the results of the initial survey in Hamlet 002 Neighbourhood 001, there were 53 households with 48 housewives, who claimed they had never carried out waste sorting. Due to the fact that the largest source of waste generation was on a household scale, it was necessary to research the influence assisting housewives on the ability to sort waste in the Panakkukang District, Makassar City.
2. Materials and Methods
This research is quasi-experimental research with a non-randomized control group pretest-posttest design. The research was conducted from June 29, 2018, to July 28, 2018. The research location was in Neighbourhood 001 Hamlet 002 Sinrijala Village, Panakkukang District, Makassar City. The population size of the study was 48 people consisting of RT 001 and RW 002, Sinrijala Village. The sample in this study was all population of housewives, which were divided into an experimental group of 24 people, and a control group of 24 people. The sampling technique used was saturated sampling[17]. Primary data was obtained by conducting field observations by comparing data between the control group and the experimental group [17].

2.1 Research procedure:
   a. On the first and second day, the delivery of the aims and objectives of mentoring to housewives and providing an agreement sheet as a form of agreement between the assistant and the housewife before assistance was carried out. The researcher himself conducted scheduling of visits, managing the companion of this study, and taking measurements by giving a pre-test questionnaire whether housewives do the sorting before mentoring.
   b. From the third to the seventh day, the researcher provided materials for sorting waste to housewives.
   c. In the second week (8th day – 14th day), the researcher conducted assistance in the practice of sorting waste twice a week.
   d. In the third week (15th day – 21st day), housewives practiced independently how to sort waste.
   e. In the fourth week, the evaluation of the results of housewife assistance on sorting waste was performed.

3. Results and Discussion
3.1 Characteristics of Respondents
Table 1 shows that the majority of the experimental group were in the 41-50 years old group; ten persons (41.70%), while the fewest were in the 20-30 years old group, with three persons (12.50%). In the control group, most respondents were aged 31-40 years and ≥ 51 years, with eight persons each (33.30%), and the least respondents aged 20-30 years old and 41-50 years, with four persons each (16.70%). The highest level of education is high school graduation in the experimental group as many as 11 persons (45.80%), in the control group as ten persons (41.70%), and the least number in the experimental group is not going to school as many as two persons (8.30%), the control has at least one person (4.20%) graduated from higher education. The maximum length of stay in the studied area is ≥ 21 years in the experimental group as many as 17 persons (70.80%) and the control group as many as 19 persons (79.28%), and the minimum length of stay is 11-20 years in both groups with one person (4.20%). The majority of the working type was housewives with 23 persons (95.80%) in the experimental group, and with 20 persons (83.30%) the control group, whereas, the fewest was the civil servant with one person each in the experimental group and in the control group (4.20%). The highest number of family members was 4-6 persons; 12 persons (50.00%) in the experimental group and 13 persons in the control group (54.20%) and the smallest number in the group with ≥ 7 persons; with two persons each in the experiment group and the control group (8.30%).

| Variables | Experiment group | Control group |
|-----------|-----------------|---------------|
| n         | %               | n             | %               |
| Age (Year) |                 |               |                 |
| 20-30     | 3               | 4             | 16.70           |
| 31-40     | 6               | 8             | 33.30           |
| 41-50     | 10              | 4             | 16.70           |
3.2 Distribution of housewives' waste sorting practice before and after assistance

Table 2 shows the practice of sorting housewives' waste before and after mentoring in the experimental group who did not sort waste before mentoring as many as 23 respondents (95.80%), and after mentoring who did not sort waste were 14 respondents (58.30%).

Table 2. Distribution of housewives' waste sorting practice before and after assistance in Neighbourhood 001 Hamlet 002 Sinrijala Village, Panakukkang District, Makassar City.

| Sample Group   | Pretest Sorting | Post-test Sorting | Amount   |
|----------------|-----------------|-------------------|----------|
|                | n   | %    | n   | %    | n   | %    | n   | %    |       |
| Experiment     |     |      |     |      |     |      |     |      |       |
|                |     |      |     |      |     |      |     |      |       |
| Control        |     |      |     |      |     |      |     |      |       |
|                |     |      |     |      |     |      |     |      |       |
| Amount         |     |      |     |      |     |      |     |      |       |

Source: Primary Data

Regarding the practice of sorting housewives' waste before / pre-test and after / post-test, there were 22 respondents (91.70%) who did not sort the waste before / pre-test and after / post-test, it remained or did not change due to the absence of assistance or treatment.

3.2.1 The Practice of Sorting Housewives' Waste Before Assistance. The mother in the household is the person who has significant involvement in managing the house. Mother as a role model as well as a teacher in different stages of a child's life is expected to be able to teach and provide necessary explanation or education such as the importance of hygiene, cleaning of household and environment...
such as sorting waste among matters. Through the role of housewives, it is hoped that all elements of the household can be involved to be able to participate in sorting waste.

Waste sorting is waste grouping at its source based on the type of waste, namely organic and inorganic. Without segregation, waste processing becomes difficult, expensive, and has a high risk of polluting the environment and endangering health.

The results of the research in Neighbourhood 001 Hamlet 002 Sinrijala Village Panakukkang District, Makassar City before the mentoring showed that in the experiment group, one respondent (4.20%) sorted the waste, and 23 respondents (95.80%) did not sort the waste. In the control group, there were 2 respondents (8.30%) who sorted the waste, and 22 respondents (91.70%) did not sort the waste. One of the causes is the lack of knowledge and information of respondents about sorting waste, this is following the initial data before assistance. Most of the respondents have not sorted household waste because they have never heard counseling. This is in line with the research of Sri Pangesti Dewi (2022) [18] in Cetan Village, Ceper District, Klaten Regency, specifically, the extension of the demonstration method affects the actions of mothers in household waste management with p-value = 0.017 [18]. Factors that influence the practice of sorting housewives' waste before assistance are age, education level, length of stay, occupation, and the number of family members. In addition, a stimulus is given in the form of facilities to be willing to be a waste sorter.

The results of the interview showed that regarding the "does the mother sort organic and inorganic waste?" question; respondents who did not sort the waste in the experimental group were 23 respondents (95.80%) with reasons; “it is troublesome” as many as 12 respondents (50.00%), “do not have two types of trash cans” with 9 respondents (37.50%), “remote disposal locations and are not used to” one respondent (4.20%). In the control group, as many as 22 respondents did not sort the waste (91.7%) with reasons; “it is troublesome” as many as 19 respondents (79.20%), “do not have two types of trash cans” for one respondent (4.20%), “are not useful for personal use and do not have the budget to provide separated trash cans” for one respondent (4.20%).

The number of respondents who sorted waste on the grounds of helping environmental preservation was one respondent (4.20%) in the experimental group, and two respondents (8.30%) in the control group. They understand that the waste problem can cause environmental damage that leads to a decrease in health quality, but they hope that all components of society can do it simultaneously so that a significant clean environment is achieved.

Regarding the availability of facilities in the research location, all respondents answered that they did not get sorted trash facilities in the experimental group as many as 24 respondents (100.00%) and the control group as many as 24 (100.00%).

**3.2.2 Housewife Waste Sorting Practices After Assistance.** Assistance is an activity that is carried out and can mean coaching, teaching, the direction in groups that have the connotation of mastering and controlling. The results of the research in RT 001 RW 002 Sinrijala Village, Panakukkang District, Makassar City after mentoring were that those who sorted the waste from the experimental group were 10 respondents (41.70%), the control group were two respondents (8.30%) and those who did not sort the waste were 14 respondents (58.30%) in the experimental group and 22 respondents (91.70%) in the control group.

According to the results of the interview, the answers to the question "does the mother sort organic and inorganic waste?" showed that the respondents who did not sort the waste in the experimental group were 14 respondents (58.30%), with reasons; “troublesome”. In the control group as many as 22 respondents (91.70%) with reasons; “troublesome” as many as 17 respondents (70.80%), “do not have two types of places and are not useful for personal trash” two respondents (8.30%), “do not have the budget to provide separated trash cans” as one respondent (4.20%).

The number of respondents who sorted waste in the experimental group were 10 respondents (41.70%) with reasons; “help to conserve the environment” as many as one respondent (4.20%) and “benefits for yourself” nine respondents (37.50%). In the control group as many as two respondents (8.30%) with reasons; “help to conserve the environment” and “benefits for yourself” as one respondent
each (4.20%). In the experimental group, 24 (100.0%) answered yes to the category “to get a trash can facility”. In the control group, 24 (100.0%) answered that they did not get trash cans.

This is in line with the research of Dewa Ayu Posmaningsih (2016) in East Denpasar, which together with knowledge, attitudes, availability of facilities, local institutions, and economic benefits, have a contribution value (65.10%) to community participation in waste management [19].

Community participation in the waste management of the Hanjuang KSM program in The Margaluyu environment, Cicurug Village, is running according to the plan from the previous stage planning of waste management activities and implementation stages of management activities waste by empowering the community in the KSM program waste management Hanjuang. The results of community participation can be seen from the awareness of citizens to carry out waste sorting business, and in the manufacture of recycled products recycle from trash [20].

Armadi’s research, (2021) said that community participation in Denpasar City is quite effective in waste management activities through composting and 3R (reuse, reduce and recycle) [21]. This is in line with Wardi’s research in the Gianyar, Bandung, and Denpasar areas which suggests strategies for implementing environmental (waste) management regulations effectively through reward (for those who merit) and Punishment (for those who violate) [22].

3.3 The Effect of Housewife Assistance on Waste Sorting

Table 3 shows that based on the results of the Wilcoxon signed-rank test calculation, the calculated Z value is -3.000, while the Z table value is obtained from the Z table with α 5% (0.05) Z table value 0.0011 with p-value (Asymp. Sig 2 tailed) amounting to 0.003 which is less than 0.05 so that the hypothesis decision has an effect of housewife assistance on the ability to sort.

Table 3. The Effect of Housewife Assistance in the Experiment Group on Waste Sorting in Neighbourhood 001 Hamlet 002 Sinrijala Village, Panakukkang District, Makassar City.

| Test Statistics                          | Post test Experiment - Pre test Experiment |
|------------------------------------------|-------------------------------------------|
| Z                                        | -3.000b                                   |
| Asymp. Sig. (2-tailed)                   | .003                                      |

Mann Whitney U test is a nonparametric test used to determine the difference in the median of two independent or independent groups if the dependent variable data scale is ordinal or interval/ratio but not normally distributed [17]. This test is an alternative test of the independent T-test.

Based on the results of the Mann-Whitney calculation between the post-experiment and control, there is a p-value of 0.008 less than 0.05, therefore there is a significant difference between post-experiment and control. This means that the experimental group that was given treatment had a greater value than the untreated control. In this case, the assistance carried out in the experimental group can change the behavior of respondents from those who are not given treatment/control (Table 4).

Table 4. The Effect of Assistance on Waste Sorting in Neighbourhood 001 Hamlet 002 Sinrijala Village, Panakukkang District, Makassar City.

| Test Statistics | Result |
|-----------------|--------|
|                 |        |
The practical assistance program for sorting waste by extension methods and the practice of sorting organic and inorganic waste through individual or group approaches can influence the behavior of household wives sorting. Counseling and the practice of sorting organic and inorganic waste were carried out routinely and continuously for nine visits to each target, both individually and in groups. According to Muljono (2007) [23], counseling will change people's awareness and behavior (knowledge, attitudes, and skills) in a better direction and can achieve a more prosperous life. The results of the research by Sri Pangesti, et al (2014) show that, in general, extension with the demonstration method affects the increase in knowledge and actions in managing waste (p = 0.037) [24].

The theory of Ebbinghaus and Boreas in Prasetyaningsih (2005) states that the power to remember of humans is decreasing over time, which in the end humans will experience forgetfulness [25]. The frequency of home visits and counseling carried out by researchers after mentoring decreased in the second week to twice visits, which caused the response of housewives to the materials that had been given during mentoring also gradually decreased. This phenomenon shows that the extension process and the practice of sorting organic and inorganic waste after mentoring, especially for targeted housewives, must be carried out continuously by the local government.

The results of research in Neighbourhood 001 Hamlet 002 Sinrijala Village, Panakukkang District, Makassar City, showed that, in the experimental group, there was an effect of housewives' assistance on waste sorting because of the treatment given such as counseling, practicing sorting waste, and providing waste sorting facilities, before assisting housewives who sort 1 respondent (4.2%) and 9 respondents (37.5%) after mentoring. In this study, although there was an effect of housewife assistance on waste sorting, there were still many respondents who did not sort the waste. In details, 36 respondents (75.00%) did not sort the waste for reasons; “troublesome” as many as 31 respondents (64.58%), “not personally use and do not have two types of trash cans” by four respondents (4.20%), “do not have the budget to provide” with one respondent (2.10%) segregated trash cans, and those who sorted the waste were 12 respondents (25.00%) with reasons; “benefits for yourself” 10 respondents (21.00%), “helping to preserve the environment” two respondents (4.16%). Overall, the answers were more dominant, the respondents answered “troublesome”; this has a significant effect on being an important factor for respondents in deciding not to sort or sort the waste. This follows the opinion of Vincent (1997) which affects the perception that humans tend to reject offers that are not following what they expect [26].

4. Conclusions
Based on the results of research on the effect of housewives' shelter on the ability to sort waste in the Panakukkang District of Makassar city, it can be concluded as follows: before mentoring, it showed that there was only one respondent (4.20%) who sorted the waste in the experimental group whereas 23 respondents (95.80%) did not sort the waste, however, after conducting assistance sorting waste in the experimental group, as many as 10 respondents (41.70%) sorted the waste whereas 14 respondents (58.30%) still did not sort the waste. Therefore, there is an effect of housewife assistance on waste sorting. For further studies, it is expected to research the practice of recycling waste into goods of economic value.

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