

# The Effect of Knowledge about Waste Management and Gender on Environmental Sanitation Behaviour

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**Abstract:** The objective of this research was to find out whether knowledge about waste management and gender on environmental sanitation behaviour. The method used in this study was an Ex Post Facto research with 2 x 2 factorial design with a random sample technique of 60 citizens at Muara Angke, North Jakarta, Indonesia. Data were analyzed by applying two way ANOVA and Tukey test. The research results were: 1) there was significant differences on environmental sanitation behaviour between knowledge about waste management who were the high and those who were the low; 2) there was significant differences on environmental sanitation behaviour between those who have an male and an female; 3) for female, environmental sanitation behaviour were more positive with the high knowledge about waste management compared to the low knowledge about waste management; 4) for male environmental sanitation behaviour were more positive with low knowledge about waste management compared to the high knowledge about waste management; 5) there was significant interaction effect between knowledge about waste management and gender on environmental sanitation behaviour. To improve the environmental sanitation behaviour, there was a need to consider the knowledge about waste management and gender factors

**Index Terms:** environmental sanitation behavior, gender, knowledge about waste management, waste

## I. INTRODUCTION

A proper sanitation system has become an indicator of development in a country, including Indonesia. However, the sanitation facilities that exist in Indonesia nowadays is not adequate to fulfill the needs of its citizen, which keep growing in number every second. As a result, diseases caused by virus and bacteria spread around easily in Indonesia. In short, it can be stated that poor sanitation system will give negative effect to people's health condition. This condition also commonly found in developing countries. Inadequate garbage disposal system may cause environmental and health problems [1].

There are some factors that, either directly or not, can become the factors that increase the chance of disease

spreading around. The first factor is related to the unhealthy habits, such as littering, not wash their hands with soap and water, and so on. The second factor is related to the unavailability of clean water facilities and healthy toilets. If those factors happened in an area for some time, then diseases will easily spread around. Other factors that are suspected to be related to the environment sanitation is the citizen's knowledge about garbage management and gender. Also, economy become a critical factor for policymakers in developing effective and relevant strategies [2].

Muara Angke is located in Kelurahan Kapuk Muara, Kecamatan Penjaringan, Kotamadya Jakarta Utara. According to a survey conducted by Puskesmas Muara Angke, the behaviour of its people related to healthy life is not good and its sanitation is still inadequate. Based on the writer's initial observation, the management of wastewater is inadequate; construction of toilets and septic tanks which are dangerously close to water pumps; the unsanitary habit of locals (such as did not wash their hand with water and soap before and after eating; defecating on rivers, fields or ponds and littering around) and the low rate of availability of household clean water facilities. A research showed that dangerous bacteria can grow easily in toilets. An unclean toilet can become the source of disease spread around households. Another thing that is important is to increase people's knowledge related to wastewater disposal [3]. Increasing income and population are the cause of rapid changes in consumption pattern in urban areas [4]. Due to this condition, there are several problems related to social, economic and ecology problem that already occurred (such as the decrease of supporting capabilities of cities in Indonesia and the inefficiency of resources usage in Indonesia) which caused the level of life of Indonesian people to be low in general [5].

Environment sanitation is closely related to age, gender, education level and income of an individual [6]. Women are social actors who are always associated with roles and responsibilities in the domestic sector, are not excluded from the effort to provide access to clean water and sanitation. It is estimated that women in developing countries travel 6 km per day on average to collect water due to the limited acces

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[7]. Based on the researches mentioned earlier, the researcher was interested to conduct a research to investigate the influence of knowledge about garbage management and gender to the environment sanitation behavior of people of Muara Angke, Kelurahan Kapuk Muara, Kecamatan Penjaringan, Kotamadya Jakarta Utara.

The research questions of this research are: a) Is there any difference in environment sanitation behaviour between people who have sufficient level of knowledge related to garbage management and those who have not?; b) Is there any difference in environment sanitation behaviour between men and women in gender perspective?; c) For women, is there any positive influence towards their environment sanitation behaviour if they have sufficient level of knowledge about garbage management?; d) For men, is there any negative influence towards their environment sanitation behaviour if they have low level of knowledge about garbage management?; and e) Is there any influence of interaction between knowledge about garbage management and gender towards environment sanitation? The aim of this research is to obtain information about the influence of interaction between knowledge about garbage management and gender towards environment sanitation behaviour.

## II. METHODOLOGY

### A. Environmental Sanitation Behavior

Environment sanitation may be defined as the health status of an environment which include houses, waste disposal system, clean water providing system and so on. Environmental sanitation behavior is a health behaviour of a person or group which emerges as an effort to prevent diseases. This type of behaviour will emerge through the management of the environment. Environment sanitation behavior not only affecting human health, but also important to keep the balance of ecosystem, socio-economy and aesthetic state of a housing complex [8]. Another definition of environment sanitation was proposed by WHO [9] which stated that environment sanitation is the efforts to control every factor of human physical environment which may cause harm to physical development, health and quality of life of human.

One factor that may influence the sustainable growth in a society is the environment sanitation, which is closely related to economy growth, social development and the society's level of health [10].

Environment sanitation behaviour may be defined as the activities of members in a society which are based on knowledge, behaviour and preventive actions in improving basic standards of environment condition which include clean water facilities, household toilets, wastewater disposal facilities and garbage management facilities.

### B. Knowledge About Waste Management

Knowledge may be divided into four types of knowledge; factual (based on actual facts), conceptual (related to concepts), procedural (related to application of knowledge)

and metacognitive [11]. The characteristic of factual knowledge including parts of knowledge which must be acquired by people to solve problems. Procedural knowledge is more related to knowledge about steps to do or finish things. Metacognitive knowledge is more related to the general cognitive about one's self, including strategic knowledge.

Waste management is the efforts to maintain cleanliness of an environment by processing waste which are done by people and its government or a management [12]. Waste management can be defined as activities which include gathering, transporting, processing, recycling or disposing waste material [13]

In general, activities in this process including garbage control, garbage gathering, transporting and disposal [14]. Garbage management can be defined as a systematic and continuous activity which include garbage reduction and management.

Concluded that knowledge about garbage management can be defined as everything that an individual knows in relation to terms, specification, classification, principles, generalization, theory, structures, specific knowledge methodology and criteria related to controlling the number of garbage through dividing, gathering, transporting and processing.

### C. Gender

There are several substances of gender which are easy to understand. First, gender to differentiate role and rights and obligation between man and woman in a society. Second, gender can be understood as an analytical tool used to see cases in order to obtain more understanding related to cause-effect relationship which may create a new reality which related to man and woman [15].

Gender is a social or cultural construction in an individual who was born either as a man or a woman. Gender role is influenced by age, social class, ethnicity, religion, economy, geography and politic factors in a society [16].

The concept of gender can be defined as a social perception which sticks to man and woman which constructed both socially and culturally. An individual, regardless to his/her sexual type, consist of feelings, behaviours and attitudes which related to himself/herself [17]. Gender is created and recreated through social interaction that takes place in dynamic cultural and institutional context [18].

Based on the literature mentioned above, it may be concluded that gender can be defined as division of role, status and duty between man and woman which established based on traits of man and woman, which itself established based on norms, customs, religions and habits.

### D. Method

This research was conducted with quantitative approach through survey method and ex post facto technique, with 2x2 design. In this research, there were three variables which are tested, including environment sanitation behavior as the



dependent variable (Y). There were several independent variables, including (1) knowledge about garbage management (A), which consist of higher level (A<sub>1</sub>) and lower level (A<sub>2</sub>); gender, which consist of woman (B<sub>1</sub>) and man (B<sub>2</sub>) [19]. The design of this research is illustrated in Table I.

The sampling was done through simple random sampling. The amount of sample is 60, which considered adequate to represent the total population. The sample consisted of 30 women and 30 men. The researcher spread questionnaire which was related to the knowledge about garbage management. The results were arranged in ranking system. Next, based on the scores, two groups were established; upper and lower level.

**Table 1:** Research Design

Knowledge about Garbage Management(A)	
High ( A <sub>1</sub> )	Low ( A <sub>2</sub> )
B <sub>1</sub> A <sub>1</sub>	B <sub>2</sub> A <sub>1</sub>
B <sub>1</sub> A <sub>2</sub>	B <sub>2</sub> A <sub>2</sub>

On the next step, a sampling process was conducted in order to determine groups based on its members' knowledge about garbage management. The results showed that there are 25% of the sample which belong to the group with high level of knowledge related to garbage management and 25% of the sample which belong to the group with low level of knowledge about garbage management,

Based on those proportion, the locals were then given test about environment sanitation behaviour. With the proportion of 25%, 15 women were picked and considered as the women group with high level of knowledge about garbage management (B<sub>1</sub>A<sub>1</sub>), and 15 other women were picked and considered as the women group with low level of knowledge about garbage management (B<sub>1</sub>A<sub>2</sub>). For men, there were 15 of them which were chosen and considered as men group with high level of knowledge about garbage management (B<sub>2</sub>A<sub>1</sub>), and 15 others which were chosen and considered as men group with low level of knowledge about garbage management (B<sub>2</sub>A<sub>2</sub>).

The data was analyzed using descriptive statistics and inference. Regression analysis was also conducted. Before the analysis stage, there were some test that conducted, which are variant homogeneity and normality test. The hypotheses were tested using Two-way ANOVA 2x2 and Tukey test.

### III. RESULTS AND DISCUSSION

The requirements for hypotheses test were related to the basic assumptions in using parameter statistics. The normality test of the data was conducted based on the data of the sample which was measured using every research variable. The hypotheses which were tested including:

H<sub>0</sub> : Data was distributed normally

H<sub>1</sub> : Data was not distributed normally

The data can be considered as normal if the value of L<sub>count</sub> was smaller compared to L<sub>table</sub> in  $\alpha = 0.05$ . The normality test of the data was conducted using Microsoft Excel. The results

of normality test can be summarized in Table II.

**Table 2:** Results of normality test of A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub> and B<sub>2</sub>

Sample	L <sub>count</sub>	L <sub>table</sub>	Conclusion
A <sub>1</sub>	0.079	0.162	The data is normally distributed
A <sub>2</sub>	0.078	0.162	
B <sub>1</sub>	0.123	0.162	
B <sub>2</sub>	0.064	0.162	

Based on the calculation, it may be concluded that the value of A<sub>1</sub> = 0.079; A<sub>2</sub> = 0.078; B<sub>1</sub> = 0.123 and B<sub>2</sub> = 0.064. As a result, it may be concluded that the group A<sub>1</sub>, A<sub>2</sub>, B<sub>1</sub> and B<sub>2</sub> which was tested can be considered as data that distributed normally. This can be observed from the value of L<sub>count</sub> which was smaller compared to L<sub>table</sub> for every group of data.

On the next step, it was important to find out the significance value of B<sub>1</sub>A<sub>1</sub>, B<sub>1</sub>A<sub>2</sub>, B<sub>2</sub>A<sub>1</sub> and B<sub>2</sub>A<sub>2</sub> data using Liliefors test. The results of the test are summarized in Table III. Those results showed that the normality test of every group of data came from population that distributed normally.

**Table 3:** Results of normality test of B<sub>1</sub>A<sub>1</sub>, B<sub>1</sub>A<sub>2</sub>, B<sub>2</sub>A<sub>1</sub> and B<sub>2</sub>A<sub>2</sub>

Sample	L <sub>count</sub>	L <sub>table</sub>	Conclusion
B <sub>1</sub> A <sub>1</sub>	0.103	0.229	The data is normally distributed
B <sub>1</sub> A <sub>2</sub>	0.091	0.229	
B <sub>2</sub> A <sub>1</sub>	0.112	0.229	
B <sub>2</sub> A <sub>2</sub>	0.096	0.229	

Variance homogeneity test of the sample data which was measured based on every research variable was conducted in several stages. The hypotheses which were tested are:

H<sub>0</sub> : variance in every group is homogenous; H<sub>1</sub> : variance in every group is heterogeneous.

The homogeneity test was conducted using Bartlett test. The results of the test of influence of knowledge about garbage and gender towards environment sanitation behaviour which was conducted using Two-way ANOVA can be seen in Table IV. Based on the test on first hypotheses, it may be concluded that H<sub>0</sub> "there is a difference of environment sanitation behavior between locals who have high level of knowledge about garbage management compared to those who do not" can be rejected.

This is based on the results of the calculation which showed that the value of F<sub>count</sub> = 44.30 while the value of F<sub>table</sub> = 4.00 in  $\alpha = 0.05$  (if F<sub>count</sub> is higher than F<sub>table</sub>, the hypotheses should be rejected). The rejection means that there is a significant difference in environment sanitation behaviour between locals who have high level of knowledge about garbage management compared to those who do not.

This match the results of research showed that environment sanitation is the basic process which become the key of health intervention of the society, which is important. Although there awareness level of environment sanitation among participants is high, the level of knowledge about environment sanitation, attitudes and practice of environment sanitation is still



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low [20].

**Table 4:** Two-way ANOVA

Source Variance	df	SS	ASS	F <sub>count</sub>	F <sub>table in α</sub>	
					0.05	0.01
Inter-group	3	1,734.03	578.01	19.6	2.77	4.15
Intra-group	56	1,651.9	29.49			
Effect of Knowledge (A)	1	1,306.66	1,306.6	44.3	4.00	7.08
Effect of Gender (B)	1	266.95	266.95	9.05		
Interaction AxB	1	166.64	166.64	5.65		
Total	59	3,591.65				

df : degree of freedom

SS : Sum of Squares

ASS : Average of Sum of Squares

Furthermore, knowledge, attitudes, awareness level and behavior of students related to solid waste management can be considered as average. As a result, it is important to encourage and raise awareness about the importance of garbage management on campus among students in order to promote sustainable environment [21]

The result of the test on second hypotheses showed that the H<sub>0</sub> “there is a difference in environment sanitation between men and women”. With the value of F<sub>count</sub> = 9.05, while the value of F<sub>table</sub> = 4.00 with α = 0.05 (If F<sub>count</sub> is higher than F<sub>table</sub>, the hypotheses should be rejected). It means that there is a significant difference in environment sanitation behavior between men and women. The results of research showed that inadequate urban sanitation may lead to low level of woman health in slums. The negative effects including contagious diseases, violence, malnutrition and poverty [22].

The fifth hypotheses which was tested in this research was: “there are some influence of interaction between garbage management and gender towards environment sanitation management”. The value of p<sub>count</sub> = 5.65, while the value of p<sub>table</sub> = 4.00. It means that there are some influence of interaction between knowledge about garbage management and gender towards environment sanitation management. This condition matched the results of O'Reilly's research [23], which showed that gender analysis is very important in order to get more understanding about the sanitation needs of the safety condition of toilets for women and children. The results of a research conducted by Lawrence that sanitation behavior could be encouraged by hierarchy in social life and opinion of children [24]. Taboos, including prohibition for different gender to share the same toilet may become another obstacle. Moreover, the results of Tiwari et al.'s research showed that public defecation which was done by billions of people around the world may lead to negative consequences such as spreading diseases and hamper the growth of children [25].

The third hypotheses which was tested in this research was “for women who have high level of knowledge about garbage management, their environment sanitation behavior will

become more positive compared to their counterparts”. The test was conducted using Tukey test. The analysis result showed that the value of Q<sub>count</sub> = 14.47, while the value of Q<sub>table</sub> = 3.86. As a result, it may be stated that for woman who have high level of knowledge about garbage management, their environment sanitation behaviour will become more positive compared to their counterparts. This condition matched the results of research conducted by Caruso et al., which showed that women in the village of Odisha, India has several problems of urination, defecation and menstruation which related to several factors, including the availability of toilet and time. In this research, there were several domains which can be considered as closely related to those problems, including sociocultural, physical and social environment and private problems [26].

The fourth hypotheses which was tested in this research was “for men who have low level of knowledge about garbage management, their environment sanitation behaviour will become more positive compared to their counterparts”. The test was conducted using Tukey test. The analysis result showed that the value of Q<sub>count</sub> = 4.32, while the value of Q<sub>table</sub> = 3.86. As a result, it may be stated that for men who have low level of knowledge about garbage management, their environment sanitation behavior will become more positive compared to their counterparts.

This condition matched the results which showed that there were inadequate practices of environment sanitation in schools. There were several solutions which were offered, including increasing awareness about environment among male students, increasing the number of garbage can in classes and inclusion of material about environment in schools' curriculum [27]

## IV. CONCLUSION AND RECOMMENDATION

### A. Conclusion

Based on the results of this research, it may be concluded that for women, if they have high level of knowledge about garbage management, their environment sanitation behavior will become more positive compared to their counterparts. On the other hand, for men, if they have low level of knowledge about garbage management, their environment sanitation behaviour will become more positive compared to their counterparts. Also, environment sanitation behaviour is not only determined by the level of knowledge about garbage management, but also gender.

### B. Recommendation

There are several other factors that may influence the environment sanitation behaviour beside knowledge about garbage management and gender, such as personality, ability, trust, justice and so on. Those factors may still be researched on. Also, there are several methods and approaches that may be used to analyze the date, such as correlational, path analyses, factor analysis and structural equation modelling.



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