

The management of household mask wastes during COVID-19 era

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Abstract. Mask is one of the largest domestic infectious wastes during the pandemic COVID-19. However, some people do not know how to manage their mask waste properly. This study aims to determine the relationship between education, knowledge, attitudes, and community participation in household mask waste management. This study used quantitative analytic research with a Cross-Sectional approach. Furthermore, the sampling method used the total sample. The number of samples were 73 respondents. Questionnaires were distributed as research tools to collect data on education, knowledge, and attitudes towards household waste management participation. data analysis was performed by chi-square analysis using computer analysis software. The study results of 73 respondents indicated that 56.8% had higher education, 79.5% had good knowledge, 79.5% had a positive attitude, and 65.8% had good participation, consecutively. The results of the education bivariate test obtained a p-value of 0,332 ($p > 0.05$), knowledge of p-value 0.003 ($p < 0.05$) RP 2,175 (95% CI: 1,209 - 3,912), and attitude p-value 0.018 ($p < 0.05$) RP 2,578 (95% CI : 1,467 - 4,530). We highlighted that there were relationship between knowledge and attitude with community participation in household waste management. On the contrary with education and community participation has no relationship in household mask waste management.

1 Introduction

The Coronavirus disease 2019 (COVID-19) pandemic has significantly affected the quality of life of society in general, related to public health and economic aspects, in addition to the negative impact on the environment [1]. Transmission of COVID-19 is very high, therefore the government is taking preventive measures by keeping a distance, working from home, sanitation and so on, to minimize the spread of disease [2].

The amount of infectious waste, which includes old masks, gloves, and other personal protective equipment (PPE), has grown dramatically as a result of the COVID-19 epidemic. Disease transmission and environmental pollution may result from improper treatment of this trash [3]. efficient mask Achieving a number of SDGs, including SDG 6, SDG 11, SDG 12, SDG 3, and SDG 13, depends on waste management. It supports the preservation of clean water and sanitation, the advancement of sustainable cities and communities, the reduction

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of waste and encouragement of recycling, the promotion of health and well-being, and the fight against climate change [3] [4] [5] [6].

The presence of COVID-19 poses new challenges for municipal waste management [3]. Proper management of urban waste during a pandemic is used as a mitigation of disease transmission. Due to the potential for contamination of COVID-19 in waste originating from daily activities [7]. Performing a proper management of city waste is a challenge that must be handled by a developing state. Public on waste have caused environmental and public health problems [8].

During a pandemic, attention to waste management must be doubled, because it is necessary to follow the procedures determined by the local government [9]. Improper waste disposal will increase environmental damage and affect public health [10] the pandemic had adverse effects on the environment, waste composition and increased transmission of the virus, particularly to frontline workers [11].

Researchers had estimated the escalating of medical waste in some countries. In Indonesia, the medical waste accumulation had been estimated at around 420.03 tons a day. The data was counted based on the confirmed case. Medical waste due to COVID-19 has also risen significantly.

As Indonesia faces the COVID-19 pandemic, the prevention and control strategies cannot be detached from environmental condition [12] In April 2020, the World Health Organization (WHO) encouraged wearing masks for all, both healthy and unhealthy (World Health Organization, 2020). Following that recommendation, the government mobile gates the people to implement it.

The mask mandate over the public had escalated to single-use disposable masks and hand gloves. If these wastes do not handle cautious they, it would be can using problem as it is being classified as household infectious medical waste [13]. Polypropylene and polyester are the main materials in single-use mask production. Mask waste will worsen the plastic and micro-plastic waste within an environment, the such in river, sea or final waste disposal [14]. However, some people remain unaware of how to properly manage this waste. This lack of knowledge in managing waste are caused by improper educational facilities and socialization regarding this issue [15]. According to the aforementioned problems, the present research aims to elaborate on the relationship between education, knowledge and attitude, and public participation in house waste management.

2 Material and Methods

This was quantitative research with a cross-sectional design. The subject population were residents of Komplek Griya Bandung Indah, Rt. 04, RW. 11, a total of 73 people). We used total sampling to recruit the participants. The research was performed in December 2022. The primary data was collected through questioners to all participants. All Questionnaires were analyzed using validity and reliability tests.

The questionnaire validity test had $r \text{ count} \geq r \text{ table}$ ($r=0.381$), which means the questions researched were valid. The reliability test got scores on knowledge (alpha Cronbach 0.711 > 0.60), attitude (Alpha Cronbach 0.918 > 0.60), and participation (Alpha Cronbach 0.811 > 0.60). Thus, all questions were reliable. Data was analyzed using univariate analysis and bivariate analysis. Univariate analysis to test education, knowledge, and attitude among participants. Bivariate analysis by chi-square to test the relation of education, knowledge, and attitude among participants. The significant score is 5% (0.05), meaning that the average p-value is less than 0.05, meaning the results obtained are statistically significant. Data analysis was performed using computer software.

The Ethics Committee Approval was given by the Research Ethics Committee Ahmad Dahlan University (No: 012004019, June 22, 2020). It has been approved regarding the study

protocol, information for subjects, and informed consent. Informed consent was given before the research was conducted. Participants have been informed that they will remain anonymous for publication purposes.

3 Results and Discussion

During the COVID-19 pandemic, people used masks during their activities. Masks used are at risk of exposure to viruses. In daily life during the pandemic, people did not pay attention to the waste management of masks that are used daily as mandated by the regulation of the minister of environment and forestry of the Republic of Indonesia (Minister of Environment and Forestry of the Republic of Indonesia, 2021). Garbage is disposed of in trash bins without any further management. The community's behavior was due to, in part, the lack of public knowledge about how to manage mask waste during the COVID-19 pandemic.

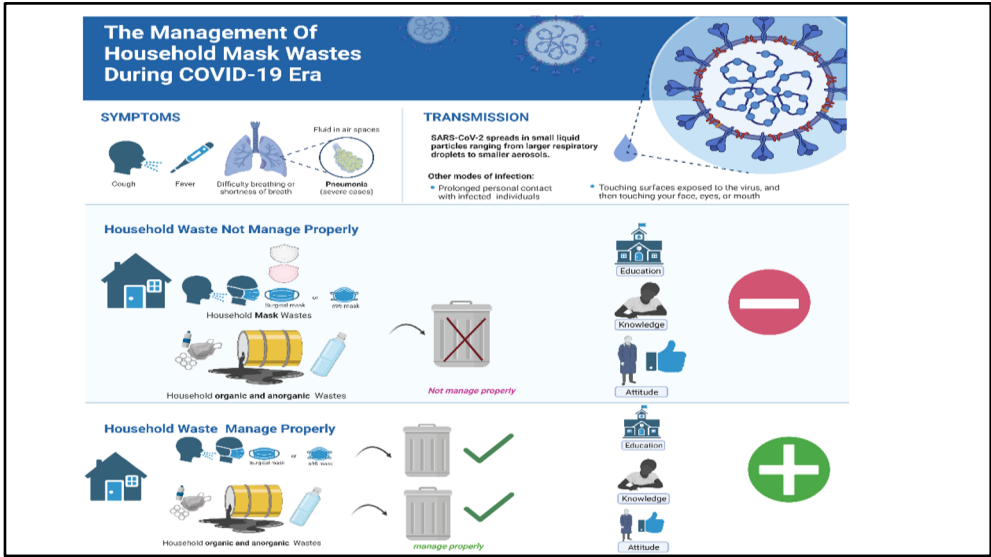


Fig. 1. Research thinking framework

3.1 The relation between education and people participation over household mask-waste

The relationship between education and people's participation in household mask-waste management in Komplek Griya Bandung Indah can be seen in Table 1.

Table 1. The relation between education and participation in household mask-waste management by inhabitants

People Education	People Participation				Total		Chi Square
	Poor		Good		N	%	
	N	%	N	%			
Low	12	16.4	29	39.7	41	56.2	0.332
High	13	17.8	19	26	32	43.8	
Total	25	34.2	48	65.8	73	100	

The results reveal that there was no significant relation between education and people's participation in household mask-waste management with a p-value of 0.332 ($p>0.05$). The P-value shows a significant result if the data obtained is $p<0.05$. This was affected by some factors. First, the COVID-19 pandemic is a novel situation for all. Second, domestic infectious waste management had inadequately informed the public. Thus, they, both with high and low education, lacked information regarding the procedure for daily disposable mask management. This lack of information was indicated in questionnaire answers concerning domestic mask waste as 48% of people did not implement the standard waste management as suggested by the health ministry.

Regional administration should urge its society to take responsible act, as they can reduce the recycle process by perform the proper waste management at home or follow the biomedical waste properly [16]. Education potentially change one attitude, in general the higher the education the easier in accepting information [17]. However, participation willingness not always affected by high education [18] This is in line with the research found in Gempol, Randusangan Kulon village, Brebes District, which revealed education did not relate with household waste management behavior, with p-value 0.115 [19].

3.2 The relation between knowledge and people participation over household mask-waste managements

The relation between knowledge and people participation over household mask-waste managements in Komplek Griya Bandung Indah can be seen in Table 2.

Table 2. The relation between knowledge and public participation in household mask-waste management

People Knowledge	People Participation				Total		Chi Square
	Low		Proper		N	%	
	N	%	N	%			
Low	10	13.7	5	6.8	15	20.5	0.003
Proper	15	6.8	43	58.9	48	79.5	
Total	25	34.2	48	65.8	73	100	

The results revealed that there was significant relation between knowledge and public participation in household mask-waste management with p-value 0.003 (P-Value shows a significant result if the data obtained is $p<0.05$) and prevalence ratio value of knowledge as 2.578 with CI value 1.467 – 4.530, did not passed 1, which mean knowledge on mask-waste management is the risk factor for this issue. Those who lack knowledge had a 2.578 chance of participating in household mask-wasted management. The information regarding mask-waste management can be accessed via health articles, visiting the Health Ministry website to add knowledge and information about COVID-19. People with proper knowledge and participated in household mask-waste management was 58.9%.

Infectious waste produced by COVID-19 has brought environmental and health issues in many states. Improper waste management can cause disease and virus spreading, particularly in developing states [20]. Mask waste management in settlement neighborhoods needs to be handled cautiously. Knowledge on self-management in the home need to be elevated to create a save trash for the surrounding [16]. Domestic waste potentially dangerous if the mask and hand-glove wastes that had been used by infected person with or without symptom were being dumped without proper handling [21].

Education on type, processing and managing the household infectious waste need to be intensify through information sharing, as it is the significant factor in managing the household infectious waste [15]. The household waste potentially danger as it is mixed with medical

waste (hand glove and mask), which can transmit the disease if it had been used by infected people with or without symptom. The more adequate community knowledge concerning waste management and the impact on neighborhood, the more active their participation in managing household waste management [22].This research results in line with research in Public Health Center of Sidomulyo, in-patient, Pakan Baru City that also stated significant relation between knowledge and mask-waste management, with p value 0.01.

3.3 The relation between attitude and people participation over household mask-waste management in Komplek Griya Bandung Indah

The relation between attitude and people participation over household mask-waste managements in Komplek Griya Bandung Indah can be seen in Table 3.

Table 3. The relation between attitude and public participation in household mask-waste management

People Attitude	People Participation				Total		Chi Square
	Low		Good				
	N	%	N	%	N	%	
Negative	9	12.3	6	8.2	15	20.5	0.018
Positive	16	21.9	42	57.5	58	79.5	
Total	25	20.5	48	65.8	73	100	

The result indicated the significant relation between attitude and public participation in managing the household mask-waste with p value 0.18 and prevalence ratio as 2.175 with CI value 1.209-3.912 did not passed 1, which means the attitude over mask-waste management is a risk factor for community to participate in waste management issue. Those who had negative attitude potentially 2.175 less participated in managing household mask-waste. Mask wearing mandate in public space had worsen the waste. Research that conducted by Nzediegwu and Chang stated face-mask used in daily had been escalated during COVID 19 [23]. Some research estimated the escalation of medical waste in some states. In Indonesia it was estimated that medical waste had reach 420.03 ton/day. The data was collected from confirmed cases number. Medical waste quantity regarding COVID 19 had also escalated significantly [20].

Vincent's research states that there is a relationship between attitudes towards mask waste sorting [24]. Changes in people's attitudes are based on awareness to prevent contamination of waste suspected of being infected and reduce the possibility of disease transmissio. Attitudes and policies on municipal waste management need to be improved under certain conditions, for example in household waste management when independent isolation and home care are prescribed for patients with mild clinical symptoms [25]. Attitude is a response that being affected by knowledge processing through listening and observing on how to handle COVID 19 spreading by managing the mask-waste properly and save. Without participation and active cooperation among society members in managing mask-waste and domestic medical waste, the negative impact on health and safety issues of cleaning workers will be difficult to prevent [18]. This is in line with research on Public Health Service of Sidomulyo, In-Patient, Pekanbaru City, stated that there was relation between attitude and mask-waste management, with p value 0.01.

Studies conducted in the US illustrate that the widespread use of masks and gloves is important in increasing waste [26]. Evidence in Spain and Asia shows the transfer of used masks into waterways and an increase in the number of single-use masks and gloves being dumped on beaches [27]. A Chinese hospital report said that in order to control the pandemic better and reduce the risk of transmitting the virus, the landfill method was replaced with the incineration method. In addition, the storage of medical waste related to the coronavirus was

reduced from 48 to 24 hours, and all infectious and household waste in hospitals had to be incinerated in a short time [28].

Community participation in managing mask waste will reduce the risk of spreading COVID-19. Increased participation can be caused by increased understanding of the importance of an action. Mask waste mixed with household solid waste increases the risk of COVID-19 transmission for the community, especially cleaning workers who have direct contact with waste. Mixing virus-laden biomedical waste with regular solid waste streams creates significant negative health and safety concerns for cleaners.

This research was conducted by distributing questionnaires to record knowledge, attitudes, and behavior of the community in managing mask waste at the household. Still, it did not explore the reasons why people did not manage mask waste during the COVID-19 pandemic. In the future, it is necessary to dig deeper into what is the background of people's behavior in managing infectious waste in households during the COVID-19 pandemic.

4 Conclusion

Mask is self-protection tools that effective to prevent COVID 19 spreading. This research show that there were relation between knowledge and attitude with community participation in household mask-waste managements; and there was no relation between education with community participation in household mask-waste management.

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