



Knowledge and Behavior of Using Personal Protective Equipment on Garbage Collectors

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Abstract. Garbage collectors are a group of workers who have a high risk of experiencing health problems due to continuous exposure to waste. Especially if they did not use personal protective equipment (PPE) while working. The purpose of this study was to analyze the relationship between knowledge about PPE and the behavior of using PPE among garbage collectors. This research is an observational analytic study that uses a survey design with a cross-sectional approach. The sample of this research was garbage collectors at The Temporary Shelter of Srikana, Gubeng District, Surabaya, which was taken using a simple random sampling technique. The variables of the study were: 1) knowledge of PPE, and 2) behavior of using PPE. Research data were collected using questionnaires and observation techniques, presented using a frequency distribution, and then analyzed using Fisher's Exact test with a significance level of 0.05. The results showed that almost all (76%) garbage collectors had good knowledge of PPE, but almost all (80%) of workers had poor behavior in using PPE, and none (0%) of workers used PPE properly. Based on the results of hypothesis testing, it was concluded that there was no significant relationship between knowledge about PPE and the behavior of using PPE among garbage collectors ($p = 0.553$). It was recommended that educational institutions provide guidance and counseling for garbage collectors, for example through community service activities.

Keywords: Knowledge, Behavior of Using PPE, Garbage Workers.

1 Introduction

Garbage is a big problem for almost all cities in developing countries, especially cities with large populations. Garbage transportation is an effort to handle waste with a mechanism for bringing waste from sources and/or from temporary storage sites or from integrated waste processing sites to the Final Disposal Site (FDA)[1][2]. The process of transporting waste has the potential to cause work accidents for garbage transport workers. Accidents that occurred were crushed and scratched by the waste generated when moving the garbage, as well as being stepped on by sharp objects while working. Occupational accidents for waste transport workers can also be in the form of workers falling from trucks, exposed to dust, slipping/spraining, slipping due to slippery garbage, exposure to bacteria/germs caused by being blown by hazardous materials contained in garbage, fires due to flammable objects/garbage burnt [3][4][5].

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The International Labor Organization (ILO) estimated that 2.78 million workers die each year from work-related accidents and diseases. Approximately 2.4 million of these deaths are caused by occupational diseases and more than 380,000 results from work-related accidents. The highest number of injuries are caused by occupational diseases and non-fatal accidents, affecting more than 300 million workers annually[6].

Following the hierarchy of controls outlined by the National Institute of Occupational Safety and Health (NIOSH) can reduce the risk of developing an occupational illness [7]. The hierarchy of controls are listed from most effective to least effective in the following order: elimination, substitution, engineering controls, administrative controls, and PPE. PPE is required by employers when elimination, substitution, and engineering controls do not work and when administrative controls are not feasible or do not provide adequate protection[8][9].

The workplace of waste workers is at risk of causing work-related illnesses and accidents, because workers do not use adequate personal protective equipment[10][11]. A preliminary survey conducted on five waste collectors at temporary shelter of Srikanan, Gubeng District, Surabaya found that all of them (100%) did not wear gloves and only 2 persons (40%) wore cloth shoes. Many workers do not feel wearing PPE is essential to their health, so PPE is often overlooked and not considered a main factor when the overall site safety is assessed[5].

Personal protective equipment (PPE) is tools used to protect workers from injury or disease caused by contact with hazards in the workplace, whether chemical, biological, radiation, physical, electrical, mechanical and other. It isolate parts or all of the body from potential hazards in the workplace. PPE does not eliminate or reduce the hazard but only reduces the amount of contact with the hazard[8]. The garbage collectors are vulnerable groups who get sick or have an accident due to work. Therefore, when working they should use adequate PPE, such as protective hat, goggles or face shield, mask, protective clothing, gloves, and boots.

Not using PPE while working can be caused by various factors, including the unavailability of PPE facilities and the lack of knowledge of workers about self-protection and health. This is in accordance with Lawrence Green's statement in Notoatmodjo (2012) that behavior is influenced by three factors, namely 1) Predisposing factors that manifest in knowledge, attitudes, beliefs, values, and so on; 2) Enabling factors that are manifested in the physical environment, the availability of health facilities or facilities; and 3) Reinforcing factors that are manifested in the attitude and behavior of health workers or other officers, which are a reference group for community behavior[12]. Therefore the knowledge of garbage collectors about personal protective equipment is very important in shaping the practice or behavior of using personal protective equipment.

To prevent the occurrence of occupational diseases among waste workers who have daily contact with waste, it is necessary to carry out promotive and preventive efforts. One effort that can be taken is socialization and providing information about the importance of using PPE. Even though there are not specific federal guidelines to protect waste workers from the hazards that they encounter, waste workers are still expected to protect themselves from these occupational exposures by using PPE. The appropriate use of PPE will aid in reducing the economic impact that occupational illnesses have on the nation, as well as increasing the health and longevity of people in the workforce [7]. As workers in the informal sector, garbage collectors should receive

attention in terms of safety and health, so that their productivity and welfare are optimal.

Based on the description above, it is deemed necessary to research the knowledge and behavior of using personal protective equipment among garbage collectors at The Temporary Disposal Site of Srikana in Gubeng District, Surabaya City.

2 Methods

This research was an observational analytic study that analyzed the relationship between knowledge about personal protective equipment (PPE) and the behavior of using PPE among garbage collectors. This study used a cross-sectional design. The research population was all garbage workers at Temporary Disposal Sites Srikana Gubeng, Surabaya in September 2021. The research sample consisted of 50 garbage collectors, who were taken using simple random sampling. Data collection regarding knowledge about PPE was carried out using a questionnaire, while data on the behavior of using PPE was collected by observation. Hypothesis testing on the relationship between knowledge about PPE and the behavior of using PPE was carried out using the Chi-Square test. In the Chi-Square test, it was stated that the distribution of the data did not meet the requirements for the Chi-Square test because 50% of the table cells had an expected count of less than 5. Therefore, the research data were analyzed using Fisher's exact test with a significance level of 0.05. Ethical clearance for this research was conducted on the Ethics Committee of Politeknik Kesehatan Kemenkes Surabaya.

3 Research Result

3.1 The Characteristics of Research Subjects

Data on the characteristics of garbage collectors showed that 48% of workers were middle-aged and almost all (92%) were men, 38% of workers had a junior high school and 36% of workers had an elementary school education. Most of the workers (62%) have worked as garbage collectors for more than 5 years, of which half (50%) work ≤ 8 hours a day and 50% work more than 8 hours a day. Complete data can be seen in Table 1.

Table 1. The characteristics of garbage collectors at The Temporary Shelter of Srikana, Gubeng District, Surabaya in September 2021.

Characteristics		Fre- quency	Percentage (%)
Age:	Young (21-40 y.o)	22	44
	Middle-aged (41-59 y.o)	24	48
	Erderly (\geq 60 y.o)	4	8
Gender:	Male	46	92
	Female	4	8
Level of Ed- ucation:	Elementary School	18	36
	Junior High School	19	38
	Senior High School	13	26
Years of Service:	<1 Year	2	4
	1-5 years	17	34
	>5 years	31	62
Working Duration:	\leq 8 Hours	25	50
	>8 Hours	25	50
Health Problems:	There is	12	24
	There isn't	38	76

3.2 Knowledge of PPE

The results showed that almost all (76%) of garbage collectors have good knowledge about PPE, and only a small percentage (6%) have poor knowledge. This data can be seen in Table 2.

Table 2. Knowledge of PPE among garbage collectors at The Temporary Shelter of Srikana, Gubeng District, Surabaya in September 2021.

Knowledge of PPE	Frequency	Percentage (%)
Good	38	76
Moderate	9	18
Poor	3	6
Total	50	100

3.3 The Behavior of Using PPE

The results showed that almost all (80%) of the garbage collectors had poor behavior in using PPE, and none (0%) of the workers used PPE properly as they should. The data can be seen in Table 3.

Table 3. The behavior of using PPE among garbage collectors at The Temporary Shelter of Sri-kana, Gubeng District, Surabaya in September 2021.

Behavior of Using PPE	Frequency	Percentage (%)
Good	0	0
Moderate	10	20
Poor	40	80
Total	50	100

3.4 The Relationship Between Knowledge of PPE and Behavior of Using PPE

The research results showed that almost all (78.9%) garbage collectors who had good knowledge about PPE had poor behavior in using PPE. Likewise, workers with moderate knowledge and workers with poor knowledge have poor behavior in using PPE. Complete data can be seen in Table 4.

Table 4. Distribution of behavior of using PPE based on knowledge of PPE in garbage collectors at The Temporary Shelter of Srikana, Gubeng District, Surabaya in September 2021.

Knowledge of PPE	Behavior of Using PPE				Total	
	Moderate		Poor			
	F	(%)	F	(%)	F	(%)
Good	8	21,1	30	78,9	38	100
Moderate	1	11,1	8	88,9	9	100
Poor	1	33,3	2	66,7	3	100
Total	10	20,0	40	80,0	50	100

The results of statistical analysis using Fisher's exact test with a significance level of 0.05 obtained a probability value of 0.553, which means that Ho is accepted. Thus,

it can be concluded that there is no significant relationship between knowledge of PPE and the behavior of using PPE among garbage collectors.

4 Discussion

4.1 Knowledge of PPE

The results of the research show that almost all garbage collectors have good knowledge about PPE, and only a small percentage have poor knowledge. This is because most of the workers have worked for more than 5 years as garbage collectors, of which half work for 8 hours per day and work more than 8 hours per day. Following the theory put forward by Notoatmodjo (2012), experience factors influence one's knowledge. According to Budiman and Agus (2013), experience as a source of knowledge is a way to obtain the truth of knowledge by repeating the knowledge obtained in solving problems in the past[13]. The results of this study are supported by research conducted by Lasmi and Ibrahim (2019) on street sweepers in Makassar, which states that there was a relationship between knowledge and work experience[14]. The work experience that garbage collectors have had over a long period means that they can understand the dangerous risks that can arise from the work they do. Experience has also taught workers so that they understand how to prevent these dangerous risks with personal protective equipment (PPE).

Another factor that can influence good knowledge in workers is the assistance and coaching provided by educational institutions such as Airlangga University and other educational institutions through research activities and community service by conveying information, knowledge, and technology transfer. As stated by Notoatmodjo (2012), the ease of obtaining information can help someone gain knowledge[12]. Thus, the more information received, it will be able to increase the insight and knowledge of workers.

4.2 The Behavior of Using PPE

The results showed that almost all garbage collectors had poor behavior in using PPE, and none of the workers used PPE properly as they should. Based on observation at the research location, it can be seen that they use PPE incompletely, for example they wear boots but no masks and gloves. This is due to the unavailability of adequate PPE facilities for each worker. To use PPE, workers must buy it themselves. This is beyond the financial capabilities of those who generally have very low incomes.

Another reason for the lack of PPE is the discomfort factor, in which some workers say they feel short of breath when wearing a mask, they are not free to move and are uncomfortable when wearing boots, they feel hot when wearing long sleeves, and various other reasons. As the results of Mahbub's research on waste workers in ten cities of Bangladesh, that over half (54%) of the workers reported problems with PPE use, such as a feeling of discomfort which included breathing problems, sweltering problems, and improper fitting[15][16].

Even though the function of PPE is to protect workers from the risk of accidents and the risk of disease due to exposure to waste . Therefore, it was recommended for

garbage collectors to maximize the use of PPE they have, at least masks and gloves, because the COVID-19 pandemic is still ongoing. Workers must also maintain personal hygiene and wash their hands frequently[17][18].

Work safety is a series of efforts to create a safe and comfortable work climate for workers. Protecting workers during a pandemic through technical efforts such as securing premises, equipment and work environment is very important. However, sometimes hazardous conditions cannot be controlled due to workers ignoring the use of PPE. As is known, PPE has the function of protecting the body or body parts from danger and reducing the risk of accidents in the workplace [19].

4.3 **The Relationship Between Knowledge of PPE and Behavior of Using PPE**

The results of the study showed that there was no significant relationship between knowledge about PPE and the use of PPE among waste transport workers. Knowledge is one domain that can shape a person's behavior. However, in reality, good knowledge does not always translate into good behavior. As stated by Notoatmodjo (2012), improving knowledge does not always lead to changes in behavior. This is in line with research conducted by Untari and Kodiyah (2020), that among 25 respondents with good knowledge, only 10 people (40%) used complete PPE[20].

A high level of knowledge about PPE is not a guarantee that respondents have a high ability to use PPE according to their level of knowledge. This is understandable, considering that knowledge is not the only factor that influences behavior. According to Lawrence Green in Notoatmodjo (2012), behavior is also influenced by resource availability factors. In fact, there is no adequate PPE available for garbage collectors. That is one of the reasons for their non-compliance in using PPE. Therefore, it requires budget support from the local government and implementation of Occupational Health and Safety Management by related agencies.

Another factor that influenced this behavior was the worker's unwillingness to use PPE. Some of the reasons are feeling uncomfortable, hindering movement, and causing difficulties in working. Garbage collectors know about PPE and its function, but they tend to ignore it because they think that this behavior is a habit and does not cause any harm. This condition is probably caused by workers who know their work area well so they neglect their safety by taking unsafe actions. Heinrich's Domino Theory states that 98% of work accidents are caused by unsafe actions[16]. Meaning that work accidents are mostly caused by workers' unawareness and unwillingness to use PPE.

Using appropriate PPE when working will reduce the risk of work accidents and work-related illnesses, especially during the current COVID-19 pandemic. However, waste is a breeding ground for germs and a source of disease transmission [21–24]. With the increase of inappropriate disposal of PPEs, the probability of transmission of the virus to the general public increases significantly. This is because this virus can survive for several days on an inanimate matter like plastics, fibers, etc[25]. Coronavirus excreted in feces could reach wastewater treatment plants in an infective state, especially in cool climates[26–28]. Amidst the ongoing COVID-19 pandemic, the use of personal protective equipment is one of the most efficient and affordable ways to prevent the transmission of the virus[29][30].

Thus, it is highly recommended for garbage collectors to use PPE to avoid the risk of work accidents such as being stabbed by sharp objects, and to avoid disease.

5 Conclusion

This research concluded that there was no significant relationship between knowledge about PPE and the behavior of using PPE among garbage collectors. Good knowledge about PPE does not always translate into good behavior in using PPE. This is caused by the unavailability of PPE in the workplace. Therefore the sub-district or village government was expected to provide budgets for the procurement of appropriate PPE for waste collectors in their area. In addition, seeing that many workers lack behavior in using PPE, it is considered necessary to provide guidance and counseling on occupational safety and health for garbage collectors by educational institutions through community service activities.

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