

## ORIGINAL ARTICLE

## HEALTH RISKS AMONG WASTE COLLECTORS IN PAHANG

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## ABSTRACT

Waste collectors were involved with a variety of health risks and health symptoms. Furthermore, they were exposed to various occupational health hazards. This study aimed to assess the correlation between workers' practices on personal protective equipment (PPE) towards the workers' health risks and health symptoms. Data were collected on the health risks and health symptoms among waste collectors working at waste management services in Pahang. Ninety-seven respondents were selected to participate and complete the questionnaires. The study shows that the ergonomic health risk was the critical health risk among waste collectors. This study also shows that there is a significant positive correlation between workers practices on PPE and health risks ( $r = 0.209$ ,  $p = 0.040$ ). However, there is no significant correlation between workers practices on PPE and health symptoms ( $r = 0.015$ ,  $p = 0.884$ ). Good work practice is very important in minimizing the risks exposed to workers at the workplace. Then, the practice and use on right protective gear would help in reducing and minimizing the health risks and health symptoms. The outcome of this study can assist the company in improving the quality of worker care in the waste management industry.

**Keywords:** Waste Collectors, Health Risks, Health Symptoms, Personal Protective Equipment (PPE)

## INTRODUCTION

The generation of solid waste in Malaysia is about 1.1 kg/day. Every day, more than 26,500 tons of solid waste is disposed of through 166 operating landfills around Malaysia (Kamaruddin et al., 2017). Currently, solid waste management has become a current problem in the urban area throughout the cities and towns of developing countries such as Malaysia (Aminuddin & Rahman, 2015) [2]. Moreover, there is a rapid growth of the human population that will reach to 33.4 million by the year 2020 (Chien Bong et al., 2017). A previous study by Tan et al. (2014), estimated that the solid waste generation would reach 31,000 t/day by 2020 due to the growth of the population year by year.

The workers in the waste management sector are often exposed to risks such as high and low temperatures, vibrations, noise and infectious materials. Data recorded by European Federation of Public Service Unions (EMCS) (EPSU, 2017), which claimed that about 8% of the workers in the waste management are exposed to noise and vibrations risk all the time.

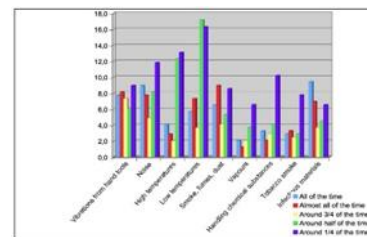


Figure 1 Exposure to physical factors in waste management (EPSU, 2017).

A previous study conducted among household collectors shows that most injuries occur among workers are around age 50 years old and above. These cases occur due to the worker's abilities were decline with their age and mental stress. The root cause of mental stress among workers is related to aged vision, auditory and mobile capabilities (Jeong et al., 2016). Waste pickers that are working with recyclable materials in which contact with sharp items and hazardous health waste are exposed to cuts, maiming, fatal accidents, contamination by heavy metals and dangerous wastes. These conditions were at risk of developing a pulmonary disease, HIV and hepatitis C (Cowing, 2013).

A study conducted in India among waste pickers who worked in three different cities reinforced these occupational health hazards. This study highlights the lack of provisions of protective equipment, low income of the informal

workers, along with the ignorance of the workers as aggravating risk factors to different types of external injuries. The major occupational health issues reported by various categories of waste workers were muscle and ligament sprain, cuts and lacerations and different allergies (Balkhyour et al., 2018). Lack of provisions of personal protective equipment, low income of the informal workers and ignorance of the workers would aggravate risk factors to various types of external injuries. Besides, muscle and ligament sprain, cuts, lacerations and different allergies are the main reported occupational health issues (Thakur et al., 2018).

The employees are exposed to the numerous physical, chemical and accidental hazards in small-scale industries (Balkhyour et al., 2019). Another previous study by De and Debnath (2016) revealed the acute health effects such as simple irritation of eyes, skin, throat and breathing (lungs) might occur due to the exposure to hazardous waste. These exposures also can become severe health conditions that affect the nervous system and paralysis of the functional body parts. A study done at domestic waste management at Kota Bharu shows that a high amount of exposure and risk on their health will be faced by waste collectors while performing their job task. Moreover, waste collectors require repeated substantial physical activity such as lifting, carrying, pulling and pushing. This will lead to the occurrence of occupational accident among waste collectors (Aminuddin & Rahman, 2015). Besides, a study done by Zaky et al. (2018) revealed that municipal waste workers are exposed to injury during work. Besides, the majority of them suffer from a musculoskeletal disorder. The occurrence of occupational injuries, accidents, and other hazards among workers can be minimizing by providing and practising the use of personal protective equipment (PPEs) (Balkhyour et al., 2019) (Ahmad et al., 2017).

There is a lack of comprehensive study on the worker practices on the personal protective equipment (PPE) towards the worker's health risks and health symptoms among waste collectors at waste at Pahang waste management service. A study done by Zahari et al. (2010) reported that about 500 tons of solid waste were generated daily in Kuantan, consisting of 60% of domestic waste and 40% of industrial and construction waste

Therefore, the present study aims to determine the association between worker practices on personal protective equipment (PPE) towards the worker's health risks and health symptoms.

## METHODS

### *Study population and settings*

A cross-sectional study was conducted at a waste management service company located in Pahang. The study samples were selected according to (Kerjcie & Morgan, 1970). The participants involved in this study were waste collector workers from the aforementioned establishment. About 97 respondents participated in this study. The respondents were given a consent form before answer the questionnaire. An observation was conducted to obtain information on their nature of work and work practices. The survey served as a preliminary assessment to design the sampling strategies.

The questionnaires were administered among the workers in waste management services to collect the information regarding their demographics, health risks and health symptoms and workers practices on personal protective equipment (PPE). Besides, in this current study, two criteria of the participants were included which are waste collector must work in Pahang state and the workers must have working experience for more than six months.

### *Instrumentations*

The validated questionnaire is adopted from (Aminuddin & Rahman, 2015). The questionnaire was distributed and answered by the 97 participants under close supervision in order to avoid bias and influences. The questionnaires cover three sections. Section 1 is demographic information that consists of sex, age, ethnic, duration employment status, shift work, smoking habit and level of education. Section 2 focusses on health and safety policy, physical health risk, psychological health risk, biological health risk and health symptoms. Section 3 covers practices on personal protective equipment (PPE). It consists of the duty of employer about PPE enforcement and training for their employees. Besides, the basic type of PPE used such as safety vest, coveralls, goggles, mask, gloves, hard hats and safety boots.

Then, the reliability of the questionnaires was tested using Cronbach's Alpha Test. The result was within the acceptable value which is 0.843. The questionnaire was re-checked to prevent the respondents from leaving blank answers. Based on the returned questionnaire from the respondents, all questionnaires were submitted with no blank question which means that the respondent answered all questions given.

### *Data Analysis*

The data obtained were analysed using the Statistical Package for Social Sciences (SPSS) version 20.0. Descriptive analysis utilizing the frequencies and percentages were performed for all the variables. The Spearman correlation analysis was used to determine the correlation of

worker practices on PPE towards the potential health risks and health symptoms.

## RESULTS AND DISCUSSION

### Demographic Data

Table 2 shows the socio-demographic information such as sex, age, ethnic, duration of employment, shift of work, smoking habit and level of education among waste collector workers.

**Table 2. Socio-demographic information among waste collectors**

Gender	n	%
Male	95	97.9
Female	2	2.1
Age	n	%
25-30	19	19.6
31-35	26	26.8
36-40	13	13.4
41-45	19	19.6
Over 45	20	20.6
Ethnic	n	%
Malay	83	85.6
Chinese	1	1.0
Indian	11	11.3
Others	2	2.1
Duration of Employment	n	%
Less than 1 year	5	5.2
1-3 years	13	13.4
4-5 years	23	23.7
Over 5 years	56	57.7
Shift of Work	n	%
Day	90	92.8
Night	7	7.2
Smoking Habit	n	%
Yes	57	58.8
No	40	41.2
Level of Education	n	%
Primary School	40	41.2
Secondary School	57	58.8

Based on Table 2, the respondents are predominantly male workers (97.9%). Next, the highest percentage for the age group is the workers aged between 30-35 years old with 26.8% and followed by the age over 45 years old with 20.6%. Meanwhile for the workers' age around 41-45 years old and 25-30 years old has the same percentage, which is 19.6%. The age group for workers around 36-40 years old has the lowest percentage with is 13.4% only. The majority (85.6%) of the participants is Malay workers. Mostly, the duration of employment for the workers in this sector that have more than half from the total of respondents is over five years with 57.7%. The majority of the

respondents are working on day shift (92.8%) rather than night shift, with only 7.2%. Besides, 57 out of 97 workers are smokers which is 58.8% of the demographics. About 58.8% of the participants have a secondary school education level, while 41.2% of the participants have a primary school education level.

### Health Risk Information

Table 3 shows the health risk and health symptoms focusing on physical health risk. Majority of waste collectors faced problems with physical health risk.

**Table 3 Health risk among waste collectors (Physical health risk)**

Health Risk	n(%)
<b>Have you faced any sharp object during work?</b>	
Yes	91(93.8)
No	6(6.2)
<b>Whole-body vibration is one of your problems while working?</b>	
Yes	53(54.6%)
No	44(45.4%)
<b>Waste collection activity required heavy lifting job?</b>	
Yes	86(88.7%)
No	11(11.3%)
<b>Have you faced the effect of heat from the surrounding environment while working (day shift)</b>	
Yes	78(80.4%)
No	19(19.6)

The data shows that the majority of respondents were dealing with a sharp object (93.8%), had body vibration problems (54.6%), involved in heavy lifting jobs (88.7%), and faced the effect of heat while performing their job (80.4%). This was supported by Jeong et al. (2016) which revealed that legs, knees, feet, hands and fingers were the most common injuries among waste collector workers. Furthermore, workers were involved with much handling heavy equipment during waste disposal. Therefore, physical health risks are often associated with waste collectors.

Based on Table 4, the majority of waste collectors faced problems with psychological health risk. The data shows that the majority of respondents have problems with the mismatch of the work environment (62.9%), job stress caused by the organization environment or poor communication (70.1%), and long and irregular duration of working hours (73.2%). The exhausting conditions at work, for example, working between five or more hours a day and six days a week, was also a concern among waste pickers. It may affect the workers' health

conditions and occupational risks among them (Ahmad et al., 2017).

**Table 4 Health risks among waste collectors (Psychological health risks)**

Health Risk	n(%)
<b>Do you face any mismatch of work environment to cognitive skills, capabilities and limitation workplace?</b>	
Yes	61(62.9)
No	36(37.1)
<b>Job stress is caused by the organization, environment or poor communication?</b>	
Yes	68(70.1%)
No	29(29.9%)
<b>Do you have a long and irregular working hour, working cycles or work shift?</b>	
Yes	71(73.2%)
No	26(26.8%)

Then, Table 5 recorded the biological health risk among waste collector workers.

**Table 5. Health risk among waste collectors (Biological health risk)**

Health Risk	n(%)
<b>Have you come across any poisonous/dangerous animals while working?</b>	
Yes	85(87.6)
No	12(12.4)
<b>Any disease-carrying insects (mosquitoes)?</b>	
Yes	87(89.7%)
No	10(10.3%)
<b>Any bacteria/ fungal growth on waste?</b>	
Yes	87(89.2%)
No	10(10.3%)

According to Table 5, the majority of waste collectors faced with biological health risk. The data shows that majority of respondents have across poisonous or dangerous animals (87.6%), disease-carrying insects (mosquitoes) (89.7%) and bacterial/fungal growth (89.7%) on waste while working. This is consistent with the study by Domingo and Nadal (2009) which stated that there are a lot of biological agents that adversely affect the human health when managing the solid waste, either via direct or indirect health risks.

Based on Table 6, the majority of waste collectors faced problems with ergonomic health risk. The results show that the majority of respondents (55.7%), (67.0%), (72.2%) and (67.0%) faced problems of body posture, repetitive movement, excessive stretching muscle and bending, sprain and swollen of body posture respectively during work. The previous study revealed that there was a high result in

illnesses due to loading of waste disposal and waste collection. This happened due to the waste collectors applying bending and twisting of the body, in the middle of lifting to garbage-loading truck and collecting of wastes, that lead to musculoskeletal illnesses (Jeong et al., 2016).

**Table 6. Health risks among waste collectors (Ergonomic health risks)**

Health Risk	n(%)
<b>Problems of body posture?</b>	
Yes	54(55.7%)
No	43(44.3)
<b>Repetitive movement?</b>	
Yes	65(67%)
No	32(33.0%)
<b>Excessive stretching muscle?</b>	
Yes	70(72.2%)
No	27(27.8%)
<b>Bending, sprain and swollen of body posture?</b>	
Yes	65(67.0%)
No	32(33.0%)

*Health Symptoms Information*

Table 7 shows the results of health symptoms among waste collectors. There are three (3) categories of health symptoms under this study which are respiratory health symptoms, gastrointestinal health symptoms and dermatological health symptoms.

**Table 7. Health Symptoms among waste collectors**

Health Symptoms	n(%)
<b>Respiratory Symptoms</b>	
<b>Cough</b>	
Yes	35(36.1%)
No	62(53.9%)
<b>Phlegm</b>	
Yes	44(45.4%)
No	53(54.6%)
<b>Wheezing</b>	
Yes	36(37.1%)
No	61(62.9%)
<b>Asphyxiate</b>	
Yes	27(27.8%)
No	70(72.2%)
<b>Gastrointestinal Symptoms</b>	
<b>Diarrhoea</b>	
Yes	28(28.9%)
No	69(71.1%)
<b>Nausea</b>	
Yes	36(37.1%)
No	61(62.9%)
<b>Dermatological Symptoms</b>	
<b>Itchy</b>	
Yes	62(63.9%)
No	35(36.1%)
<b>Rashes</b>	



Yes	59(60.8%)
No	38(39.2%)
<b>Musculoskeletal Symptoms</b>	
<b>Low back pain</b>	
Yes	77(79.4)
No	20(20.6%)
<b>Elbow/Wrist pain</b>	
Yes	55(56.7%)
No	42(43.3%)

The highest frequency and percentages for health symptoms are musculoskeletal health symptoms. The musculoskeletal symptoms are low back pain and elbow or wrist pain. Majority of participant faced low back pain (79.4%) followed with elbow/wrist pain (56.7%). Waste collectors usually carried out many considerable heavy lifting as well as other manual handling tasks with the containers that will increase the risk of musculoskeletal problems (Aminuddin & Rahman, 2015).

The dermatological symptoms like itchy (63.9%) and rashes (60.8%) recorded the second-highest health symptom among waste collector workers after musculoskeletal symptoms. A study by Rushton (2003) shows that the waste collectors are highly exposed to bioaerosols and volatile compounds which lead to respiratory gastrointestinal and skin problems.

*Worker Practices on Personal Protective Equipment (PPE)*

**Table 8 shows the result of workers practices on personal protective equipment.**

Health risks	n(%)
<b>Worker practices on PPE</b>	
<b>1) My employer supplies PPE</b>	
Yes	96(99.0%)
No	1(1.0%)
<b>2) My employer provides training regarding the use of PPE</b>	
Yes	91(93.8)
No	6(6.2%)
<b>3) I used the long sleeves, pants or coverall</b>	
Yes	95(97.9%)
No	2(2.1%)
<b>4) I used the heavy leather work glove</b>	
Yes	93(95.9%)
No	4(4.1%)
<b>5) I used the safety boots during work</b>	
Yes	95(97.9%)

No	2(2.1%)
<b>6) I used the eye protection and splash shields as needed</b>	
Yes	81(83.5%)
No	16(16.5%)
<b>7) I used the hearing protection if needed (noise level above 80 decibels)</b>	
Yes	73(75.3%)
No	24(24.7%)
<b>8) I used the communication device-radio or cell phone in the case emergency</b>	
Yes	86(88.7%)
No	11(10.3%)
<b>9) I used the hard hats in traffic areas</b>	
Yes	24(24.7%)
No	73(75.3%)
<b>10) I used the safety vest in traffic areas</b>	
Yes	83(85.6%)
No	14(14.4%)
<b>11) I used any types of mask at a needed condition</b>	
Yes	91(93.8%)
No	16(6.2%)

According to Table 8, the waste collector workers was provided with personal protective equipment (PPE) by their employers such as coverall, gloves, safety boots, goggles, earplugs, hard hats, safety mask and mask. Besides, their employer also provides training regarding the use of PPE. The occupational risk perception among workers has improved their protective behaviour in increased the use of PPE (Black, 2018).

*Correlation between worker practices on PPE towards workers' health risks and health symptoms*

Table 9 shows the Spearman correlation analysis investigated the correlation between worker practices on PPE towards workers' health risks and health symptoms. The results signify that the p-value for the workers' practices on PPE and health risks was below 0.050 ( $p = 0.040$ ,  $r = 0.209$ ), indicating that there is a significant positive correlation between the workers' practices on PPE and health risks. However, there is no significant correlation between workers' practices on PPE and health symptoms ( $p = 0.884$ ,  $r = 0.015$ ).

**Table 9 Correlation of worker practices on PPE towards health risks and health symptoms**

Variable	Waste Collectors (N=97)			
	Health Risks		Health Symptoms	
	r-value	p-value	r-value	p-value
Workers Practices on PPE	.209	.040	.015	.884

These study results indicate that a wrong or incorrect use of PPE would lead to health risk among workers. These results are supported by a study done by Bogale et al. (2014). [18], which proved that there was a significant association between the prevalence of injury and non-use of PPE. Another study also found that the use of PPE, such as gloves among workers in waste management services, was associated with the reduction of injury cases among them (Burns et al., 2019) [19]. Interestingly, a study by Black et al. (2018) [17] and found no association between the prevalence of injury and non-use of PPE. A study by Thakur et al. (2018) [8] revealed that the protective gear did not fully prevent the exposure to a variety of injuries at all time. However, the regular usage of PPE will significantly reduce the chances of exposure among workers at waste management services. The employment of unconventional and nonstandard PPE would reduce or lesser the protection level of workers. Then, a broken PPE would also contribute to the minimum protection level. Moreover, it is very crucial to ensure the workers are aware of PPEs and its guideline. At the same time, they deal with harmful substances or situation to make sure the PPE use is beneficial in the protection level (Ahmad et al., 2017) [12].

## CONCLUSION

The current study showed that many potential health risks associated with the waste collectors such as physical health risks, psychological health risk, biological health risk and ergonomic health risk. The study revealed that the ergonomic health risk was the critical health risk among waste collectors. This study also showed that there is a positive correlation between workers practices on PPE and health risk among waste collectors. Frequent training and campaign are recommended to enhance the awareness of safety and health among waste collectors. One of the crucial steps to increase the worker's social welfare is by improving their occupational safety among them. Provision of personal protective equipment and training in proper behaviour among workers is vital (Jerie, 2016) [20].

An improvement in study design and methodology should be emphasized for future research. Besides, further study on the ergonomic risk assessment is recommended among waste collectors. Besides, the outcome of this study can assist the company in improving the quality care of the workers in the waste management industry.

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## COMPETING INTERESTS

There is no conflict of interest.

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