

## THE PREVALENCE OF RESPIRATORY SYMPTOMS AMONG WORKERS IN A DOMESTIC WASTE COLLECTION CENTER IN KLANG VALLEY, MALAYSIA

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### ABSTRACT

**Background:** Domestic waste collectors are potentially exposed to many occupational hazards which might result in health problems including respiratory illnesses. The severity of the problem might differ between developed and developing countries due to the protective measures taken for the workers. Therefore the objective of this research was to determine the prevalence of respiratory symptoms among workers who were working in a domestic waste collection centre, in Klang Valley, Malaysia.

**Materials and Methods:** A cross sectional study was carried out for one week period in November 2014. Those aged between 18 to 60 years old and without any chronic respiratory illness have been included in the study. Data of respiratory symptoms were obtained using interview-guided questionnaire.

**Result:** A total of 111 workers responded out of 130 with response rate of 85%, to the questionnaire with mean age ( $\pm$ SD) of 40.38 years old. Majority of them were Malay with average working experience up to 6.3 ( $\pm$ 3.62) years. Their average working duration was 11.27 ( $\pm$ 1.18) hours per day and majority of them had 1 to 5 days of absentees in the last 6 months. The prevalence of respiratory symptoms was 56.8%. Age of workers ( $p = 0.003$ ; 95% CI), age started working ( $p = 0.003$ ; 95% CI) and days of absentees ( $p < 0.001$ ; 95% CI) were significantly associated with respiratory symptoms among the workers.

**Conclusion:** There were respiratory health implications among the workers and appeared to be relative effect on those who have direct contact and with longer period of exposure to domestic waste. Nevertheless, compliance of workers to preventive measures is crucial and emphasis on further intervention is important in reducing the exposure and to prevent the incidence of adverse health effects among the workers.

**Keywords:** Domestic waste, respiratory symptoms, staff, Klang Valley, Malaysia

## 1.0 Introduction

The growth of the world's population, increasing urbanization, rising standards of living, and rapid development in technology have contributed to an increase in both amount and variety of solid wastes generated by industrial, domestic and other activities (World Bank Group 2006). Dealing with greater volume production and present of dangerous waste materials are relatively acute in management of waste in developing countries whereby the proportion of waste being produced has not been met by improvement in waste management technologies (Wilson & Balkau 1990). Domestic solid waste has even become one of the sources of health hazard in many developing countries. It was due to careless in handling the waste and failure to organize appropriate solid waste collection schemes and management (UNEP 2008).

In Malaysia, waste management services fall under the local authority administration. It includes the process of collection and waste disposal. Agencies that are involved directly in solid waste management are the Federal and State Government as well as local authorities. In 1995, it was estimated that 5.5 million tons of domestic wastes and commercial wastes were generated in Malaysia. This amount has increased to 6 million tons per year in 1998 and 8 million tons in 2000. Over the period of 1991 to 2020, waste generation is estimated to increase by an average of 3.24% per annum. Domestic waste composition in urban setting of Malaysia consists of 51.8% vegetables and putrescible, 28.3% paper, 7.7% plastics, 4.9% metal, 2.3% glass as well as 2.0% textile (Manaf et. al 2009).

All activities in solid waste management involve risks. The risks could appear at any step starting from waste collection till disposal process at landfill. The relative risk for disease and injury for domestic waste collectors are noted to be six times more compared to the control population (World Bank Group 2006). Domestic waste collectors have an increased risk of respiratory and influenza-like symptoms as they are exposed to various materials found in the waste itself, irrespective of the type of wastes they collect. Despite the low levels of exposure, several studies have demonstrated that it has an effect to the respiratory system and that the exposure levels are measurable (Kuijer & Frings 2004).

Based on several studies conducted before, environment in waste collection site is a potential place of health hazard because of the dusts, gases, bio-aerosols, chemicals as well as biological materials released or contacted during waste handling (Heldal et. al 2003; Wouters et. al 2002; Betsinger et. al 2000). The effect of these substances towards the increased prevalence of respiratory diseases has been reported in the Netherland, USA and Norway. Once a disease stage has occurred, a long life treatment is usually required.

Therefore, it is important to detect the disease as early as possible. Respiratory function test is one of the assessment tools that are able to detect the respiratory impairment, which occur at an early stage and it has the probability of developing respiratory illnesses. Respiratory impairment is a reversible condition whereas respiratory illnesses usually irreversible (Cotes & Steel 1983; Cotes 1993). Thus, it is important to detect respiratory impairment as early as possible in order to prevent the development of respiratory illnesses.

Although there were many worldwide epidemiological studies that showed relationship between work exposure and adverse health effects including respiratory problems, there was no similar study to date conducted in Malaysia that relates the effect of these exposures to the respiratory health of domestic waste collectors. Therefore, the present study was conducted to

explore the exposure status of working environment and gather information on the respiratory health status among workers at a domestic waste collection centre in Klang Valley, Malaysia.

## 2.0 Materials and Methods

### 2.1 Study area and subjects

This cross-sectional study was conducted among a local domestic waste collection company in Klang Valley. Data were collected from the 3<sup>rd</sup> till the 10<sup>th</sup> of November. The ages of the respondents were between 27 and 56 years old. Those who had any medical history of respiratory illness or is currently being diagnosed having respiratory problem were excluded from the study. The participated staffs were chosen via convenient sampling based on their availability and readiness to take part in this study.

### 2.2 Data collection

One hundred and thirty workers in the domestic waste collection centre who fulfilled the study criteria were included in the study. An interview-guided questionnaire based on variables of interest was used to gather information from respondents. An interview was conducted by a single researcher to avoid interviewer bias. All information and findings were recorded. Information on occupational and environmental history was obtained based on the period of the past six months.

### 2.3 Statistical analysis

Data management and analysis were performed using SPSS version 21. The distribution and frequencies were examined. Chi square test was used to analyze the categorical data while Independent Student's t-test was used to compare the numerical variables.

### 2.4 Ethical Consideration

This study was conducted with the permission from the National Solid Waste Management Department, Ministry of Urban Wellbeing, Housing and Local Government, Malaysia. All collected data were kept confidential throughout the study.

## 3.0 Result

### 3.1 Characteristics of respondents

Overall, there were 111 workers responded to our survey. The sociodemographic profiles of the respondents are described in Table 1. The mean age of the respondents was 40.38 ( $\pm 9.28$ ), in which the youngest is 20 years old while the oldest is 56 years old. Majority of the workers were males and of Malay ethnicity. Nearly two thirds of them have education up to secondary level and most of them are married. Meanwhile, in term of job history, the mean age of started working was 33.87 ( $\pm 8.84$ ) with 6.3 ( $\pm 3.62$ ) years of working experience and 11.27 ( $\pm 1.18$ )

hours of working per day. In term of shift work, 87.4% work in shift while majority of workers have 1-5 days of absentees.

**Table 1:** Characteristics of respondents

Variables	Mean (SD)	Frequency (%)
Age (years)	40.38 (9.28)	
Sex		
Male		101 (91.0)
Female		10 (9.0)
Ethnicity		
Malay		99 (89.2)
Others		12 (10.8)
Educational Status		
Primary School		32 (28.8)
Secondary School		72 (64.9)
Diploma/ Degree		7 (6.3)
Marital Status		
Single		17 (15.3)
Married		87 (78.4)
Widow		7 (6.3)
Age started working (years)	33.87 (8.84)	
Working Experience (years)	6.30 (3.62)	
Duration of working (hours)	11.27 (1.18)	
Shift		
Yes		97 (87.4)
No		14 (12.6)
Days of absentees		
0 day		52 (46.8)
1-5 days		51 (45.9)
6 days or more		8 (7.2)

### 3.2 Prevalence of respiratory symptoms

The overall prevalence of respiratory symptoms was 56.8% with two fifth of them complaint of cough and phlegm as the most frequent respiratory symptoms that they encounter (Table 2).

**Table 2:** Respiratory symptoms

Variable	Frequency, n	Percentage (%)
Overall prevalence	63	56.8
Phlegm	24	21.6
Cough	23	20.7
Wheezing	19	17.1
Shortness of breath	3	2.7

For the PPE usage among the workers, most of them wear long sleeve shirts, long sleeve pants and boot. Meanwhile, only two fifths of the workers choose to wear face mask while working (Table 3).

**Table 3:** Personal Protective Equipment (PPE) usage among workers

Variables	Frequency, n	Percentage (%)
Overall prevalence	71	64.0
Boot	109	98.2
Long sleeve shirt	107	96.4
Long pants	107	96.4
Face mask	47	42.3
Helmet	37	33.3
Ear muff	15	13.5

Table 4 showed the bivariable analysis of the factors associated with respiratory symptoms among the workers. Age of workers, age started working and days of absentees are significantly associated with respiratory symptoms among the workers.

**Table 4:** Bivariable analysis on respiratory symptoms among the workers

Variables		Respiratory Symptom		$\chi^2$ (df)	<sup>1</sup> t-test (df)	P Value
		Yes	No			
Age	Mean (SD)	42.03(8.52)	38.21(9.85)		2.15 (93)	0.030
Sex	Male	46 (35.5)	55 (54.5)	1.29 (1) <sup>3</sup>		0.220
	Female	2 (20.0)	8 (80.0)			
Ethnicity	Malay	43 (43.4)	56 (56.2)	0.01 (1)		0.910
	Others	5 (41.7)	7 (58.3)			
Educational Status	Primary School	19 (59.4)	13 (40.6)	4.87 (2) <sup>3</sup>		0.090
	Secondary School	26 (36.1)	46(63.9)			
	Diploma/ Degree	3(42.9)	4 (57.1)			
Marital Status	Single	11 (64.7)	6 (35.3)	4.13 (2) <sup>3</sup>		0.130
	Married	35 (40.2)	52 (49.4)			
	Widow	2 (28.6)	5 (71.4)			
Age started working (years)		31.08 (8.45)	36.00 (8.60)		3.00 (109)	0.003**
Working Experience (years)		6.59 (4.03)	6.08 (3.28)		-0.72 (89)	0.470
Duration of working (hours)		11.23 (1.28)	11.30 (1.12)		0.33 (109)	0.750
Shift	Yes	42 (43.3)	55 (56.7)	0.01 (1)		0.970
	No	6 (42.9)	8 (57.1)			

Smoking	Yes	23 (46.9)	26 (53.1)	0.49 (1)	0.480
	No	25 (40.3)	37 (59.7)		
Days of absentees	0 day	4 (7.7)	48 (92.3)	52.82(2) <sup>3</sup>	<0.001***
	1-5 days	36 (70.6)	15 (29.4)		
	6 days or more	1 (12.5)	7 (87.5)		
Face mask	Yes	25 (53.2)	22 (46.8)	3.28 (1)	0.070
	No	23 (35.9)	41 (64.1)		

<sup>1</sup> statistical analysis by Student T-test

<sup>2</sup> statistical analysis by Chi-square with row column percent (%)

<sup>3</sup> continuity correction

\* significant at  $p < 0.05$

\*\* significant at  $p < 0.01$

\*\*\* significant at  $p < 0.001$

#### 4.0 Discussion

Working with waste material has long been known as a hazardous occupation, with potential for occupational lung exposure and infection. The findings of this study revealed that of those who had worked for a longer duration in the selected domestic waste setting, they have more incidences of respiratory problems compared to more recent workers. Doney et al. (2014) conducted a national health interview survey among American working adults aged 40 to 70 years old which revealed that the highest prevalence of chronic obstructive pulmonary disease was among the healthcare support occupations, followed by those in the food preparation and domestic-waste related occupation. The prevalence varied by occupations, suggesting workplace exposures may contribute to pulmonary symptoms. Our findings revealed that those in situations of constant contact to domestic waste have higher respiratory symptoms.

The mean age of workers in this study was above 40 years old. The mean age group that had the highest complain of respiratory symptoms are those in 40 years and above category. This is consistent with several WHO studies (2010). What is consistent in several international studies was that age is a determinant to health-related morbidity and mortality. Ethnic has been described in many epidemiological studies as a risk factor for mortality such as cardiovascular disease. Our study did not show any significant risk with ethnicity, however this study is limited by the low percentage of the respondents being non-Malays (10%). Neither were there significant findings among genders due to the scope of work which is predominant male workers.

When specifically examining the risk factors of domestic waste workers, low education and poor knowledge of hygiene have been identified and were all predictors of respiratory disorders. Our findings however failed to show any significant association between education level and PPE usage with respiratory symptoms. There is a positive relationship between higher prevalence of absentees among workers in the present study with respiratory symptoms. Another possible explanation of the absentees includes the age of the respondents enrolled in the study (Ferr'e 2012). Majority of them were relatively older.

The impairment is obvious because the decline of lung function and the prevalence of airway obstruction with increasing age, were less pronounced during youth and early adulthood (Robbin et al. 1995). Furthermore, factors such as non-occupational outdoor pollution, indoor pollution as well as environmental tobacco smoke in the workers of the present study possibly contributed to the differences in the findings.

The variety of symptoms could be contributed by factors like differences in geographical variants and climate, types of wastes involved and personal attribute of the worker such as smoking and education level. Of these factors, we noticed that a large portion of our respondents that had respiratory symptoms were active smokers. Smoking led to impaired lung capacity that aggravated their symptoms. The respiratory problems also occurred in other types of occupation, for example among quarry workers, although the content of the irritants might be different, but the physiological mechanism irritant remains the lungs tissue damage culprits (Razlan et al. 2002). Even though the causative agents are different, occupational workers at risk needed to be informed about the occupational exposure risk. Employers have the responsibilities to educate and prevent further health deterioration of their employees.

Undeniably, the workers are constantly exposed to organic dusts, bio-aerosols or aerosolized bacteria and fungi in their course of work. The exposure leads to infection and inflammation of the airways and resulting in the development of respiratory disorders. The range of workers' symptoms might vary from mild to severe as from findings of the many studies conducted in different countries. Our findings are consistent with a study conducted in the Netherlands, which revealed that majority of the workers complained of respiratory symptoms. Furthermore, our findings where majority of the workers complained of productive cough were similar to an epidemiological study conducted in Mumbai, India (Giri et al. 2010). The authors found that among sewage workers, the prevalence of cough was the highest compared to other symptoms.

Despite the presence of high prevalence of respiratory symptoms in this study, there was a low awareness among the workers in the present study on the need of personal protective equipment usage. Face mask has the lowest usage. Failure of face mask usage probably explained the number of absentees among the workers. In a hostile airborne environment, protective measures like face mask usage is of importance in personal hygiene practice. The welfare of the workers and their families are of concern as 78% of the workers were married. Furthermore, our study did not inquire if their family or household members' health were affected by the workers' occupation. Thus, the history of household members' health should be assessed to identify possible link of the workers bringing home infectious agents. Our findings revealed that majority do not shower nor change their working clothes upon the end of shift.

The present findings in this study have several potential limitations. Our study used self-reported questionnaire thus, subjected to reporting bias. Further work should, therefore, be conducted using quantifiable assessment like spirometry test and for severe respiratory symptoms, a lung function test. Our respondents are of mixed work unit. That is, we have workers working in the office environment and workers who are directly involved in the domestic waste process. The presence of healthy worker effects might cause the relationship between respiratory symptoms and various occupational factors to be non-significant.

Health assessment that was done might not reflect the true health status of the workers and the exposure status of the work environment due to limitation of the study design. Non-occupational outdoor environmental pollution such as automobile exhaust fume, dusty surrounding and environmental tobacco smoke create hazardous dust and fumes that could affect the respiratory health of the workers in the present study and might act as confounders to the study. Pollution from other sources must be assessed to achieve a true picture of how the domestic waste occupation influences the health of the workers.

## 5.0 Conclusion and recommendation

There was a certain degree of respiratory health implications from the exposure to hazardous materials in domestic waste among the domestic waste collectors. It also appeared that there was a relative effect on the respiratory health among those in direct contact and among those with longer period of exposure to domestic waste. Respiratory symptoms could have been more serious if preventive measures were not in place. Nevertheless the attitude of the workers to comply towards personal protective equipment usage and hygiene practice of the workers has a bigger role in respiratory disease control. Additional emphasis is needed to develop an intervention packages to reduce the exposure and prevent the adverse health effects by identifying and minimizing the risk factors among domestic waste collectors.

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## Declaration

Author(s) declare that all works are original and this manuscript has not been published in any other journals.

## Authors' contribution

Author 1: Advised during manuscript preparation, idea conceptualizing

Author 2: Idea conceptualizing, literature review, drafting the final manuscript, publication

Author 3: Literature review, data analysis

Author 4: Literature review, reviewing the final draft

Author 5: Reviewing the final draft, publication

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