

Survey of Potential Health Risk of Rubbish Collectors from the Garbage Dump Sites in Kelantan, Malaysia

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ABSTRACT— *Landfill is a traditional method for solid waste disposal used throughout Malaysia including Kelantan and landfill is a place for the poor to earn their living. Some of them depend 100%, some of them do it as a part time job to earn extra income. Due to unhygienic working environment, rubbish collectors may be exposed to various type of diseases and landfill hazards. Hence, this study aims to investigate the potential health risk faced by garbage collectors from the landfill sites in Kelantan. Interviews were carried with 50 respondents based on a structured questionnaire crafted to capture the demographic characteristics and potential health risk. A descriptive statistical method was used to describe demographic profiles of respondents and to analyze potential health risk faced by respondents. Out of 50 respondents, 47 of them were locals (Malaysians), two Burmese and one Indonesian. They were 33 males and 17 females. Majority of the respondents were from the age group of 20 to 29 where 8 (16%) of them were still single while 42 (84%) were married. Among the married respondents, 8 (16%) of them have no children, 12 (24%) have one to two children, 13 (26%) have three to four children and 17 (34%) have more than four children. Majority of the respondents had from primary education. There provided a few reasons of why they were involved in rubbish collecting. 17 (34%) respondents said that it was a source of income, nine (18%) respondents answered as self-employment, 21 (42%) respondents said that it was for an extra income, while, three respondents said that they took over (continued) the work from their parents. There were 29 respondents (58%) who worked around three to four hours per day, 17 respondents (34%) worked around five to six hours per day, and four respondents (8%) worked more than six hours per day. The study also showed that, 37 of surveyed garbage collectors have ever suffered from twisted ankle, 36 of garbage collectors often suffered from backache, 35 of garbage collectors have ever injured by sharp object and 30 of garbage collectors often suffered from sore throat, cough, and fever. It also showed that 19 of garbage collectors have ever suffered from respiratory disease while 14 of garbage collectors have ever suffered from skin disease. In conclusion, garbage collectors faced tremendous health challenge. Garbage collectors with higher years of experiences have higher chances of getting skin disease and respiratory disease such as shortness of breath. The results also showed that the risk of injured by sharp object decreased with the increase in education level of garbage collectors. It is hoped that through this study, the local authority will recognise garbage collectors as a job for the poor to earn their livelihood and develop proper mechanism to address the issue related to their health risk.*

Keywords— garbage collectors, demographic profile, garbage dump site, health risk, descriptive statistical, Kelantan.

1. INTRODUCTION

Scavenging renders economic and environmental benefits such as providing income to unemployed individuals, supplying cheaper raw materials to industries, decreasing the demand for collection, transportation and disposal of waste. In other developing countries such as Malaysia, scavenging starts with the collection of plastic bags, bottles, papers, cardboards, aluminium, iron and rubber materials, and it mostly takes place in the informal sector. Garbage collectors in Malaysia provide informal collection and recovering additional materials at the open dumping sites (landfill) which not only help them in earning an income but also assist to reduce the amount of solid waste to be disposed and thus reduce environmental degradation.

Recycling of waste in the developing countries is largely dependent on garbage collectors in recovering materials. This is done by garbage collectors at the dumpsites who searched for recyclables in exchange of money. Scavenging is an occupation that provides a livelihood for the poor and it is an important survival strategy in which impoverished individuals cope with scarcity. Garbage collectors typically specialize in recovering only one or a few types of waste materials. Scavenging takes place in all stages along the waste management system that is; source separation at household or place generating waste material; where material are reused, sold or given away for instance, old newspapers are reused for packing. Batone and Okiverira (1992) observed that during collection, garbage collectors segregate recyclables for sale. On the other hand, garbage collectors also retrieve recyclables at dumps, along the roads or public places, in canals and streams, at landfill sites prior to burial and purchase source of separated recyclables from residents.

Scavenging is a prevalent occurrence throughout the developing world. World Student Community for Sustainable Development, (WSCSD, 2005) estimated that up to 2% of the population in the third world countries survive by recovering materials from waste. Garbage collectors sort out materials to sell for recycling, as well as for their own use. The recovery of materials from dumpsites by garbage collectors in developing countries takes place in the wide variety of settings. Although, the circumstances in which materials are recovered in a particular place may be unique, it is obvious as opined by Blincow (1986) that garbage collectors source their materials from two major ways; either by sorting or collecting freely from dumps and landfill, or by purchasing the already sorted materials from households.

Poverty is common in most developing countries and this has forced the poor to get incomes in most of the resources available to them. Vogler (1984) stated that given the very low income in most developing countries, scavenging provides them with reusable and saleable materials. In doing so, the poor has developed creative ways in order to satisfy their needs. This is through the recovery of items which are not necessarily pail of the waste stream. In Mali, a lot of farmers search and dig artefacts produced by ancient Mali Empire in order to sell them to art collectors (Holmes, 1984). In Calcutta, garbage collectors work along the rail road tracks in order to recover the pieces of coal that fall from the train (Furedy, 1984). In Cairo, garbage collectors search ox dung for undigested kernels of corn to eat (Meyer, 1987).

Like most developing countries, solid waste landfill sites in Malaysia comprise of either open dumping or controlled dumping sites as proper sanitary landfill concepts are not fully implemented due to technological and financial constraints (Chong, *et al.*, 2005). The list of existing landfill sites as prepared by the Ministry of Housing and Local Government (MHLG, 2002) is summarized in **Table 1.0**. Majority of the landfills in Malaysia are open dumps, thus cause natural resource polluted and various environmental problems such as health hazards, surface water and ground water pollution as well as foul smell formation. There are other treatment or disposal methods such as incineration and composting which could moderate the solid waste problems. However, these methods are not economically and socially viable at this moment. Therefore, reduction, recovery and recycling of waste play important roles in tackling the pressing solid waste problems.

Table 1.0: Existing Landfill Sites in Malaysia

No.	States	Number of landfill	Average Area (ha)	Waste received (ton/day)	Landfill Level				
					Level 0	Level 1	Level 2	Level 3	Level 4
1	Johor	18	5.6	1,082	10	6	2	1	0
2	Melaka	4	18.5	1,065	2	0	1	1	0
3	Negeri Sembilan	11	10.9	727	7	3	1	0	0
4	Selangor	14	10.6	2,285	0	7	1	1	5
5	Pahang	14	8.7	895	5	3	2	3	1
6	Terengganu	8	5.6	707	2	4	1	0	1
7	Kelantan	12	5.6	424	10	1	1	0	0
8	Perak	19	10.3	1,450	9	6	3	1	0
9	Kedah	10	7.7	893	3	2	4	0	1
10	Pulau Pinang	2	22.3	1,400	0	0	1	1	0
11	Perlis	1	4.0	100	0	0	0	0	1
12	Sarawak	36	2.9	1,000	20	14	2	0	0
13	Sabah	20	21.7	851	15	4	1	0	0
14	Kuala Lumpur	1	12.0	600	0	0	1	0	0
15	Labuan	1	12.1	12	0	1	0	0	0
Total		171	9.1	13,491	83 48 %	51 30 %	21 12 %	8 5 %	9 5 %

Notes: Level 0: Open dumping
Level 1: Controlled tipping
Level 2: Controlled landfill with bund and daily cover soil
Level 3: Sanitary landfill with leachate recirculation system
Level 4: Sanitary landfill with leachate treatment system

Source: MHLG, (2002).

In the 8th Malaysian Plan (2001 to 2005), the government has included solid waste minimisation, promotion of reuse, developing a recycling-oriented, and execution of pilot projects for recycling as some of its main policy goals. The 9th Malaysian Plan (2006 to 2010) further emphasised the continuation of reduce, reuse and recovery of solid waste as well as greater use of environmentally friendly products. A department, known as the “Jabatan Pengurusan Sisa Pepejal” (National Solid Waste Management Department), has been established under the ministry of Housing and Local Government after the bill is gazetted to implement the new policy. All matters relating to solid waste management will be under the jurisdiction of this new department.

The Government of Malaysia, through the Ministry of Housing and Government (MHLG) launched a national recycling in 1993. However, the campaign was not successful due to lack of support and participation from the public. The recycling campaign was re-launched on 2nd December 2000. At the launch, it estimated that by 2020, 22% of all waste would be recycled (Agamuthu, 2001). In tandem with government initiatives, scavenging of recyclable materials by garbage collectors in open dumping sites and along the streets is increasing. Garbage collectors commonly earn their livelihood through sorting and recycling of recyclable materials such as paper, bottles, plastics and metals in dump site. In doing this, waste collectors were exposed to all kinds of diseases and landfill hazards. In Manila for example, there are more than 35 diseases have been identified in garbage collectors communities and areas that lack refuse collection and sanitation, including diarrhea, typhoid fever, cholera, dysentery, tuberculosis, anthrax, poliomyelitis, skin disorders, pneumonia and malaria (German Agency for Technical Cooperation, 1986). A number of health studies have been conducted in India and Nepal (Huisman, 1994; Direct Initiative for Social and Health Action, 1996). Tuberculosis, dysentery, asthma, pneumonia, parasites, malnutrition and bronchitis are the most common diseases among garbage collectors based on health studies of garbage collectors conducted in Bangalore, Manohar, and New Delhi (Huisman, 1994). Of the 180 garbage collectors surveyed at Calcutta's open dumps in 1995, 40% had chronic cough, and 37% jaundice; the average quarterly prevalence of diarrhea was 85%; fever, 72%; cough and cold, 63%; eye soreness or redness, 15%; and skin ulcers, 29% (Direct Initiative for Social and Health Action, 1996). A study comparing garbage collectors working at Calcutta's Dhapa dump in the 1980s with nearby farmers who use organic solid waste as fertilizer showed that garbage collectors reported a higher prevalence of respiratory diseases (71% versus 34%), diarrhea (55% versus 28%), and proto-zoal and helminthic infestation (32% versus 12%) (Nath, 1991). At Bombay's open dump sites, 80% of garbage collectors reported eye problems, 73% respiratory ailments, 51% gastrointestinal ailments, 40% skin problems, and 22% orthopedic ailments. Based on clinical examination, 90% had decreased visual acuity, and 27% had skin lesions, of which 30% were determined to be directly related to work (Konnoth, 1991).

Women and children often make up a majority of waste pickers at dump sites in developing countries. Besides the implications for reproductive toxicity, morbidity data from dump site waste pickers in India suggest that waste picking children have 2.5 times more risk of morbidity than non-waste picking children from the same housing areas. In 1991, 974 children below 16 years of age were working at the largest dump site of Metro Manila in the Philippines. Clinical examination of 194 children showed that 30% had skin diseases (including rashes, hypopigmentation, fungal infection, or boils) at the time of examination. They also reported multiple respiratory symptoms including chronic cough (23%), chronic phlegm production (18%), wheezing (25%), and shortness of breath (19%). Based on chest x-rays conducted following the survey, in only three percent were these symptoms attributable to residual or minimally active pulmonary tuberculosis (Adan, *et al.*, 1982; Torres, *et al.*, 1991).

2. MATERIALS AND METHODS

Sampling Sites

Eight landfills in Kelantan were selected for the survey. Before selecting the study site, preliminary visit was done to assess the presence of rubbish collectors. Henceforth, survey sites were selected based on the accessibility, status of the landfills whether it is active or not and also the presence of rubbish collectors. Selected landfills are located in Tanah Merah, Machang, Bachok, Tumpat, Lubok Jong, Gua Musang, Kuala Krai and Jeli in Kelantan (**Figure 1.0**).

Sampling and Data Analysis

A set of questionnaire was designed based on Magaji, *et al.*, (2011) which consists of four parts namely demographic profile, type of materials scavenged, quantity and volume of each material scavenged and potential health risk of garbage collectors. Garbage collectors were chosen randomly from eight selected domestic waste landfills with the total of 50 respondents. The data was collected through interview with the use of prepared questionnaire. Survey was conducted during peak hour of a day which was from 8.00 a.m. until 5.00 pm at each of the dumping sites. This was done to ensure that there was no any possibility of garbage collectors that were left behind from this survey.

A descriptive statistical method based on the Statistical Package for Social Science (SPSS) version 15 and Microsoft Office Excel 2003 was used to describe demographic profile of respondents, types and volume of waste collected by respondents and potential health risk.

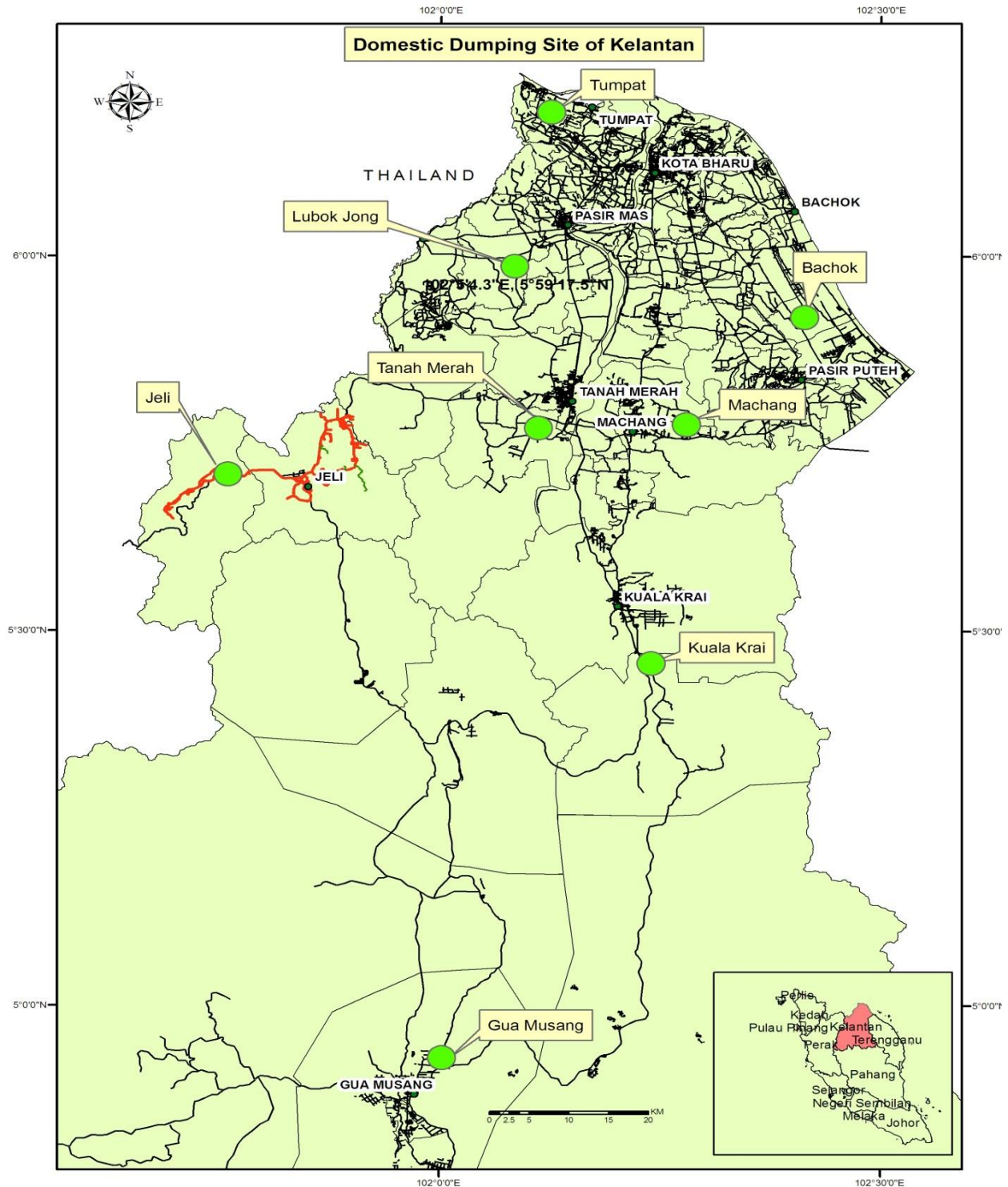


Figure 1.0: Sampling Sites

3. RESULTS AND DISCUSSION

Demographic Profile of Respondents

The demographic data of respondents such as citizenship, gender, age, number of children and level of education only involve single variable because it only has small number of categories or values. Therefore, a pie chart was used to illustrate relative frequency of the categories or values of data.

The results showed that there were 47 Malaysians, two Burmese and one Indonesian respondent. The percentage of Malaysians was 94% and 4% for Burmese as well as 2% for Indonesian. This result indicated that, not only Malaysians who saw the potential of scavenging at the landfills as one of the income source but there were also immigrants from Burma and Indonesia. This also revealed that, landfills in Malaysia especially in Kelantan have plenty of saleable waste materials to be explored and can be turned into money.

There were 33 male respondents and 17 female respondents that were involved in this study. In terms of percentage, the male respondents contributed 66 % of the total respondents while, female respondents was 34 %. Male respondents' percentage was higher than female respondents due to the nature of the job. Scavenging was quite unsanitary and the garbage collectors may face molestation by others (Magaji, *et al.*, 2011). Hence, females would not prefer to become garbage collectors due to unsanitary and un-aesthetic condition of the dumping sites. Besides that, females were not able to collect and handle heavy waste during collection and selling.

In terms of age groups, there were two respondents from the age group of below 20 (4%), 15 respondents from the age group between 20 to 29 (30%), eight respondents from the age group between 30 to 39 (16%), 11 respondents from the age group between 40 to 49 (22%), ten respondents from the age group between 50 to 59 (20%) and four respondents from the age group between 60 to 69 (8%). Majority of the respondents were in the age group of 20 to 29 years old and very few were below 20 years old. Many of the respondents who were involved in waste collecting were between 20 to 29 years old. This evidence was supported by Magaji *et al.* (2011) where they stated that, young and energetic garbage collectors were able to withstand the stress of scavenging. These garbage collectors were also attracted and motivated by the income collected and the flexibility of this job as compared with other jobs especially in the time factor. The age group of respondents had led to another relating factor i.e. the marital status. It was found that, 8 respondents (16%) were still single while 42 respondents (84%) were married. The age of married respondents was between 20 to 59 years old. Furthermore, based on the results obtained, eight respondents (16%) had no children, 12 respondents (24%) had one to two children, 13 respondents (26%) had three to four children and 17 respondents (34%) had more than four children. From the results, it was evidently that there were only a small number of garbage collectors (16%) that had no children and the rest of the garbage collectors (84%) had at least one or more children. This showed that, rubbish collecting was one of the sources of income for them to support their families. This was parallel with the findings of Medina (2000) and Wilson, *et al.*, (2006) where they reported that, up to 2% of Asian and Latin America's urban population was dependent on waste collecting to earn their livelihood.

In terms of educational background it was shown that, 11 respondents (22%) had no formal education, 17 respondents had primary education (34%), 15 respondents had *PMR* (lower secondary- form three) qualification (30%), and seven respondents had *SPM* (secondary - form five) education (14%). Majority of the respondents were from primary education (34%). This was believed to be the reason why they chose to be garbage collectors because they did not have adequate academic qualification to seek for better jobs. The percentage of garbage collectors decreased as the academic qualification increased. This was shown in the results obtained where respondents who had *SPM* education level contributed only 14% of the total respondents.

When they were asked the reasons of getting involved in scavenging, most of them said that they did that to get extra income; 38 respondents (76 %), nine (18%) of them did it as a permanent job and three (6%) respondents were involved in rubbish collecting because they carried on or took the work from their parents. Majority of the respondents joined this scavenging for extra income. Some were rubber tappers and petrol station attendants and these were their permanent jobs. This job helped them to generate extra income to support their families. A few respondents joined this scavenging because they continued from their parents. However, most of the parents nowadays would send their children to schools for better jobs in the future instead of *inheriting* rubbish collecting job from their parents.

Most of the respondents work at least three to four hours per day. The results obtained shows that, 29 respondents (58%) worked around three to four hours per day, 17 respondents (34%) worked around five to six hours per day, and four respondents (8%) worked more than six hours per day. It could be suggested that, respondents who worked three to four hours per day basically is part-time garbage collectors. On the other hand, respondents who worked five to six hours could be in to two groups which were part-time and full-time garbage collectors. Meanwhile, respondents who worked more than six hours per day can be categorized as full-time garbage collectors.

Potential Health Risk

The potential health risk faced by 50 garbage collectors which were obtained through interview was given in **Table 2.0**. The results indicated that 37 of them have ever suffered from twisted ankle, 36 of garbage collectors often suffered from backache, 35 of garbage collectors have ever injured by sharp object and 30 of garbage collectors often suffered from sore throat, cough, and fever. It also showed that 19 of garbage collectors have ever suffered from respiratory disease while 14 of garbage collectors have ever suffered from skin disease. The relationship between type of diseases and perception of respondents on the health risk faced by them was determined. Based on calculation, Ho was rejected

because calculated chi-square (142.85) is greater than distribution table chi-square (18.31) for alpha 0.05 at degree of freedom 10. Thus there is a relationship between type of diseases and perception on health risk faced by respondents.

Table 2.0: Potential Health Risk Faced by Respondents

Type of Diseases	Yes	No	Total
Skin disease	14	36	50
Respiratory disease such as shortness of breath	19	31	50
Sore throat, cough and fever	30	20	50
Diarrhea	19	31	50
Trachoma	10	40	50
Twisted ankle	37	13	50
Backache	36	14	50
Pricked by hard or sharp object	35	15	50
Visit a specialist for medical body check-up	3	47	50
Vaccinated with hepatitis or tetanus	1	49	50
Eat at workplace	13	37	50
	217	333	550

There were many factors that affect health and safety of garbage collectors. Such factors related to the gender, age group, educational level, and monthly income of garbage collectors as well as years of experience of garbage collectors in scavenging. However, years of experience in scavenging, educational level, and income level of garbage collectors proved to be more significant and more influential than other factors after being interpreted by using cross tabulation with chi square-method.

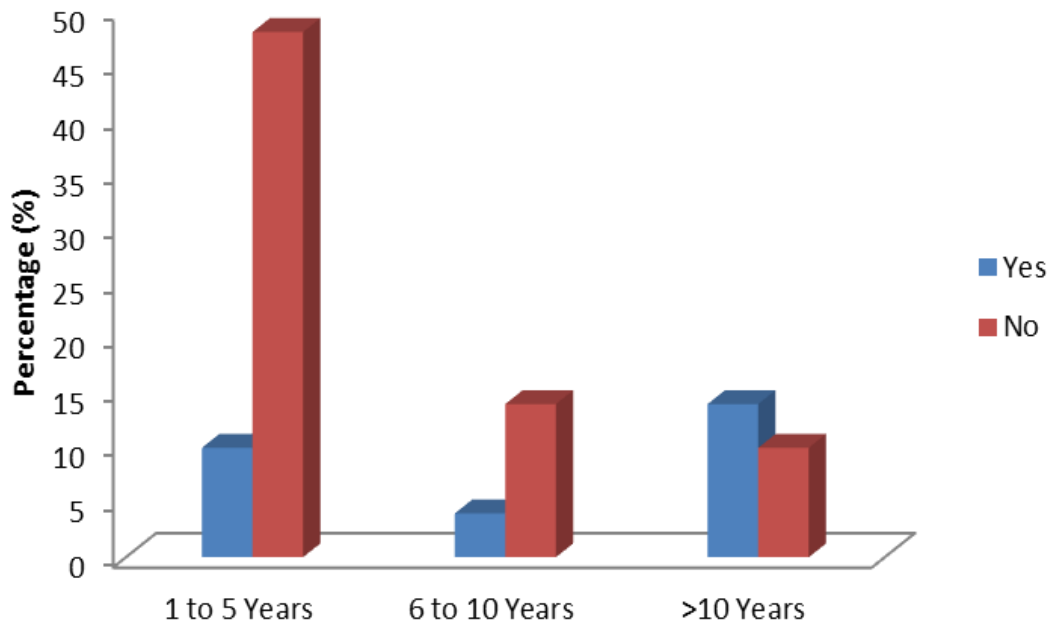


Figure 2.0: Years of Experience in Relation to Skin Disease

The results showed that there is a significant ($P < 0.05$) relationship between years of experience and suffer from skin diseases at a chi-square 7.291, with a degree of freedom 2. Meaning that, garbage collectors with higher year of experiences have higher chances of getting skin disease. The results also showed that there is a significant ($P < 0.05$) relationship between years of experience and suffer from respiratory diseases such as shortness of breath at a chi-square 7.763 with a degree of freedom 2. Meaning that, garbage collectors with higher years of experience have higher chances of getting respiratory disease such as shortness of breath. **Figure 2.0** and **Figure 3.0** shows that the risk of suffered from skin disease and respiratory disease increased with the years of experience (indicated with blue colour bar). In other word, the longer the time spent working at dumping site, the higher the risk they would suffer from skin diseases and respiratory problem. This was because they often getting direct contact with toxic and infectious components such as broken glass, leachate, dust and fires. (Wilson, *et al.*, 2006). On the other hand, percentage of respondents who answered no to the questions whether they have experienced skin disease and respiratory diseases such as shortness of breath were decreased as the experiences increased (indicated with red colour bar).

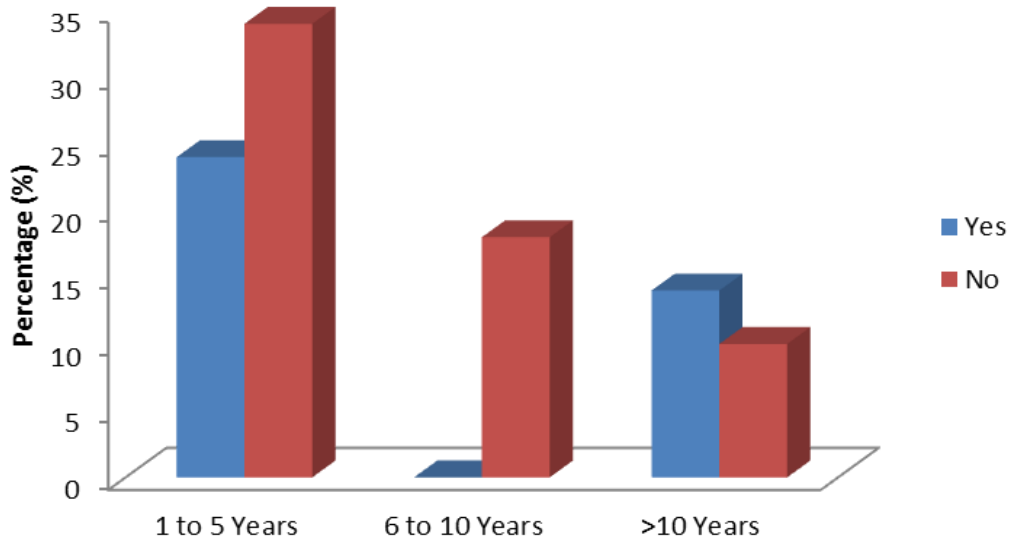


Figure 3.0: Years of Experience in Relation to Respiratory Disease

Educational level is another parameter which was cross tabulated with potential health risk. The results showed that there is a significant ($P < 0.05$) relationship between education level and risk of injured by sharp object at a chi-square 12.687, with a degree of freedom 3. The results showed that the risk of injured by sharp object decreased with the increase in education level of garbage collectors (**Figure 4**). In other word, the higher the education of garbage collectors, the lower the risk they would get injured by sharp object. This was because educated garbage collectors were more aware of the potential hazards and health impacts related to the waste collecting method at the dumping site and thus they are more concerned about their health. They were always equipped with personal protective equipment such as glove and rubber boot (100% of garbage collectors in this survey wore rubber boot) during scavenging. Therefore, they faced lowest risk of getting injured by sharp object such as broken glass.

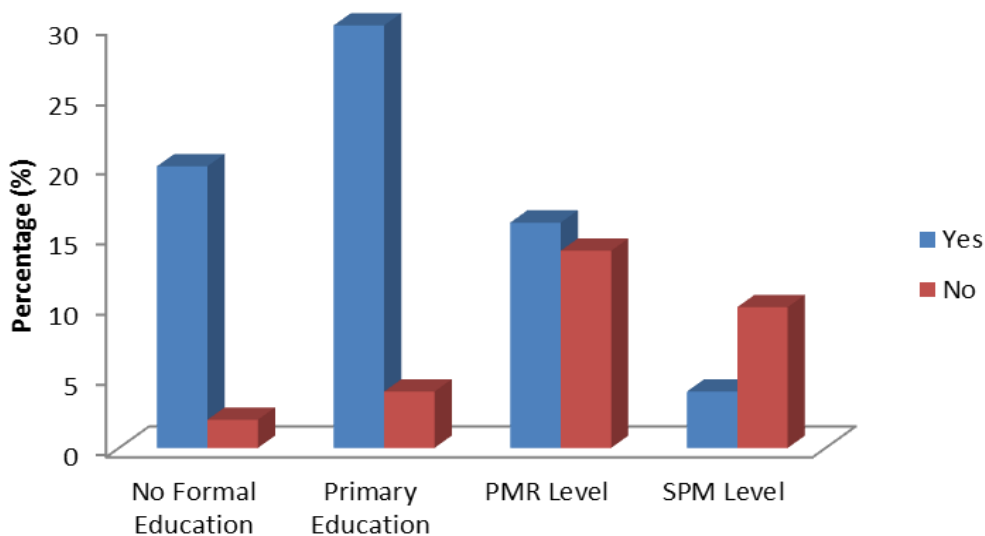


Figure 4.0: Education Level in Relation to Risk of Pricked by Sharp Object

Garbage collectors are undoubtedly exposed to various health risks including being pricked by sharp object because of manual handling of waste and lack of protective clothing or equipment (Wilson, *et al.*, 2006). In Bangkok, 88% of garbage collectors reported being injured by glass, 73% by needles, 30% by bamboo, and 25% by metal (Kungskulniti, *et al.*, 1991).

4. CONCLUSION

Majority of the garbage collectors were males as it was due to the nature of the jobs which was unsanitary and unsuitable for women. Most of the garbage collectors were from age group of 21 to 29 and most of them had low educational level. About half of the respondents involved in rubbish collecting (scavenging) had one reason, which is to gain extra income to support their families. This was evidently shown when 34% of the respondents who were garbage collectors had more than four children. Most of them worked as a rubber tappers or petrol station attendants their full time jobs and scavenging was a part time job for them. The average monthly income of the garbage collectors from selling waste was about RM 465.50 and this was considered as high and able to pull them out of hard core poor groups. At the same time, they have to voluntarily absorb all the risks that may occur at the rubbish dumping sites every day when they perform their duty. They suffered from serious occupational health risks due to manual handling of waste and lack of personal protective equipment. They were undoubtedly exposed to various health risks (Wilson, *et al.*, 2006). Result from this survey showed that garbage collectors that worked at dumping site faced the risk of suffered from skin disease, respiratory disease, injured by sharp object and fever. The garbage collectors who engaged in this profession for longer period of time faced higher risk of suffered from skin disease and respiratory disease as compared with others. Besides, garbage collectors often suffered from backache resulting from the handling of collected wastes. Based on the findings, the risk of get injured by sharp object such as broken glass decreased with the increase in educational level of garbage collectors. This was because more educated garbage collectors were more concerned and aware of their personal health risk and therefore taken appropriate safety measures. Garbage collectors from middle income level suffered the most from cough and fever because they were not able to visit specialist for health check-up as well as they did not have chance to get better nutrition and so for better immune system since they earn money which is only sufficient for supporting their livelihood. In conclusion, garbage collectors faced tremendous health challenge. Garbage collectors with higher years of experiences, low and middle level of income were at higher risk.

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