

# THE ANALYSIS SAFETY AND HEALTH RISKS OF WORKERS IN THE MUNICIPAL SOLID WASTE LANDFILL IN MALAYSIA

**Kamal Imran Bin Mohd Sharif**

School of Technology Management & Logistic,  
Universiti Utara Malaysia, 06010, Sintok, Kedah, Malaysia  
Email: kamalimran@uum.edu.my

## **Abstract**

*The aim of the paper is to reflect the findings from a case study conducted on the awareness to the operation of the municipal solid waste landfill. The study focused on safety and health risks for workers in the municipal solid waste landfill in Malaysia. Workers involved in and face occupational health and safety hazards which are as diverse as the materials they are handling. The study was conducted to identify the safety and health risks to their workers and implementation of appropriate exposure prevention or control measures. The information analysis throughout the research was gathered from survey conducted on a few key personnel of the company. Finally, the study draws several relationships between operation of municipal solid waste landfill in Malaysia and safety and health risk for workers and reflects several recommendations for further research.*

## **Keywords:**

*Safety and Health risks, worker, municipal solid waste disposal, Malaysia*

## **1.0 INTRODUCTION**

In order to reduce the strain on the environment from the deposition of waste in landfills and combustion at incineration plants, several governments throughout the industrialized world have planned greatly increased recycling of domestic waste by the turn of the millennium. To implement the plans, new waste recycling facilities are to be built and the number of workers involved in waste sorting and recycling will increase steadily during the next decade. Several studies have reinforced the hypothesis that exposure to airborne microorganisms and the toxic products thereof are important factors causing a multitude of health problems among workers at waste sorting and recycling plants. Workers at transfer stations, landfills and incineration plants may experience an increased risk of pulmonary disorders and gastrointestinal problems. High concentrations of total airborne dust, bacteria, faecal coliform bacteria and fungal spores have been reported. The concentrations are considered to be sufficiently high to cause adverse health effects. In addition, a high incidence of lower back injuries, probably due to heavy lifting during work, has been reported among workers at landfills and incineration plants.

Workers involved in manual sorting of unseparated domestic waste, as well as workers at compost plants experience more or less frequent symptoms of organic dust toxic syndrome (ODTS) (cough, chest-tightness, dyspnoea, influenza-like symptoms such as chills, fever, muscle ache, joint pain, fatigue and headache), gastrointestinal problems such as nausea and diarrhoea, irritation of the skin, eye and mucous membranes of the nose and upper airways, etc. In addition cases of severe occupational pulmonary diseases

(asthma, alveolitis, bronchitis) have been reported. Manual sorting of unseparated domestic waste may be associated with exposures to large quantities of airborne bacteria and endotoxin. Several work functions in compost plants can result in very high exposure to airborne fungal spores and thermophilic actinomycetes. At plants sorting separated domestic waste, e.g. the combustable fraction of waste composed of paper, cardboard and plastics, the workers may have an increased risk of gastrointestinal symptoms and irritation of the eyes and skin. At such plants the bioaerosol exposure levels are in general low, but at some work tasks, e.g. manual sorting and work near the balers, exposure levels may occasionally be high enough to be potentially harmful.

Workers handling the source-sorted paper or cardboard fraction do not appear to have an elevated risk of occupational health problems related to bioaerosol exposure, and the bioaerosol exposure is generally low. To our knowledge no studies have yet been published on occupational health problems and exposures in relation to recycling of glass or metal tins, or in relation to the production of biogas from biodegradable domestic waste. Limited information exists on the risk and causal factors of the occupational health problems, and analytical epidemiological studies and surveillance programmes need to be undertaken to elucidate causal links between exposures and work-related health problems. These programs can provide data which can be used for administrative regulations and recommendations, e.g. establishment of occupational exposure limits (OELs), to prevent occupational health problems at existing waste recycling plants as well as the large number of plants to be built throughout the industrialized world in the near future. When establishing such OELs attention should be paid to a series of technical problems which have not yet attracted sufficient attention: average versus peak airborne exposure, total versus inhalable aerosol exposure, microbial viriability, viable versus total microorganisms and static area air sampling versus personal air sampling. In addition, synergistic interactions between the different components of the bioaerosol exposure as well as individual susceptibility may be of importance when OELs for exposures at waste sorting and recycling plants are to be established.

## **2.0 OBJECTIVE**

1. To identify the impact of landfill municipal solid waste on worker's safety and health.
2. To identify the relationship between the safety and health elements towards the MSW workers.

## **3.0 LITERATURE REVIEW**

The findings of a study indicated a higher prevalence of work related dermatological, neuromuscular, respiratory, hearing, gastrointestinal symptoms, and injuries among landfill workers than among the control group participants. Furthermore, specific symptoms like nasal stuffiness were positively correlated with the handling of wood products, machine oil, greases, and lubricants; job tasks that required the use of manual or power tools also were positively correlated with backaches and aching joints. Finally, the hygienic survey indicated a high amount of airborne dust, bacteria, and fungi within the breathing zone of the landfill employees (Kitsantas et al. , 2000).

In a study, characteristics of jobs and workers engaged in the collection and disposal of waste were based on a specially developed questionnaire. Five occupational groups were selected: domestic waste collectors, waste reloading workers, waste composting workers, waste sorting workers, and workers at landfill sites. In addition, five job posts were selected: heavy equipment operators, waste sites workers, waste loaders, waste sorters, and waste truck drivers. The analysis of characteristics revealed that among job-related burdens reported by the workers the following were found most noxious: repugnant odor, high dust concentrations, required physical effort, and changing atmospheric conditions. Nevertheless, the workers in question did not claim any occupation-related illnesses or symptoms. The majority of respondents assessed their health as good or very good (Krajewski et al. , 2000).

Potential impacts of landfill gases emissions and flaring include explosion and fire, asphyxia, human health affections, odor nuisance, harm to flora and fauna, noise pollution, and heat (Environment Agency, 2002). The typical causes of landfill fire were studied in Finland and they were found to be insufficient covering/compacting, ash disposal, and deliberate fire starting (Ettala et al. , 1996).

A review of literature showed an increase of reports of adverse health effects by people living near hazardous wastes landfill sites in the form of increase in self-reported health outcomes and symptoms such as headaches, sleepiness, respiratory symptoms, psychological conditions, and gastro-intestinal problems; excesses in bladder, lung, and stomach cancers reported; adverse pregnancy outcomes such as low birth weight and increased risk of birth defects; and increased presence of chromosomal changes, especially in children (Vrijheid, 2000).

Municipal solid waste (MSW) workers, particularly garbage collectors, are among the most highly exposed occupational groups with respect to health and safety risks (Drudi, 1999; An et al. , 1999) Results of a study in Florida, US indicated an extremely and routinely high rate of injury to MSW workers. The expected annual numbers of musculoskeletal and dermal injuries to MSW workers, not including primarily the recycling industry, in Florida from 1996 through 1997 were assessed at 2,420 and 728, respectively. The expected annual number of total injuries was assessed at 3,146, corresponding to a rate of  $54 \pm 18$  injuries per 100 workers per year with 95% confidence. Although some workers may be injured more than once during a year, this finding indicates that the majority of MSW workers sustain an injury requiring clinical care each year (Englehardt, 2003).

#### **4.0 METHODOLOGY**

Research Methodology applies the ways to researcher comes close to problems and seeks answers. This chapter describes the subject of the study and the methods used to gather information. Research methodology is a set of procedures or methods used to conduct research. There are two types of research methodologies. These two types of methodologies are qualitative and quantitative methodologies. Both methodologies will be used during the research of exploring the elements in municipal solid waste landfill. Qualitative research involves the use of qualitative data such as direct observations and

analysis of documents. Questionnaire is the research method used for developing to evaluate quantitative data. These research methods are important to gather information such as users' preferences, opinions and suggestions.

The main objective of this study was to identify the elements in municipal solid waste landfill in Malaysia impact on the worker safety and health. The structured methodology has been chosen to exploring the elements in municipal solid waste landfill that affect the safety and health of the workers. However by doing this study, the municipal solid waste landfill especially in Malaysia can improve the elements that unsafe to workers while increasing their awareness and facilities at the same time.

#### 4.1 Types and Sources of Data

Both primary and secondary data were used in conducting the study. The primary data was obtained mainly from the administration of questionnaires and observation, while the secondary data were obtained from the previous research and sources from internet.

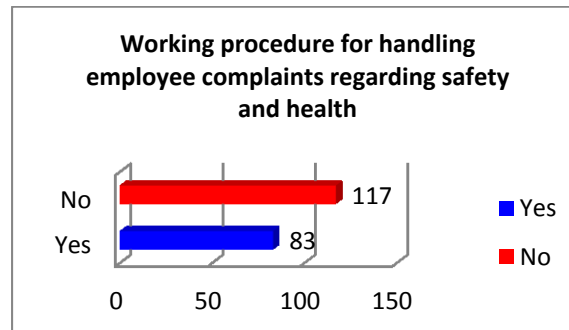
#### 4.2 Sampling Procedure and Data Collection

In this project, one worker in municipal solid waste landfill is one sampling unit. The survey questionnaires were distributed during weekdays while the respondents take their rest after work. We explained the purpose of the study and asked if they were willing to answer the questionnaire. A total of 200 samples were collected from March to April in 2014. 200 questionnaires were used for the final data analysis.

#### 4.3 Data Analysis

The data was analysis using the Statistical Package for the Social Sciences (SPSS) version 19. Statistical results were presented in graphs, simple statistics and pictorially.

## 5.0 FINDING



*Figure 4.1: Working procedure for handling employee complaints regarding safety and health*

According to 4.1, the graph shows that the 117 respondents are response that their working sites do not have any working procedure for handling employee complaint regarding safety and health. 83 respondents are response that their working sites have working procedure for handling employee complaints regarding safety and health. From this result, most of the landfill are not aware the importance of safety and health plan for worker to ensure that they are follow the rules and regulations established in landfill.

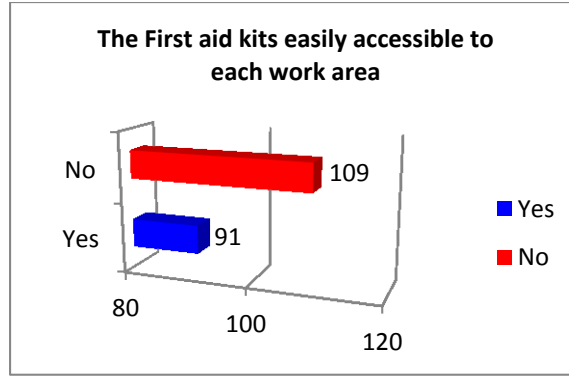


Figure 4.2: The first aid kits easily accessible to each work area

According to the figure 4.2, the graph shows that the 109 respondents are response that the first aid kits are not easily accessible to each work area and 91 respondents are response that the first aid kits are easily accessible. This result shows that most of the landfill do not emphasized on medical service and first aid for their workers.

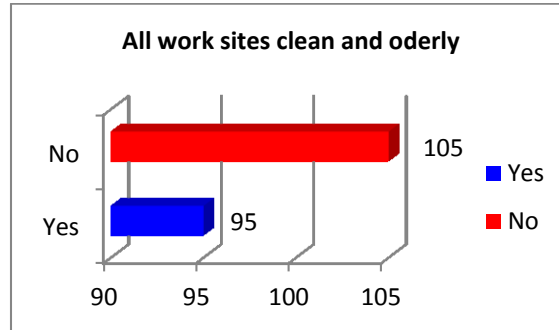


Figure 4.3: All work sites clean and orderly

According to the figure 4.3, the graph shows that 105 respondents are response that all work sites are dirty and unorderedly. 95 respondents are response that all sites are clean and orderly. This shows that most of the landfill are not emphasized the cleanliness element of working area.

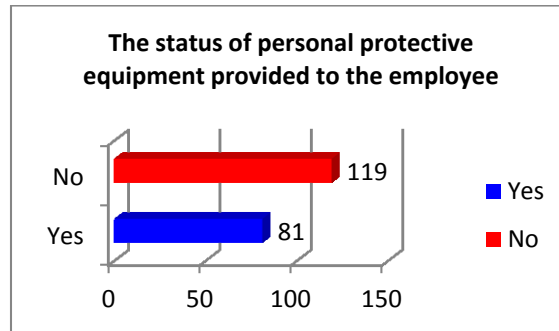


Figure 4.4: The status of personal protective equipment provided to the employee

Figure 4.4 shows that 119 respondents are response that personal protective equipment has not provided to employee. 81 respondents response that landfill are provide personal protective equipment to worker. This result less worker are aware of the importance of wearing PPE in landfill area and did not really emphasized on the safety and health issues.

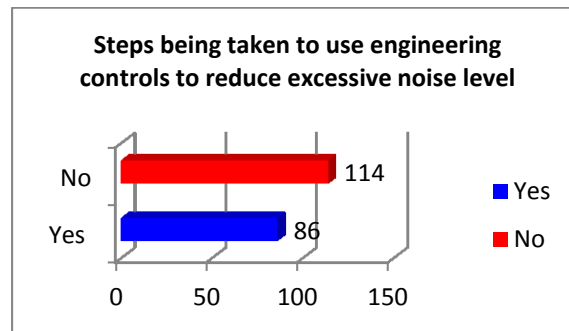


Figure 4.5: Steps being taken to use engineering controls to reduce excessive noise level

According to the figure 4.5, the graph shows that 114 respondents are response that there are have no any steps being taken to use engineering controls to reduce excessive noise level and 86 respondents said yes, working sites have taken steps to use engineering controls to reduce excessive noise level. This result that, the landfill is not really emphasizes the noise hazard that can affect the worker health.

## 6.0 DISCUSSION AND CONCLUSION

1. Solid waste disposal is one of the most hazardous occupations. Almost no good epidemiological information is available on the subject.
2. There are obvious preventive measures which can and should be undertaken immediately. These include the following:
  - Safety education courses should be offered, starting with top management personnel, and extending down to every supervisory level and to field personnel;
  - Equipment must be evaluated from a human factors engineering standpoint, so that the equipment is made to fit the worker's capacities;
  - The work environment must be further evaluated and tested on a continuous basis in terms of hazardous conditions;
  - The basic work procedures of solid waste disposal must be changed to hasten mechanization and containerization.

## 7.0 REFERENCE

- Achankeng, E. (2003). Globalisation, Urbanisation and Municipal Solid Waste Management in Africa. Africa on a Global Stage. A Paper Presented at the Annual Conference of the African Studies Association of Australasia and the Pacific.
- Biggeri A, Catelan D: Mortality for non-Hodgkin lymphoma and soft-tissue sarcoma in the surrounding area of an urban waste incinerator. Campi Bisenzio (Tuscany, Italy) 1981- 2001. *Epidemiol Prev* 2005, 29:156-159.
- Cape Town Metropolitan Assembly (CTMA). (2004). Integrated Waste Management. Republic of South Africa.
- Denison, Richard A. and Ruston, John F. 1995. Assessing the Full Costs and Benefits of Curbside Recycling. [www.edf.org/pubs/Reports/advrec.htm](http://www.edf.org/pubs/Reports/advrec.htm)

- Fukuda Y, Nakamura K, Takano T: Dioxins released from incineration plants and mortality from major diseases: an analysis of statistical data by municipalities. *J Med Dent Sci* 2003, 50:249-255.
- Hanks, T. G. Solid Waste Disease Relationships. A Literature Survey. Public Health Service Pub. No. 999-UIH-6. Cincinnati, 1967.
- Refuse Collections in Municipalities. National Safety News. Data Sheet No. 6.8, 1969.
- Vital Health Statistics. Series 10, No. 21. Division of Health Interview Statistics, Public Health Service, U.S. Department of Health, Education, and Welfare, Washington, DC, 1965.