

**FULL LENGTH RESEARCH PAPER**

**Health Implications Of Solid Waste Disposal: Case Study Of Olusosun Dumpsite, Lagos, Nigeria**

Oyelola, O. T<sup>1</sup>, Babatunde, A.I<sup>2</sup> and Odunlade, A. K<sup>3</sup>

<sup>1</sup>Chemical Science Dept, Yaba College of Technology, Lagos

<sup>2</sup>Chemistry Dept, University of Lagos, Akoka, Lagos

<sup>3</sup>Biological Science Dept, Yaba College of Technology, Lagos

Received: July 2008

Accepted: August 2008

---

**ABSTRACT**

*The uncontrolled burning of solid wastes at Olusosun disposal site, Lagos State, Nigeria creates smoke that affects the environment while the gas emission causes a public nuisance. This paper describes a study carried out at the Olusosun dumpsite with the objective of correlating the exposure factors (smoke, odor and dust) with health hazards of its workers. The correlation analysis between sex of workers, years of service, different ailments and exposure factors showed a positive correlation between eye irritation and dust at 0.05 and also between difficulty in breathing and smoke at 0.01 levels of significance; likewise between typhoid and dysentery and also malaria and dysentery at 0.01 and 0.05 levels of significance respectively. The percentage of research diseases as they affect the dumpsite workers and the scavengers are 86% eye irritation, 66% difficulty in breathing, 48% asthma, 90% cough, 10% pneumonia, 82% malaria, 46% typhoid, 44% dysentery, 42% cholera and 96% fatigue. This shows that open dump solid wastes disposal affects the health of the dumpsite workers.*

**Keywords:** Gas emission, health, open dump, dumpsite workers.

---

**INTRODUCTION**

Solid wastes comprise all the wastes arising from human and animal activities that are normally solid, discarded as useless or unwanted. According to Tchobanoglous *et al* (1993), solid waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer and transport, processing and disposal of wastes in a manner that is in accord with the best principles of public health, economics, engineering, conservation, aesthetics, and other environmental considerations that are also responsive to public attitudes.

Municipal solid wastes are regularly disposed of in open space dumpsite in Lagos Metropolis and one of these sites is Olusosun dumpsite is situated at Ojota / Oregun in Kosofe Local Government Area. Originally this dumpsite was on the outskirts of the metropolis but due to rapid urban development the site is presently within developed locality of the metropolis being surrounded by residential, commercial and industrial neighbourhoods.

All manner of solid waste are indiscriminately disposed of at the Olusosun dumpsite without any attempt to seclude. The infectious medical

wastes, toxic industrial solid wastes and domestic wastes are disposed together. The domestic waste putrescible may include human and animal faeces from sources such as pet's faeces, soiled disposable napkins and occasionally human excreta. These are sources of pathogenic organisms that can affect the scavengers who depend on recyclable materials for their livelihood and other waste workers (Leton and Nweke, 2003). Brash (1996), reported that the New Zealand practice of co-disposal of toxic and hazardous materials with the other refuse, increases the likelihood of exposure to toxic and hazardous compounds. People living and working in the vicinity of solid waste processing and disposal facilities are also exposed to environmental health and accident risks (Cointreau, 1997). Large quantities of waste are often left uncollected in Lagos metropolis and these may accumulate on open lots clog drains and channels causing flooding.

Open dumps generate various environmental and health hazards. The decomposition of materials produces methane, which can cause fire and explosions and produce strong leachates, which pollute surface and ground water. It ruins the natural beauty of the land (Cointreau-Levin, 1997). The Olusosun dumpsite constitutes health hazard even to all passers-by due to the obnoxious smell oozing from the activities of micro-organisms on the uncontrolled waste during the wet season (Plate 1). In the same vein, the ensuing smoke that fills the air from the uncontrolled burning of solid waste during the dry season constitutes serious environmental pollution, adversely affecting solid waste workers and pickers.

Toxic and hazardous wastes when burnt with other solid waste like asbestos fibre may introduce potential carcinogenic fibre to the smoke plume. According to Elliott *et al*, (1996), lag period of ten years are generally assumed for cancers to develop as a result of cancer-inducing agent exposure, and 5 years for lymphatic and haematopoietic cancers. The study carried out on cancer incidence of over fourteen million people living within 7.5 kilometer of 72 solid waste incinerators in Great Britain within a period of 10years, showed a decline in risk with distance from the incinerators. There was a strong association for liver cancer than for the other cancers. By inference therefore, the effect of the open burning of solid waste at the Olusosun

disposal site can constitute a serious health hazard on the residents near the dumpsite.

Fire periodically breaks out in open dumps, generating smoke and contributing to air pollution. According to Woodward (1997) dump managers in some cities deliberately set periodic fires at the dumps in order to reduce the volume of the wastes, creating room for more wastes and thus extend the life of the dumps. Human scavengers may also cause intentional fires since metals are easier to spot and recover among ashes after the fires than among piles of mixed waste. Pruss *et al*, (2000), reported that fire at a sanitary landfill can arise from hot ashes in a vehicle delivering wastes, a cigarette thrown down by worker, the sun rays through the fragment of glass on the surface. Landfill fires emit a variety of pollutants that have the potential to affect the health of people exposed to the smoke.

The incomplete combustion of refuse burning emits particulate matter, carbon-monoxide which is a common by-product of the incomplete combustion of fuels such as paper, cardboard and wood, acrolein, formaldehyde and other pollutants depending on the composition of waste (Pruss *et al*, 2000). The left over food and kitchen wastes attracts birds, rats, flies and other animals to the dump. Animals feeding at the dump may transmit diseases to human living in the vicinity.

This paper highlights the implication of solid wastes exposure factors (smoke, dust and odour) on the health status of Olusosun dumpsite workers and scavengers.

## MATERIALS AND METHODS

Data were gathered through the use of structured questionnaires and oral interview (Leton and Nweke, 2003).

One hundred (100) copies of questionnaires were administered to the Olusosun dumpsite workers comprising the Lagos State Waste Management Agency (LAWMA) staff and the scavengers. The questionnaires covered occupational information and occupational health hazard. Occupational health information was included in order to determine the effect of solid waste on refuse workers (Leton and Nweke, 2003).

**RESULTS AND DISCUSSION**

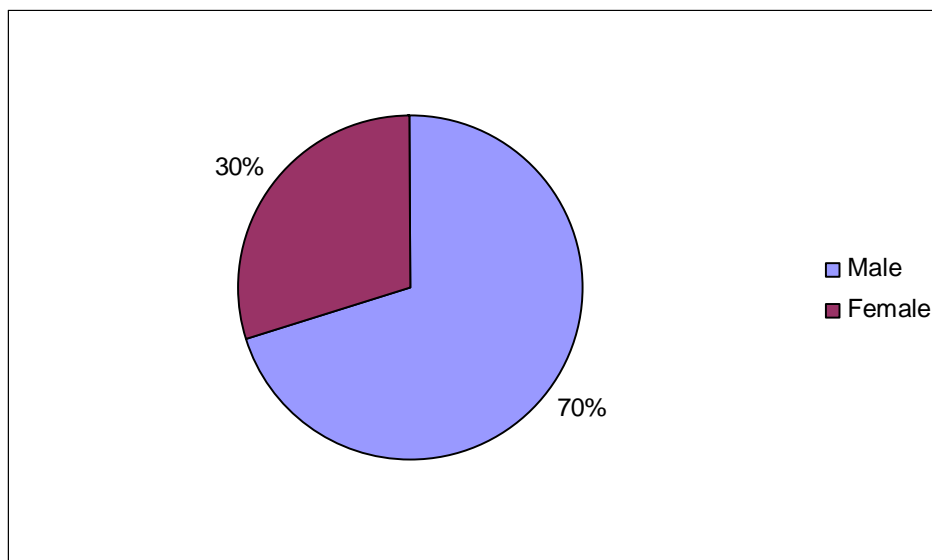
The percentage description of sex of workers is presented in Table 1. The percentage frequency description of the length of years of service on

the job is presented in Table 2. The percentage of respondents suffering from different ailments is presented in Table 3 and the correlation between the exposure factors and the research diseases is presented in Table 4.

**Table 1:** Description of Workers by sex

Sex	Number of scavengers	Number of Refuse State workers	Frequency Distribution	Percentage %
Male	27	8	35	70
Female	8	7	15	30
Total	35	15	50	100

There are more male workers (70%) than female (30%) at the dumpsite. There are more scavengers at the site and most of them are males (Figure 1).



**Figure 1.** The percentage description of workers by sex.

**Table 2:** Percentage frequency of years of exposure of the workers

No. of years	Frequency	Percentage (%)
1	2	4
2	6	12
3	16	32
4	9	18
5	10	20
6	2	4
7	5	10
Total	50	100

The duration of years of exposures indicates the numbers of years the workers have been working at the site. The workers who have spent three

years gave the highest number (32%) followed by those with 5years, while those with 1 year and 6years gave the least number (4%)(Figure 2).

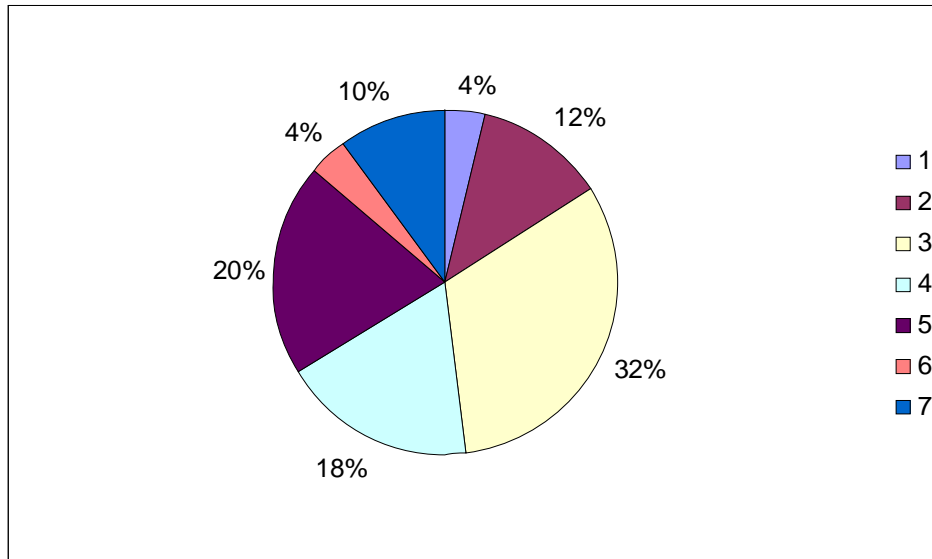


Figure 2. The percentage frequency of years of exposure of the workers.

**Table 3:** Correlation analyses between exposure factors and research diseases

	Sex	Duration	Eye Irritation	Difficulty in Breathing	Asthma	Cold & Cough	Pneumonia	Malaria	Typhoid	Dysentery	Cholera	Fatigue	Smoke	Odour
Duration	0.211													
Eye Irritation	-0.075	-0.155												
Difficult in Breathing	0.085	-0.007	-0.196											
Asthma	-0.118	0.265	-0.167	0.208										
Cold and Cough	0.026	0.321*	-0.001	0.276	0.155									
Pneumonia	0.013	-0.187	0.364**	0.02	-0.058	0.148								
Malaria	0.136	-0.192	0.041	-0.346*	0.559**	-0.207	0.176							
Typhoid	0.139	-0.045	0.033	0.103	0.480**	-0.204	0.461**	0.248						
Dysentery	-0.166	-0.327	-0.112	-0.325*	0.479**	0.441**	0.201	0.350*	0.428**					
Cholera	-0.102	0.143	-0.206	-0.149	0.283*	0.546**	0.038	-0.161	-0.124	0.061				
Fatigue	-0.175	-0.144	0.052	0.065	-0.273	0.407**	0.269	0.204	0.164	0.443**	0.277			
Smoke	-0.072	0.067	-0.148	-0.601**	0.185	0.177	-0.177	0.005	0.172	-0.08	-0.08	-0.203		
Odour	0.089	-0.075	-0.198	-0.161	-0.063	0.287*	-0.075	0.171	0.033	0.228	0.19	0.055	0.487**	
Dust	-0.021	0.013	0.342*	0.102	-0.112	0.122	0.245	-0.179	0.131	-0.155	-0.117	0.138	0.461**	0.550**

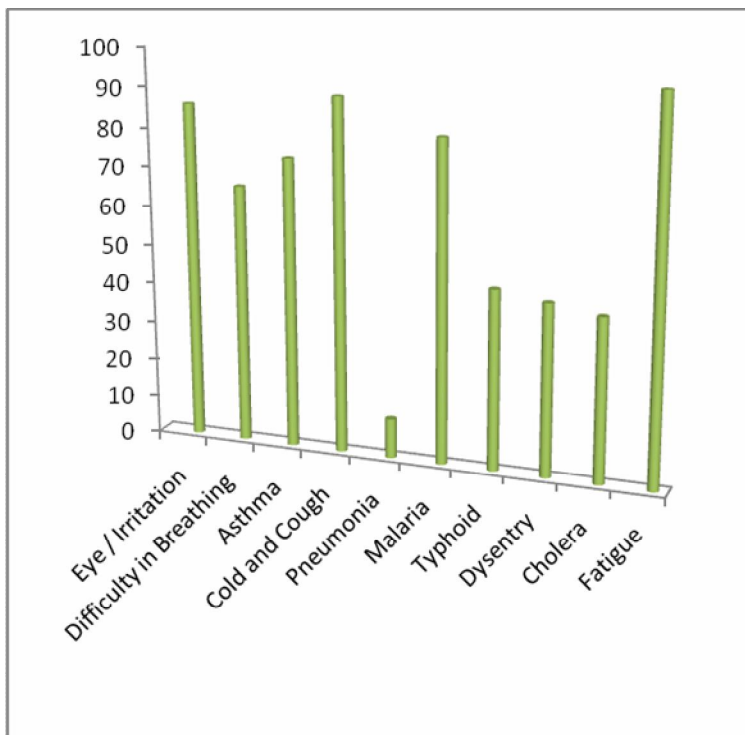
r = 0.05 (50) = 0.279 \*      \* = Significant at 95%  
 r = 0.05 (50) = 0.363 \*\*      \*\* = Significant at 99%

The correlation analysis showed 105 possibilities of occurrences with 15 different combinations between exposure factors and the research diseases.

There are 21 results that are significant at 0.05 and 0.01 levels of significance (8 results at 0.05 and 13 results at 0.01). Although most of the results are without an evidence of relationship but the respiratory diseases appeared as a relevant outcome in the study, as they were present in combinations in which 12 of the results are significant.

**Table 4:** Percentage of the research diseases affecting the workers

Research Diseases	Affected Percentage %
Eye / Irritation	86
Difficulty in Breathing	66
Asthma	74
Cold and Cough	90
Pneumonia	10
Malaria	82
Typhoid	46
Dysentery	44
Cholera	42
Fatigue	96



**Figure 3.** The percentages of research diseases on Olusosun dumpsite workers.

Fatigue presented the highest percentage as a result of the effect of sun, rain, the influence of smoke, dust and odour. According to Leton and Nweke (2003) in their findings on the survey on the health risks of domestic solid waste scavenging at fifteen (15) different dumpsites in Port Harcourt, Rivers State, Nigeria, bending position and carrying of heavy loads of scavenged items cause backache, pains in the arms and legs, stiffness of joints and fatigue.

The eye irritation (86%), difficulty in breathing (66%), cold and cough (90%), and asthma (74%), may be due to dust particles and the particulates from incomplete combustion of fuel source of burning refuse. According to Woodward (1997), exposure to smoke particles can reduce the ability to breathe, and reduce resistance to diseases. Existing respiratory conditions may also be aggravated. Those with greater pulmonary sensitivity may show a much greater reduction in lung function than the others. Also according to Brash (1996), most of the respiratory diseases are attributed to exposure to smoke and dust. Smoke from incomplete combustion contains formaldehyde. Low atmospheric concentration of formaldehyde causes eye irritation, coughing and irritation of the lungs. Discomfort increases rapidly with increase exposure and asthmatic symptom may occur due to development of allergic sensitivity. The findings in this study are in accord with that reported by Huisman (1996), on the health studies of waste pickers in Bangalore, Manohar, and New Delhi where tuberculosis, bronchitis, asthma, pneumonia, dysentery, parasitizes and malnutrition are the most commonly experienced diseases among the workers. Tones et al (1991) reported 23% chronic cough, wheezing 25% while 3% had active pulmonary tuberculosis in their study on children scavengers.

There are positive correlations between typhoid and dysentery and also malaria and dysentery at 0.01 and 0.05 levels of significance respectively. The cause of typhoid, malaria, cholera and dysentery may be attributed to the flies (Howard, 2001) and mosquito, which find their breeding space on the solid wastes containing 68% vegetable/ putrescible (Lavalin, 1992), which are left to decompose for Months. Insects and rodents proliferate in garbage dumps, which can transmit plagues, typhoid, cholera, skin diseases and malaria with the breeding of mosquitoes in rain water stagnant in garbage dump (WHO, 1995)

Contrary to the views of Cointreau-Levine (1997) that women make up a majority of waste pickers in developing countries dumpsites and the hazards of their work lead to infant mortality and deformity, men make up the majority of waste pickers in Lagos metropolis as seen in this study. This can be attributed to the culture and social values of Nigerian men particularly those in Lagos State who would not allow their wives to do certain jobs which are considered debasing and hazardous to women health.

Smoke filled-air from dump fire causes poor visibility to road users around Olusosun dumpsite and this has the potential to cause road accidents. In addition gas emission from the activities of micro- organisms on the decomposable wastes makes the dumpsite unbearable to the nearby residents.

Answers to oral interview with some of the scavengers and the dump site workers reviewed that scavengers suffered many diseases for which they bear hospital bill themselves. The situation with the dump workers is not much better as their health needs are seldom taken care of by the government.

## CONCLUSIONS AND RECOMMENDATION

Improper disposal of solid wastes poses potential risks to health. Direct health risks concern mainly the dumpsite workers who need protection from hazards of dumpsite burning, dust, odour and skin contact with the wastes. The open dump solid wastes disposal practice at the Olusosun dumpsite is not in accord with the best principles of public health and environmental protection. Scavenging plays a vital role in resource recovery/reuse but in the process endangers lives. Scavengers should be incorporated in the formal sector programme for reduced health hazards on workers. Lagos State Government needs to consider the option of zero waste, which will involve the populace in sorting process from source of generation before collection of waste by the Lagos State Waste Management Authority and other agents. Material recovery facilities can be installed in every loading station with conveyance, sorting and processing facilities which can enable the recovery of secondary materials such as paper, carton, glass, etc, from the solid wastes. This will, in effect, reduce the health danger faced by the scavengers at the dumpsite, and eliminate fire incidences that may emanate from packages of flammable materials with other items.

Government should formulate policy regulation and enforcement measures to control waste burning at the dumpsite in order to safeguard the health of workers, residents and passers-by.

#### REFERENCE

- Brash, D. (1996). New Zealand Landfills Where to Now? Waste Management Institute New Zealand 8<sup>th</sup>. *Annual Conference Proceedings*. Nov. 1996
- Cointreau – Levine, Sandra. (1997). Occupational and Environmental Health Issues of Solid Waste Management. Special Emphasis on Middle and Lower – Income Countries. (Draft). World Bank Report.
- <http://www.ilsr.org/recycling/other/dctransfer/ochealth.pdf>
- Elliott, P, Shaddick, G, Kleinschmid, I, Jolley, D, Walls, P, Beresford, J and Grundy, C. (1996). Cancer Incidence near Municipal Solid Waste Incinerators in Great Britain. *British Journal of Cancer*. 702 – 710.
- Howard, J. (2001). Nuisance Flies around a Landfill: Pattern of Abundance and Distribution. *Waste Management and Research*, 19. (4): 308-313.
- Huisman, M. (1996). The Position of Waste Pickers in Solid Waste Management. In: Baud, I, Schenk, H. Solid Waste Management: Modes, Assessment, Appraisals and Linkages in Bangalore, Manohar, New Delhi 46 - 104.
- Lavalin International Inc. (1992). Waste Generation and Composition Study For Metropolitan Lagos. Lavalin Appraisal Report. *Lagos State Government Project, Lagos*: pp 44-56.
- Leton, T. G and Nweke, V. N. (2003). Health Risk of Domestic Solid Waste Scavenging. *Journal of Environmental and Behaviour* : 1, pp 35 - 38
- Pruss, A., Girout, E and Rushbrook, P. (Eds). (2000). *Safe Management of Wastes from Health – Care Activities World Health Organization. Geneva*. pp 5-67.
- Tchobanoglous, G, Theisen, H and Vigil, S. (1993). *Integrated Solid Waste Management: Engineering Principle and Management Issue*. International Ed. McGraw - Hill Book Co. Singapore, pp 12-43.
- Tones, E. B., Subida, R. D., Rabuco, L. B. (1991). *The profile of Children Scavengers in Smokey Mountain, Balut, Tondo Manila*. pp 1-83.
- Woodward Clyde Ltd. (1997). Hazard of Burning at Landfill. Landfill Guidelines report. Ministry of Environment, New Zealand  
<http://www.mfe.govt.nz/publication/waste/hazards-of-landfill-burning-dec97.pdf>
- World Health Organization. (1995). Emerging Diseases Fact sheets. Internet webpage.  
<http://www.who.int/programmes/emc/emcfacts/htm>