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Impact of Landfill Waste on Health: An Overview

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Abstract: *Landfill is the most popularly used method of waste disposal which includes burying the waste in lands all over the world. The waste landfill sites are major source of land, air, ground and surface water pollution. This is very harmful for the people especially who resides near landfill sites.This paper present an overview literature in concern with environmental pollution that evaluates health effects in relation to residence near landfill sites. Environmental pollution by waste dumping shows short and long-term effects on health. Gas released from waste landfill site is the main factor in polluting the environment and hazardous effect on health as Volatile organic compounds (VOC) in them various types of Cancer and birth problems etc. Self reported health problems like irritations of skin, nose & eyes, allergies, psychological disorders, headache, fatigue, and gastrointestinal problems have been documented due to landfills.*

I. Introduction

Waste is any matter leftover after primary use and becomes insignificant & substandard. Generally waste is gas, liquid or solid and all of them could be dangerous to the environment, which is the main cause for environmental pollution. The main sources of pollutant that release from landfill site are emission from transport, waste blown by wind, some types of gases generated by leaching. World is facing ecological pollution on a massive scale today. Pollution is increasing with time and causing serious and irreparable damages to humankind primarily in terms of health.

With increase in the global population, demand for food and other essential products is on a constant rise. Improper usage, uneven distribution and absences of a proper implantation plan are some of the major problems leading these resources to become waste in large amounts. Garbage in public spaces is one of the biggest problems to aid an unhealthy society that introduce pathogens (bacteria & virus) into environment. Humans may be exposed to these pathogens that cause many diseases like Diarrhoea, Cholera, skin diseases, respiratory allergies, Malaria, Tuberculosis, Jaundice and Cancer etc. At times, these lead to death. Some of above diseases are communicable and spread from one person to another or from animals to human. If animals such as rats, flies and birds are exposed to these pathogens, they become a source for communicable diseases to humans in some form or the other by which larger population is infected.

To prevent from such infectious diseases and to create a healthy environment, one should be aware of waste minimization strategies. There are so many methods for garbage disposal such as Landfill, Combustion, Recycling, Recovery, Reducing and Compositing.

The Landfill is the most popularly used method of waste disposal that includes burying of waste in the land. In combustion method, waste is burnt. In reducing lesser resources are consumed. In recovery we take out useful items from discarded ones, for a specific next use. In recycling waste products are either used again or broken down physically or chemically in order to make new products from it. Composting is one of the best methods of waste disposal that converts unsafe organic products into safe compost.

Workers involved with several tasks related to waste disposal, containing hazardous chemical & metals are exposed to toxicity and hence require special attention and to follow hygiene practice by maintaining cleanliness with proper handling of trash & garbage deposits to ensure that it does not affect them or the environment.

II. Brief Review of Literature

A substantial number of workers contributed their work on population living near hazardous waste site like landfill.

Increasing rate of solid waste and their proper management is a foremost problem of local body like Municipal Corporation. Increasing population and urbanization is only factor for increasing waste. The work carried out by Alam and Ahmade (2013) has documented that excreta, liquid and solid waste from households

and the community are a serious health hazard and responsible for the spread of infectious diseases and environmental pollution.

Disposal of solid waste causes soil, air and water pollution which provides breeding ground to biological vectors such as flies, rodents and insects pests. From these biological vectors number of diseases like diarrhoea, dysentery, worm infection, food poisoning, dengue fever, cholera, leptospirosis and bacterial infection are caused. (Pradyumna, 2013).

Gases released from landfill sites are the main factor in polluting the environment and leading hazardous effects on health as VOCs, various types of Cancer and birth problems etc. The composition of gas varies according to type of waste and phase of degradation of waste. Gases generated by landfill waste are generally methane, carbon dioxide, nitrogen dioxide etc. Local people are exposed by these gases via inhalation of air born emissions or dust.

Nitrogen oxide and sulphur dioxide acts as irritants, their exposure can produce inflammation & bronco-constriction and can affect the immune cell. Hydrogen chlorides and hydrogen fluoride is an irritant to mucosa membrane and deposited in the nose and upper respiratory tract which causes cough, chest tightness & breathlessness. (EPAQS, 2009).

IARC (International Agency for Research on Cancer) documented that from landfill sites a wide range of waste degradation products are released into the environment in the form of gases like methane, carbon dioxide, traces of hydrogen sulphide, VOCs and metal vapours (Zmirou *et al.*, 1994; Hamar *et al.*, 1996; Ward *et al.*, 1996). Cadmium (IARC, 1993 & 1994) are carcinogenic to humans and classified under Group 1 whereas formaldehyde (IARC, 1995), styrene & lead (IARC, 1987a) are also carcinogenic to human, classified under Group 2A & Group 2B respectively.

According to Hammer *et al*., 1996 it is very difficult to precisely measure individual exposure to environmental contaminants. They had worked on Volatile organic compound (VOC) in blood of population who living near a hazardous waste site and have found an unusual situation of illness that they believe would have been attributed due to VOC exposure.

Many studies have revealed that pesticides which are commonly used on landfill sites shows an association with brain cancer (Bohnen and Kurland, 1995), Leukaemia has been linked with exposure to VOCs (volatile organic compounds) such as benzene which is released from landfill sites (IARC, 1987b). Benedetti *et al*., 2015 have been documented that occurrence of soft tissue sarcomas in an Italian area which is occurred due to illegal waste dumping sites.

Volatile organic compounds like arsine and stibine are generated by halogenatic or aromatic hydrocarbons are acutely toxic. Arsine is expected to be converted into arsenic in humans. (WHO, 2000). Humans are exposed to hazardous release from landfill like H_2S and other gases occurring through inhalation of polluted air and also by use of contaminated water. " WHO report suggested that any potential exposure is likely to be limited to 1 km from landfill sites by the air pathway, and 2 km by the water pathway" Paigen *et al*., 1987.

According to Wrensch *et al*., 1990 and Wrensch, 1992, Municipal drinking water of contaminated wells due to waste disposal site has adverse effect on spontaneous abortions, birth defects and children heath concern leukaemia. Jarup *et al*., 2002 have studied Cancer risks in the population which was living 2 km. from landfill sites in Great Britain and found leukaemia in childern and adult. Brain & bladder cancer and hepatobiliary cancer in people were also reported.

A landfill site which is nearby residential area also has many adverse effects on health, causing different types of cancer, birth problems were also documented by Vrijheid, 2000, Goldberg *et al*., 1995.

Various reports showed two clusters of lung cancer in the southern part of Caserta Province and in the northern part of Naples Province. (Martuzzi *et al*., 2009; Feo and Gisi, 2010; Pirastu *et al*., 2010; Musmeci *et al*., 2010; Barba *et al*., 2011; Pirastu *et al*., 2011; Fazzo *et al*., 2011 and Ulaszewska *et al*., 2011).

Goldman *et al*., (1985) studied on low birth weight, prematurity and birth defects in children living near the hazardous waste sites. Similar results have also been documented by Vianna and Polan (1984).

There occurs birth weight reduction due to hazardous waste landfill associated with residential area as published by Berry and Bove (1997). "Low birth weight and preterm births among infants born to women living near a municipal solid waste landfill site" were reported. (Goldberg *et al*., 1995). Children who lived near dangerous waste site showed poor growth as suggested by Kramer, 1987 and Paigen *et al*., 1987.

Elliott *et al*., 2001 published a paper on "Risk of adverse birth outcomes in populations living near landfill sites" and also documented that populations exposed to it have small extra risks of inborn irregularities. Kharrazi *et al*., 1997 had reported that in California the population who lived nearby large harmful waste landfill shows adverse effect on pregnancy outcome.

Increased incidence of many health problems like eye irritation, skin rashes, learning problems, abdominal pain, hypersensitivity, incontinence and seizures are found in those children who lived close to landfill site as compared to control, according to their parents, was reported by Clark, 1982.

Health surveys investigated number of self reported health problems. They found that there are many inconvenience related to health due to odour released from landfill sites. So odour is another key issue of landfill site. The source of odour is leachate, landfill gases, and deposited material. From this odour many health problems, include irritation of skin, nose & eyes, allergies, psychological disorders, headache, fatigue, nausea and gastrointestinal problems occurs. (Roth *et al*., 1985; Mallin, 1990; Muir *et al*., 1990; Neutra, 1991; Shuterman *et al*., 1991; Sorsa *et al*., 1992; Deloraine *et al*., 1995; Goldberg *et al*., 1995; Dalton *et al*., 1997 and Dalton 2003. Same problems were also documented by other investigators. (Cutler, 1986; Byers *et al*., 1988; and Rothman, 1990).

A study conducted by Logue and Fox, 1986 on residential health study of families living near the Drake Chemical Superfund site in Lock Haven, Pennsylvania. Ozonoff *et al*., 1987 revealed that there was a residential health problem due to the landfill sites.

Environmental pollution of waste dumping shows short and long-term effects on health (Porta *et al*., 2009 and Mattiello *et al*., 2013). The examples of short-term health effects are respiratory infection, asthma and congenital anomalies. (Elliott *et al*., 2001; Ashworth *et al*., 2014). Its other symptoms are eye & respiratory irritation, headache, stress, anxiety, dizziness and nausea, have also been documented by Kah *et al*., 2012. Long-term waste exposure to health includes cancer, brain, liver, chronic respiratory and cardiovascular and nerves disorder. (Minichilli *et al*., 2005; Vrijheid, 2000 and Carpenter *et al*., 2008). Short-span health effects due to industrial toxic waste landfill were reported by Zmirou et al., 1994 and Deloraine et al., 1995.

In human investigation revealed links between waste-related pollution and biomarkers assessment. Further studies reported that there is high dioxin levels in breast milk in Naples and Caserta provinces and a positive correlation with environmental dioxin risk index (EDR), age of sampled women and illegal waste fires which is an index based on dioxins concentrations in buffalo milk samples (Rivezzi, *et al*., 2013 and Giovannini *et al*., 2014).

There was a harmful effect on environment due to contamination of leachate as of a pesticide waste dump in drinking water as documented by Clark *et al*., 1982, Gartside *et al*., 1982.

Sullivan, (1993) has documented that the effect of the pollution in the environment affects reproduction from conception to parturition. Lipscomb *et al*., 1991 also worked on communities who lived nearby waste disposal site. In urban population adverse effects of chemical waste had been reported by Dunne, *et al*., 1990.

There are so many biochemical and physical reactions occurring in landfills when solid wastes are disposed in them. This causes leachate and gaseous emissions that contaminate surface and ground water resource. (Abbas *et al*., 2009; Kängsepp and L. Mathiasson, 2009; Lou *et al*., 2009; Olsson *et al*., 2009).

The work on cytogenetic observation from village population who were exposed to low level of environmental pollutants has reported by Lakhanisky *et al*., 1993 and Sorsa *et al*., 1992.

"Cytogenetic bio-monitoring of a population of children allegedly exposed to environmental pollutants. Phase 2: Results of a three-year longitudinal study" has documented by Klemans *et al*., 1995. Shorter telomere length and lower telomerase enzyme activity were found in peripheral blood mononuclear cells of healthy pregnant women who were living in north-east Naples area. (Felice de *et al*., 2012).

III. Conclusion

Solid waste generated by almost every society in the world is a very big issue contributing adversely to environmental pollution. In general, solid waste landfill sites contaminated by heavy metals and gases can undoubtedly, prove fatal and harmful to humankind.

Musmeci *et al*. 2010 have also reported the hazardous effect of landfill sites. Ulaszewska *et al*., 2011 documented the adverse effect of waste combustion. Senior and Mazza, 2004 for the first time used the term "triangle of death" in the journal The Lancet Oncology. They referred this to the eastern area of the Campania Region Southern Italy which reported one of the worst records of illegal waste dumping practices causing deterioration of land, and polluting air as well as water. (Legambiente *et al*., 2003 & 2007; Altavista, 2004; Trinca *et al*., 2001). In Italy, mortality study of residents is documented by Pirastu *et al*., 2010.

To understand the risks of hazardous waste disposal within health-care establishments, one should be responsive about hygiene methods of solid waste (trash and garbage deposits) disposal. For this most important thing is creating awareness in public to improve the quality control in healthcare. Local health board should play

main role in awareness programmes. They must also know the role of municipalities and their approach towards such landfill sites.

Workers are involved with several tasks related to waste disposal, containing harmful chemical & metals, exposed to toxicity and hence require special attention. It is therefore necessary to improve landfill design scientifically and categorised (EC, 1999) into inert waste, non-hazardous waste or hazardous waste.

Management of landfill waste side is also an important parameter in this matter. Solid-waste management practices were assessed in order to discover its link with incidence of vector-borne disease and strategies for solid-waste management were employed as a practical model to resolve the problems regarding pollution and hazardous health problems. (Puri *et al.*, 2008). For proper management of landfill site local authorities must look into this by introducing control and routine preventive measures, also for reducing the levels of various kinds of infections. It must also be ensured that all control measures have their desired designated effect and at the same time are cost-effective.

Long term sustainability of the environment, additional analyses and protective measures should essentially be imbibed in the practises of treating such landfill sites.

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