



IMPACTS OF MUNICIPAL SOLID WASTE DISPOSAL SITE ON SOIL QUALITY: A REVIEW

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ABSTRACT:

At the global level India is one of the top countries which produces large amount of solid waste. The composition of solid waste varies with living standard and economic status of the nation. In India, upsurge of urbanization and industrialization have resulted into huge amount of solid waste generation and impacted air, water and soil quality. Municipal solid waste management is being handled by Municipal Corporation which comes under a third priority after water supply and sanitation. In many countries waste disposal is performed unscientifically in which wastes thrown on open sites. Unscientific waste disposal contribute to different environmental problems such as land pollution, air pollution, groundwater pollution, and bad odor production. Since the waste is disposed directly on surface soil, number of contaminants including toxic heavy metals readily penetrate and contaminate the soil which ultimately get leached into ground water and pollute it. Thus the focus of this review is to evaluate waste disposal effects on soil quality. Through the rigorous literature survey of the scholars at national and international level it has been found that number of contaminants particularly toxic heavy metals get originated in soil from municipal waste disposal and the values were found to be higher in comparison to standards given for soil degrading soil quality.

Keywords : - Soil quality, impacts, toxic heavy metals.

INTRODUCTION :

India as growing country accounts about 18% of the total world population and 12% of global municipal solid waste generation (Ian Tiseo; 2022). World Bank study revealed that India was the world's highest waste generating nation whereas according to 2016 estimate waste generation is likely to touch 387.8 million tons in 2030 and 543.3 million tons by 2050. (The World Bank, 2022). India produces 277.1 million tons of solid waste every year in which 43 MT is collected 31 MT is dumped on landfill sites and only 11.9 MT is scientifically treated (Karelia G. 2020). Untreated waste can contaminate the environment around them (Elsayed E. and Frances Okaye; 2019). Landfilling is being practiced from 1970s with informal system in any convenient location without concerning about health and environmental conservation or cost efficiency (4) (Choudhary S., 2019). But now

according to solid waste management rules 2016 it is mandatory to dispose waste scientifically through segregation, collection, and treatment and disposal in an environmental friendly disposable site to minimize the adverse effects on the environment (Vikaspedia). Environmental pollution and its impacts over public health is increasing over the last three decades and is a matter of great concern as exposure of human to pollution is believed to be increasing day by day. (Ghouri 2011; Kimani 2007; Schell 2006).

Improper management of solid waste give rise to most common problems such as transmission of diseases, fire hazards, odor nuisance, atmospheric and water pollution, aesthetic nuisance and economic losses (Dr. S. Sivasankar. et. al. 2017, Basagaoglu 1997). In India, open waste disposal is a common method of dumping and is a source of soil and water pollution (Johny Joseph, et.al, 2019).

Unscientifically Managed dump sites contaminate groundwater because of leachate production (Pillai S. et. al. 2014). Leachate is a diverse mixture of chemicals with high strength and toxicity formed through the solid wastes percolates into the sub soil and contaminates underground water (Amah Onyedikachi, 2020). Landfill consists of both hazardous and non-hazardous wastes (Gurbaksh Singh, 2019). Heavy metal present in MSW eventually accumulate in soil by wet and dry deposition this leads to soil contamination and affect health of the people living in the neighborhood of MSW (Patel M. ,et.al. 2019, Tepanosyan et al., 2017). Heavy metals in soil can be easily transferred into human body via three routes: ingestion, inhalation and dermal contact (Wu et al., 2015). Heavy metal pollution is caused by various metals such as Cu, Ni, Cd, Zn, Cr and Pb (Dr. Jivan Singh, et.al., 2011). Heavy metal contamination even at low concentrations harm environmental quality and human health also poses a long term risk to groundwater and ecosystems (Ebong G.A., et al., 2007). Therefore this study is based to study depth literature search to discuss the influential factors on soil contamination due to waste disposal.

RESULTS AND DISCUSSION :

When wastes are disposed to a landfill, decomposition of wastes takes place through a series of biological and chemical reactions. These reactions are categorized into four different phases that is initial aerobic phase, anaerobic acid phase, initial methanogenic phase and stable methanogenic phase. There is direct relationship between decomposition phase and composition of leachate. When leachate penetrates into the soil Dissolved Organic Matter of the soil increases and cause imbalances in the soil ecosystem. (Irvanian A. et al., 2020, Dobrowolski JW et al., 2017).

Improper disposal solid wastes without proper separation increases the concentration of heavy metal such as Arsenic(As), Cadmium (Cd), Chromium (Cr), Copper (Cu), Lead (Pb), Zinc (Zn) and Mercury (Hg). These heavy metals produce the major environmental impacts (Xiaoli et al.,2007). plants grown on such land shows reduction in growth of the plants. Studies showed that Elements such as Cr, Cd, are carcinogenic and metals like Pb, Hg, Ti, possess high spectrum of toxicity that includes neurotoxic, hepatotoxic, nephrotoxic, teratogenic or mutagenic effects (M. Menesses et al., 1997). A study on heavy metals in a Municipal solid waste dumpsite in India revealed that the concentrations of Hg, Cr and Pb exceed the limits set by the standards set up by the Government of India

A research showed that there is decline in soil productivity due to changes of the physical and chemical properties of the soil because of land use and land cover resulting in land degradation (Biro et al. 2013). Soil richness get decreased when important factors in which soil development is dependent increases such pH, total nitrogen.

CONCLUSION :

The dumpsite generally recorded the highest concentration of the metals in the soil. The findings from research suggest that the soils around the dumpsite are not suitable for agricultural activities due to leaching of heavy metal which may be picked by food crops. There is need for regular monitoring and awareness by municipal authorities to ensure segregation of waste before dumping to reduce increased levels of contaminants at the waste disposal site which may pose serious health risks.

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