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Impact of Solid Waste Management on Pollution

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Abstract- ***It may take the shape of a solid, a liquid, or a gaseous substance. Many of them are a result of human activity like farming and manufacturing. Domestic, industrial, commercial, clinical, construction, nuclear, and agricultural waste are all subcategories based on where it comes from. Waste may be classed as inert, poisonous, or flammable based on its physical qualities. As a result, pollution may occur in any of these areas: the air; water; soil; and solid waste. Solid waste management is thus a must. The municipal solid waste management system includes a variety of tasks, such as storage, collection, transportation, and disposal. In 2016, cities throughout the globe created 2.01 billion metric tones of MSW, or 0.74 kg per person every day. A 70 percent rise from 2016 levels to 3.40 billion tones of yearly trash creation in 2050 is predicted because of increasing population expansion and urbanization. Indian garbage management currently depends on insufficient trash infrastructure, informal businesses, and landfills. Public engagement in trash management is a serious problem, and there is a widespread lack of accountability in the community.***

Keywords- Solid Waste, Pollution, Construction, Manufacturing, Trash

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1. INTRODUCTION

A waste is a substance that can no longer be used because it has been rendered unusable by additional processing. Solid, liquid, or gaseous forms are all possible. It is a result of human activities such as farming, industrial production, and home chores. Domestic, industrial, commercial, clinical, construction, nuclear, and agricultural waste are the most common types of waste. Waste is categorized as inert, hazardous, and flammable based on its qualities. In the absence of treatment, these pollutants pollute the air, water, soil and solid waste. As a result, proper garbage disposal is critical. Activities such as storage, collection, transportation and disposal are all included in the municipal solid waste management system. No matter how well they're managed, these activities nevertheless have the potential to have negative effects on the environment, including harm to human health and the well-being of animals and plants. Precautions may be taken to avoid the possible negative impacts of these activities by conducting an Environmental and Health Impact Assessment (EHIA).

2. LITERATURE REVIEW

GinaKanhai et.al (2021) Despite the evident connection between air pollution and health, research into the interaction between municipal solid waste management and air pollution and health has been overlooked. This kind of investigation might provide scientific data that could be used to lessen the amount of air pollution that people are exposed to. A case study of Accra, Ghana, which is grappling with a significant waste management issue, is examined in this report. According to the research, waste management may have a significant influence on air pollution in cities, as well as on people's health. Waste management emissions are modelled to get concentration values, and then emissions are converted to concentration values to calculate health effects. These four processes make up the study. The WHO AirQ+ and the CCAC SWEET tools were used to perform the evaluation. An analysis of waste sector policy may be done in a variety of ways, depending on the availability of relevant data, using the technique described. Changes in waste management practises in Accra might decrease air pollution and save 120 lives by 2030, according to the findings of this health impact assessment based on PM2.5 emissions from the garbage industry. Efforts to minimise air pollution in Accra should be encouraged. Health implications and new ideas for waste management policy are provided by a thorough examination of present conditions.

SAMUEL ASUMADU SARKODIE ET.AL (2020) Waste management has been greatly impacted by the containment of the COVID-19 epidemic and restrictions on commercial activity, travel, and the industrial sector. When the COVID-19 epidemic breaks out, proper waste management becomes even more important. For the sake of health and the spread of COVID-19, the waste management industry provides a vital service by preventing unusual mounds of garbage. Using lockdown and social distancing methods, we examine the

influence of the COVID-19 pandemic on trash management. We discovered that the amount of trash produced rose across nations when the social distance generated by staying in was taken into consideration. Increased manufacture and consumption of single-use items and panic purchasing has thwarted attempts to reduce plastic pollution. In spite of this, a number of nations have already implemented rules to assure the long-term sustainability of waste management while ensuring the safety of trash handlers.

RUCHI SRIVASTAVA ET.AL (2020) Solid waste comprises of residential garbage, building and demolition debris, sanitation residue, and waste from roadways. This waste is produced mostly by residential and business buildings. The volume and content of solid waste have changed dramatically as a result of growing urbanisation and a corresponding shift in people's lifestyles and eating habits. Solid waste sheds light on the society that creates it and has a negative impact on the health of the people and the environment in which it is found... As the usage of plastic and electronic consumer goods spreads around the globe, people are throwing away increasing amounts of garbage. Because they harm both living and nonliving things, solid wastes pose a threat to the ecosystem as a whole. Many novel and innovative techniques of disposing of solid waste, including pyrolysis, pulverisation, incineration and the construction of sanitary landfills, are used to address the issue of managing solid waste. In terms of environmental and health concerns, it is unacceptable to dispose of rubbish in landfills or burn it.

HUSSEIN I.ABDEL-SHAFY ET.AL (2018) In many industrialised and emerging nations, the disposal of solid wastes is a significant and pervasive issue. Most nations nowadays have a severe challenge with the collection and disposal of municipal solid waste (MSW). An effective MSW management strategy must satisfy all of these criteria: financial viability; technical feasibility; social and legal acceptability; and ecological friendliness. Authorities in small and large cities alike have an uphill battle when it comes to dealing with the problem of solid waste management. Food organic waste valorisation is an important field of study right now. In terms of trash disposal, the usual landfill, incineration, composting, and other methods for handling solid wastes are all well-established options. Composting and anaerobic digestion have traditionally been the most widely employed methods for the treatment and exploitation of the organic part of MSW (AD). The amount of organic solid waste (OSW) being generated globally is rising at an astronomical rate every year. Agricultural waste, food waste from households, human and animal waste, and other sources account for the majority of OSW. In most cases, they are fed to livestock, burnt, or deposited in landfills. OAWs are made up of protein-, mineral-, and sugar-rich components that may be employed as substrates or raw materials in other processes.

DR. B. GANGADHAR ET.AL (2017) Increasing population, urbanisation, and globalisation are to blame for the ever-increasing rate of solid garbage globally. Managing solid waste properly is one of the most difficult tasks faced by municipal corporations and municipalities alike. Waste disposal and management inflicts damage on the environment in all three ways: air, water, and soil. Surface and groundwater sources are contaminated by the indiscriminate disposal of solid wastes. Organic garbage breakdown in landfills produces greenhouse gases. Urban air pollution is exacerbated by uncontrolled burning of municipal solid waste (MSW) and inefficient incineration. The effects of solid waste on the environment and human health are not limited to one another. Diseases like cholera and dengue fever may be transmitted by insects and rodents drawn to the trash. Individuals may be exposed to disease organisms and other toxins if they use dirty water for bathing, food irrigation, or drinking.

3. SOLID WASTE POLLUTION

Waste that has been abandoned in the environment, such as plastic litter, and is discovered in the sea or along its shores, either floating or submerged, is known as "marine litter."

Agricultural and industrial activities, as well as maritime activity, as well as consumer garbage disposal (such as dumping in parking lots, streets, drains, and at random) all contribute to the problem (fishing, shellfish farming, recreation, harbours and marine transport).

Toxic substances from sewage treatment plants are conveyed by the water cycle and end up in accumulation zones, such as river mouths, estuaries or the shore.

4. IMPACTS OF SOLID WASTE ON ENVIRONMENT

When garbage decomposes into its component compounds, it pollutes the environment around. Developing countries are particularly vulnerable to this issue. Very few of the world's poorest countries' current landfills would fulfil the environmental standards recognised in wealthier nations, and with limited finances few sites are likely to be carefully studied before usage in the future. Again, the situation is exacerbated by urbanization's problems. The release of gas from decomposing garbage is a major environmental concern. A byproduct of anaerobic bacterial respiration, methane is produced in landfills with high levels of moisture. When anaerobic decomposition is at its peak, methane concentrations in landfill gas may reach as high as 50%. (Cointreau-Levine, 1997). In addition, the increased greenhouse gas impact and subsequent climate change are exacerbated by these gases. Leachate management in developing world landfills varies widely. As a result of leachate, nearby surface and groundwater systems are at risk. In

order to keep excess liquid from seeping into the surrounding soil, it is recommended that waste pits be lined with plastic sheeting-type liners and covered with thick clay deposits at the bottom. Instead of being infiltrated, garbage is enticed to evaporate in this manner.

5. SOLID WASTE MANAGEMENT IN INDIAN CITIES

5.1 Solid Waste Generation and Composition

Globally, cities produced 2.01 billion tones of MSW in 2016, averaging 0.74 kg per person every day. Annual trash output is predicted to rise from 2016 levels to 3.40 billion tonnes in 2050 by 70% as a result of fast population expansion and urbanisation.

Table 1: Regional Waste Generation (annual)

Region	Waste Generation (Million Tonnes)
East Asia & The Pacific	468
Europe & Central Asia	392
South Asia	334
North America	289
Latin America & The Caribbean	231
Sub-Saharan Africa	174
Middle East & North Africa	129

6. CONTROL OF SOLID WASTE POLLUTION

6.1 Disposal

In most cases, a sanitary landfill or incinerations are used. Modern sanitary landfills consist of a depression in an impervious soil layer that is coated with an impermeable membrane for disposal of waste. In it, solid waste is disposed of in a predetermined manner at a landfill site that has been carefully selected and prepared. Heavy equipment is used to disperse and compress the waste material. Every day, a fresh layer of compacted earth is applied on the garbage.

Incineration: Combustion of municipal solid waste at an appropriate temperature and operational conditions takes place in a furnace that has been correctly built. Approximately 90% of municipal solid trash is reduced in volume and 75% in weight by this method.

Composting: Combustion of municipal solid waste at an appropriate temperature and operational conditions takes place in a furnace that has been correctly built. Approximately 90% of municipal solid trash is reduced in volume and 75% in weight by this method.

6.2 Recycling

In other words, it involves repurposing waste materials that have some kind of economic value. Resources are saved, energy is saved, and pollution is lessened when waste is recycled.

6.3 Source recovery (pyrolysis)

Solid waste is cooked in a pyrolysis reactor to temperatures between 650°C and 1000°C in an oxygen-depleted atmosphere in this kind of destructive distillation. Some organic wastes' chemical components and chemical energy may be recovered this way. Carbon dioxide, carbon monoxide, tar, methane, charred carbon, etc. are some of the gaseous liquid and gaseous fractions of the organic elements.

6.4 Source reduction

It's a basic approach to cut down on waste. Making a product out of less material, reusing things, and reducing the packaging of products are all ways to achieve this goal. Individuals may help to limit the amount of trash that is generated via the usage of needless things.

7. CURRENT STATUS OF MUNICIPAL SOLID WASTE MANAGEMENT (MSWM) IN INDIA

7.1 Municipal solid waste quantity and generation rate

Roughly 143,449 metric tonnes of MSW are created in India each day, of which approximately 111,000 metric tonnes are collected, and approximately 35,602 metric tonnes are processed (S. Kumar et al., 2017). When looking at garbage production in cities, the CPCB's annual report for 2018 indicates considerable changes in waste creation at an exponential rate strictly (0.24 to 0.85) between the years 2001 and 2018. As a result of which the pace of growth is expected to be fast in the near future (S. Kumar et al., 2017). Because of the MSWM system's unified status, it has been taken for granted by India's 29 states and union territories.

The kind of rubbish in a city varies depending on its location, climate, population, and socioeconomic position. There has been an increase in municipal garbage in cities with a high population density. The wide range of trash poses additional difficulties for communities, demonstrating the impossibility of using the same approach across the board. There is no other explanation as to why municipalities are struggling to keep up with the demands they face and seem to be falling behind.

Overcrowded states like Maharashtra, Tamilnadu, Uttar Pradesh, the National capital Region, Gujarat, Karnataka, and West Bengal generate a massive amount of waste, according to the MNRE report of 2018.

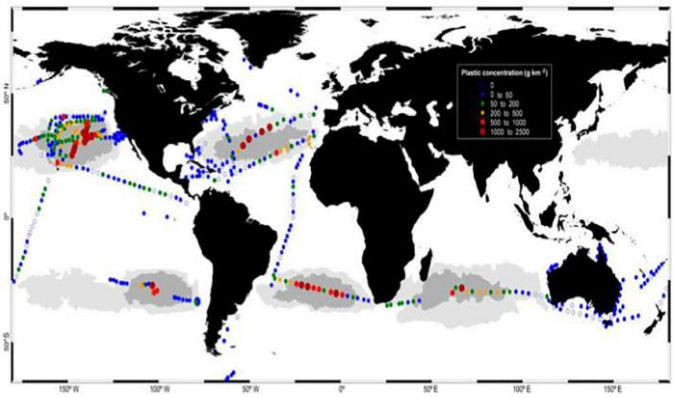

Fig. 1 Concentrations of plastic debris in surface waters of the global ocean

8. INDUSTRIAL SOLID WASTE

Thermal power plants produce coal ash, integrated iron and steel mills produce blast furnace slag and steel melting slag, non-ferrous industries like aluminium, zinc, and copper generate red mud and tailings, sugar mills generate press mud, pulp and paper mills produce lime and fertiliser, and allied industries produce gypsum are the major generators of industrial solid wastes.

Table 2: Source and Quantum of generation of some major industrial waste

s.no	Name	Quantity (million tones per annum)	Source/Origin
1.	Steel and Blast furnace	35.0	Conversion of pig iron to steel and manufacture of Iron
2.	Brine mud	0.02	Caustic soda industry
3.	Copper slag	0.0164	By product from smelting of copper
4.	Fly ash	70.0	Coal based thermal Power plants
5.	Kiln dust	1.6	Cement plants
6.	Lime sludge	3.0	Sugar, paper, fertilizer tan-neries, Soda ash, calcium carbide industries
7.	Mica scraper waste	0.005	Mica mining areas
8.	Phosphogypsum	4.5	Phosphoric acid plant, Ammonium phosphate
9.	Red mud/ Bauxite	3.0	Mining and extraction of alumina from Bauxite
10.	Coal washery dust	3.0	Coal mines
11.	Iron tailing	11.25	Iron Ore
12.	Lime stone	50.0	Lime stone quarry

9. CONCLUSION

Solid waste is hazardous to the environment regardless of its form, whether it's solid, liquid, or gaseous. Urbanization and industrial waste are the primary sources of solid waste contamination. In humans, it causes bacillary dysentery, amoebic dysentery, plague, salmonellosis, trichinosis, the endemic type of typhus, cholera, hepatitis, gastroenteritis, and a variety of other disorders. A clean and pollution-free environment can only be achieved if the proper management of solid waste is in place. Composting, recycling, incineration, pyrolysis, disposal, and landfills are just a few of the techniques used to reduce pollution from solid waste. As a result, solid waste management helps to decrease or even eliminate pollution caused by solid waste and the dangers it poses. Indian SWM has become a big issue due to the country's expanding population and the resulting emergence of megacities. A lack of trash infrastructure, the informal sector, and garbage dumping have made India dependent on these methods. Waste management is plagued by problems with public engagement, and there is a general lack of accountability in the community. The development of effective and long-term waste management systems requires raising public awareness and changing attitudes about trash.

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