

# Impact of Solid Waste on Health and the Environment

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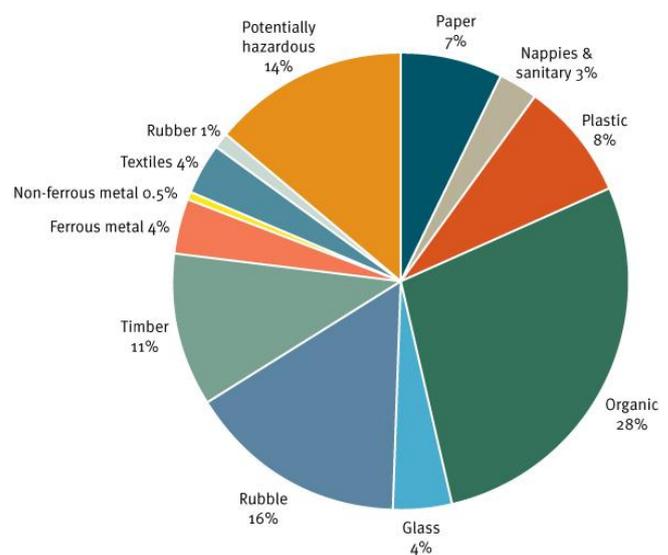
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**Abstract:** *Modernization and progress has had its share of disadvantages and one of the main aspects of concern is the pollution it is causing to the earth – be it land, air, and water. With increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. Waste that is not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. Thus excessive solid waste that is generated should be controlled by taking certain preventive measures.*

**Keyword:** Pollution, population, household, hazard, solid waste, community.

## 1. Introduction

Solid waste can be classified into different types, depending on their source; household waste is generally classified as municipal waste; industrial waste as hazardous waste, and biomedical waste or hospital waste as infectious waste. The term "solid waste" means any garbage, refuse, or sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations (US Law-Solid Waste Act 2, 1999). The term "disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid wastes, hazardous wastes, or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters, from community activities (US Law-Solid Waste Act 2, 1999). Waste that is not properly managed, especially excreta and other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious diseases. Unattended waste lying around attracts flies, rats, and other creatures that in turn spread disease. Normally it is the wet waste that decomposes and releases a bad odour. This leads to unhygienic conditions and thereby to a rise in the health problems. The plague outbreak in Surat is a good example of a city suffering due to the callous attitude of the local body in maintaining cleanliness in the city. Plastic waste is another cause for ill health. Thus excessive solid waste that is generated should be controlled by taking certain preventive measures.



**Figure:** Percentage distribution of various solid waste management

Solid waste disposal sites are found on the outskirts of the urban areas, turning into the child sources of contamination due to the incubation and proliferation of flies, mosquitoes, and rodents; that, in turn, are disease transmitters that affect population's health, which has its organic defences in a formative and creative state. The said situation produces gastrointestinal, dermatological, respiratory, genetic, and several other kind of infectious diseases. Consequently, dumping sites have a very high economic and social cost in the public health services, and have not yet been estimated by governments, industries, and families. The group at risk from the unscientific disposal of solid waste include – the population in areas where there is no proper waste disposal method, especially the pre-school children; waste workers; and workers in facilities producing toxic, and infectious material. Other high-risk groups include the population living close to a waste dump and those whose water supply has become contaminated, either due to waste dumping or leakage from landfill sites. Uncollected solid waste also increases risk of injury and infection.

## 2. Characteristics of Solid Wastes

- **Corrosive:** these are wastes that include acids or bases that are capable of corroding metal containers, e.g. tanks (Moeller,2005).
- **Ignitability:** this is waste that can create fires under certain condition, e.g. waste oils and solvent
- **Reactive:** these are unstable in nature, they cause explosions, toxic fumes when heated.
- **Toxicity:** waste which are harmful or fatal when ingested or absorbed.

### Solid-waste treatment and disposal

Once collected, municipal solid waste may be treated in order to reduce the total volume and weight of material that requires final disposal. Treatment changes the form of the waste and makes it easier to handle. It can also serve to recover certain materials, as well as heat energy, for recycling or reuse.

## 3. Incineration

Incineration is a waste treatment process that involves the combustion of organic substances contained in waste materials (Knox, 2005). Incineration and other high-temperature waste treatment systems are described as "thermal treatment". Incineration of waste materials converts the waste into ash, flue gas, and heat. The ash is mostly formed by the inorganic constituents of the waste, and may take the form of solid lumps or particulates carried by the flue gas. The flue gases must be cleaned of gaseous and particulate pollutants before they are dispersed into the atmosphere. In some cases, the heat generated by incineration can be used to generate electric power. Incinerators reduce the solid mass of the original waste by 80–85% and the volume (already compressed somewhat in garbage trucks) by 95–96%, depending on composition and degree of recovery of materials such as metals from the ash for recycling.

## 4. Composting

Organic matter constitutes 35%–40% of the municipal solid waste generated in India. This waste can be recycled by the method of composting, one of the oldest forms of disposal. It is the natural process of decomposition of organic waste that yields manure or compost, which is very rich in nutrients. Composting is a biological process in which micro-organisms, mainly fungi and bacteria, convert degradable organic waste into humus like substance. This finished product, which looks like soil, is high in carbon and nitrogen and is an excellent medium for growing plant.

### Composting: some benefits

Compost allows the soil to retain more plant nutrients over a longer period.

- It supplies part of the 16 essential elements needed by the plants.
- It helps reduce the adverse effects of excessive alkalinity, acidity, or the excessive use of chemical fertilizer.
- It makes soil easier to cultivate.
- It helps keep the soil cool in summer and warm in winter.
- It aids in preventing soil erosion by keeping the soil covered.
- It helps in controlling the growth of weeds in the garden.

## 5. Sanitary Landfill

Land disposal is the most common management strategy for municipal solid waste. Refuse can be safely deposited in a sanitary landfill, a disposal site that is carefully selected, designed, constructed, and operated to protect the environment and public health. One of the most important factors relating to landfilling is that the buried waste never comes in contact with surface water or groundwater. Engineering design requirements include a minimum distance between the bottom of the landfill and the seasonally high groundwater table. Most new landfills are required to have an impermeable liner or barrier at the bottom, as well as a system of groundwater-monitoring wells. Completed landfill sections must be capped with an impermeable cover to keep precipitation or surface runoff away from the buried waste.

## 6. Landfill

Disposal of waste in a landfill involves burying the waste and this remains a common practice in most countries. Landfills were often established in abandoned or unused quarries, mining voids or borrow pits. A properly designed and well-managed landfill can be a hygienic and relatively inexpensive method of disposing of waste materials. Older, poorly designed or poorly managed landfills and open dumps can create a number of adverse environmental impacts such as wind-blown litter, attraction of vermin, and generation of liquid leachate. Another common product of landfills is gas (mostly composed of methane and carbon dioxide), which is produced from anaerobic breakdown of organic waste. This gas can create odor problems, kill surface vegetation and is a greenhouse gas.

Design characteristics of a modern landfill include methods to contain leachate such as clay or plastic lining material. Deposited waste is normally compacted to increase its density and stability and covered to prevent attracting vermin (such as mice or rats). Many landfills also have landfill gas extraction systems installed to extract the landfill gas. Gas is pumped out of the landfill using perforated pipes and flared off or burnt in a gas engine to generate electricity.

## 7. Recycling

Recycling is a resource recovery practice that refers to the collection and reuse of waste materials such as empty beverage containers. The materials from which the items are made can be reprocessed into new products. Material for recycling may be collected separately from general waste using dedicated bins and collection vehicles, a procedure called kerbside collection. In some communities, the owner of the waste is required to separate the materials into various different bins (e.g. for paper, plastics, metals) prior to its collection. The recycling of complex products (such as computers and electronic equipment) is more difficult, due to the additional dismantling and separation required.



## 8. Waste to Energy (Recover Energy)

Waste to energy (WtE) process involves converting of non-recyclable waste items into useable heat, electricity, or fuel through a variety of processes. This type of source of energy is a renewable energy source as non-recyclable waste can be used over and over again to create energy. It can also help to reduce carbon emissions by offsetting the need for energy from fossil sources. Waste-to-Energy, also widely recognized by its acronym WtE is the generation of energy in the form of heat or electricity from waste.

## 9. Avoidance/Waste Minimization

The most easier method of waste management is to reduce creation of waste materials thereby reducing the amount of waste going to landfills. Waste reduction can be done through recycling old materials like jar, bags, repairing broken items instead of buying new one, avoiding use of disposable products like plastic bags, reusing second hand items, and buying items that uses less designing. Recycling and composting are a couple of the best methods of waste management. Composting is so far only possible on a small scale, either by private individuals or in areas where waste can be mixed with farming soil or used for landscaping purposes. Recycling is widely used around the world, with plastic, paper and metal leading the list of the most recyclable items. Most material recycled is reused for its original purpose.

### Impacts of Solid Waste on Environment



The decomposition of waste into constituent chemicals is a common source of local environmental pollution. This problem is especially acute in developing nations. Very few existing landfills in the worlds poorest countries would meet

environmental standards accepted in industrialized nations, and with limited budgets there are likely to be few sites rigorously evaluated prior to use in the future. The problem is again compounded by the issues associated with rapid urbanization (Kinman,1987). A major environmental concern is gas release by decomposing garbage. Methane is a by-product of the anaerobic respiration of bacteria, and these bacteria thrive in landfills with high amounts of moisture. Methane concentrations can reach up to 50% of the composition of landfill gas at maximum anaerobic decomposition. A second problem with these gasses is their contribution to the enhanced greenhouse gas effect and climate change (Goorah et al, .2009). Liquid leachate management varies throughout the landfills of the developing world. Leachate poses a threat to local surface and ground water systems. The use of dense clay deposits at the bottom of waste pits, coupled with plastic sheeting-type liners to prevent infiltration into the surrounding soil, is generally regarded as the optimum strategy to contain excess liquid. In this way, waste is encouraged to evaporate rather than infiltrate (Royal Commission on Environmental Pollution. 10th Report tackling pollution,1984)

### Preventive Measures for Reduction Of Adverse Impact On Environment And Human

Proper solid waste management have to be undertaken to ensure that it does not affect the environment and not cause health hazards to the people living there. At the household-level proper segregation of waste has to be done and it should be ensured that all organic matter is kept aside for composting, which is undoubtedly the best method for the correct disposal of this segment of the waste. In fact, the organic part of the waste that is generated decomposes more easily, attracts insects and causes disease. Organic waste can be composted and then used as a fertilizer. These steps may be taken for prevention of impact

- Generation of waste should be decreased.
- Promoting the production of goods which minimize waste generation after use.
- Material recycling and recovery should be increased.
- Promoting the use of plastic recycling identification codes and labels in order to make sorting and recycling of plastic packaging easier.
- Municipalities increasing their level of service to the public regarding sorting of waste.
- Education of producers, the public and people who work in the waste sector should be increased.
- Promoting the use of less hazardous alternatives to hazardous chemicals during production of goods.
- Legislation in the waste sector should be improved.
- Collection of hazardous waste at collection points shall be safe, secure and performed in an environmentally sound manner.

## 10. Conclusion

The focus of the study was on impact of Solid waste due to non engineering and non scientific disposal. It is found that with increase in the global population and the rising demand for food and other essentials, there has been a rise in the amount of waste being generated daily by each household. Waste that is not properly managed, especially excreta and

other liquid and solid waste from households and the community, are a serious health hazard and lead to the spread of infectious disease.

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