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WASTE MANAGEMENT AND ITS EFFECTS ON THE ENVIRONMENT AND HUMAN HEALTH – A REVIEW BASED ON DIFFERENT INDIAN CITIES

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ABSTRACT

Waste management minimises waste's negative impact on the environment and human health. Waste management is a complex problem that requires the combination of technology, economics, sociocultural, and political activities. Today's market offers a variety of advanced waste management systems. You can reduce waste more successfully by focusing on the first of the 3Rs, "reduce," then "reuse," and finally "recycle." The primary issues influencing solid waste management are unscientific treatment, ineffective garbage collection, and ethical concerns. Environmental deterioration, water pollution, soil contamination, and air pollution become an issue as a result. When it comes to waste management, many factors must be considered, including disposal options, recycling systems, waste avoidance and reduction efforts, and garbage transportation. Waste management includes the treatment of both solid and liquid waste. It also offers a number of possibilities for recycling items that aren't considered trash during the process. Non-biodegradable and toxic wastes, such as radioactive leftovers, can cause irreversible damage to the environment and human health if they are not properly disposed of. Waste disposal has long been a source of concern, with the chief causes being population growth and industrialization. Recycling, incineration, landfills, composting, Biological Reprocessing, Animal Feed, and other waste disposal methods are examples. It also offers a number of possibilities for recycling items that aren't considered trash during the process. The waste management issues that emerging and industrialised countries face are very different. Population Trends, Large Population Increases, Migration from Rural to Urban Centers, Lack of Legislation and Policies, Lack of Rules and Regulations Relevant to Waste, Lack of Proper Disposal, Use of Inappropriate Dump Sites, Inappropriate Technology, Scavenging, etc. are

some of the waste management issues that developing countries face. Solid waste management problems in emerging economies and developing parts of countries with mixed economies are raising growing concern. Trash disposal in developing countries, on the other hand, is still mostly unregulated, and massive amounts of garbage go uncollected. Waste management is more challenging in affluent countries due to a lack of comprehensive taxation, tariff, fee-for-service, loan, and debt payment regimes to fund infrastructure.

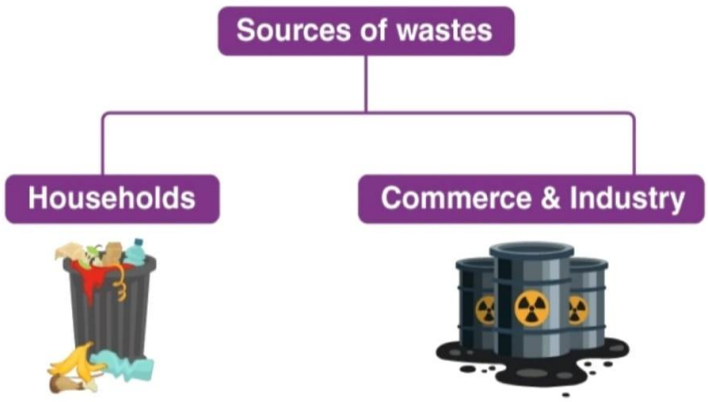
INTRODUCTION

Waste is defined as unwanted and unusable resources, and it is regarded as a waste product. Garbage is the term used to describe the rubbish that we see in our world. All of the behaviours and actions required to handle garbage from its inception to its final disposal are referred to as waste control or waste disposal. Storage, transportation, management, and recycling of garbage, as well as control and enforcement, are all part of this. It also includes the waste control legislative and regulatory structure, as well as recycling rules and other topics. Waste management is a difficult and time-consuming task in every European country, with significant implications for human health and well-being, environmental preservation, sustainability, and the economy. In the past, the WHO and many other health organisations around the world have addressed the health implications of trash (WHO Regional Office for Europe, 2007). The European Environment and Health Process (EHP), started in the late 1980s by European countries to eradicate the most serious environmental hazards to human health, includes waste as part of its objective. A series of ministerial conferences, coordinated by WHO every five years, have highlighted progress. In 2010, the fifth and most recent conference was held in Parma, Italy. In the coming decade, the 53 Member States of the WHO European Region set specific goals to mitigate the negative health effects of environmental risks. As the process approaches its Sixth Ministerial Conference on Environment and Health in 2017, Member States have listed trash as one of the subjects to be discussed. The WHO Regional Office for Europe agreed to convene an expert consultation to evaluate the evidence on the health consequences of urban and hazardous waste, as well as to explore practises, needs, knowledge gaps, and resources in Member States, in order to support the EHP and prepare for 2017. Current epidemiological evidence, appropriate legal and normative frameworks, practicality of policy alternatives, and their economic implications were the key topics of discussion. Twenty-six experts from ten nations and five international organisations attended the expert meeting. The major findings of the exercise are presented in this study, which demonstrate that garbage disposal might have significant

health consequences. While modern waste management technology can significantly reduce noxious emissions and human exposure to hazardous agents, many cases still exist where old generation facilities are in use, or worse, where informal uncontrolled waste disposal such as casual dumping or open-air waste burning occurs, which disproportionately affects marginalised groups. It indicates that addressing the most serious cases of waste-related human exposure to harmful chemicals, as well as speeding up the implementation of contemporary waste treatment equipment, is critical. Sustainability is also gaining traction, with a growing interest in supporting the circular economy in accordance with the European Union's (EU) waste hierarchy, which prioritises waste reduction, reuse, or recycling over incineration and landfilling. Due to its negative environmental effects, the latter has been phased out in various nations. Further consultations with Member States will be held in 2016 based on the available evidence on the health impacts of waste in order to identify priorities, goals, and policy action that can reduce negative health effects and inequity, improve human well-being, and promote long-term sustainability across Europe and beyond.

Sources of Waste

Sources of waste can be broadly classified into four types: Industrial, Commercial, Domestic, and Agricultural.



Industrial Waste

These are the wastes created in factories and industries. Most industries dump their wastes in rivers and seas which cause a lot of pollution.

Example: plastic, glass, etc.

Commercial Waste

Commercial wastes are produced in schools, colleges, shops, and offices.

Example: plastic, paper, etc.

Domestic Waste

The different household wastes which are collected during household activities like cooking, cleaning, etc. are known as domestic wastes.

Example: leaves, vegetable peels, excreta, etc.

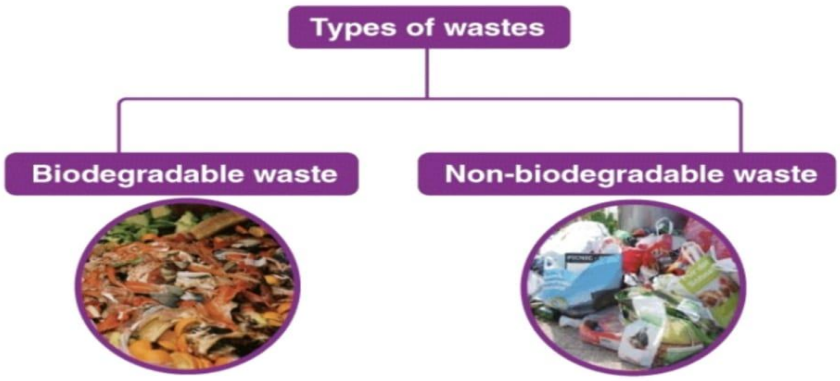
Agricultural Waste

Various wastes produced in the agricultural field are known as agricultural wastes.

Example: cattle waste, weed, husk, etc.

Types of Waste

Commonly waste is classified into two types: Biodegradable and Non-biodegradable waste. These two kinds of wastes are explained below.



Biodegradable waste

These are the wastes that come from our kitchen and it includes food remains, garden waste, etc. Biodegradable waste is also known as moist waste. This can be composted to obtain manure. Biodegradable wastes decompose themselves over a period of time depending on the material.

Non-biodegradable waste.

These are the wastes which include old newspapers, broken glass pieces, plastics, etc. Non-biodegradable waste is known as dry waste. Dry wastes can be recycled and can be reused. Non-biodegradable wastes do not decompose by themselves and hence are major pollutants.

Composition and production of household trash

In India, where urbanisation, industrialization, and economic expansion have resulted in incre ased municipal solid waste (MSW) generation per person, solid waste management (SWM) is a major issue for many urban local bodies (ULBs).

In densely populated cities, effective SWM is a huge difficulty.
Because India is a varied country with many different religious groups, cultures, and customs, achieving sustainable development within a country experiencing fast population increase an d improvements in living conditions is more difficult.

India's e-waste

According to the worldwide e-waste monitor, which was created by the International Telecommunication Union (ITU) and the United Nations University, India generated 1.975 million tonnes of e-waste in 2016, or about 1.5 kg of e-waste per inhabitant. Rapid economic growth and changing consumer behaviour, according to the Associated Chambers of Commerce and Industry (ASSOCHAM), will certainly boost e-waste creation in India to 5.2 million tonnes per year by 2020, if not more.

Waste management in India

The Union Ministry of Environment, Forests and Climate Change is in charge of waste management in India (MoEF&CC).

The Solid Waste Management (SWM) Rules, which were repealed in 2016 and replaced by the Municipal Solid Waste (Management and Handling) Rules, had been in effect for 16 years. For the first time, this national policy contributes to the recognition and integration of the informal sector (trash pickers) in the waste management process.

Every year, India produces 62 million tonnes of trash. Around 43 million tonnes (70%) are collected, with 12 million tonnes being processed and 31 million tonnes being disposed in landfills.

Urban municipal solid waste generation is expected to rise to 165 million tonnes in 2030 as a result of shifting consumption patterns and rapid economic expansion.

INDIA'S Solid Waste Management Regulations

- Waste segregation at the source is required under the Solid Waste Management Rules, which were implemented in 2016. Households are required to separate waste into three streams - Organic or Biodegradable waste, Dry waste (such as plastic, paper, metal and wood), and Domestic Hazardous waste (diapers, napkins, mosquito repellents, cleaning agents). Further, bulk waste generators such as hotels and hospitals are expected to treat organic waste either onsite or by collaborating with the urban local body.
- The inclusion of informal waste pickers and rag pickers in the waste management process has been mandated for municipalities and urban local authorities.
- This is the first time in national policy that the informal sector has been acknowledged and incorporated in the waste management process.
- India has around 1.5 million poor informal garbage pickers, and integrating them into the formal waste management system will allow urban local governments to streamline their operations while also providing better revenue prospects for the waste pickers.
- Manufacturers of non-biodegradable packaging for fast-moving consumer goods (FMCG) are required to set up a system to collect packaging trash created during production.
- A provision has been made for urban local governments to charge bulk generators a user fee for collecting and processing their trash.
- People who burn garbage or throw it out in public locations may also be fined on the spot.
- In landfills, no non-recyclable garbage with a calorific value of 1,500 Kcal/kg or more is allowed. These wastes should either be utilized for generating energy or for preparing refuse derived fuel. It may also be used for co-processing in cement or thermal power plants.

India's waste management market

The waste management market in India is expected to be valued USD 15 billion by 2025, with annual growth of roughly 7%. Emerging economies around the world are seeing a burgeoning economy, soaring urban populations, rising living standards, and rising consumption levels. Similarly, in India, rising purchasing power parity has resulted in increased affordability, resource accessibility, and a significant growth in trash volumes. Given India's present urbanisation trend, MSW volumes are predicted to treble in the next ten years. At approximately 80-85 MTs by 2030, presenting a business opportunity estimated at US$20 Billion. Initiatives based in the city In 2014, India launched the Swachh Bharat Mission, a five-year cleanup campaign across the country. Many cities and towns in India had

already launched individual efforts directed at municipal waste collection of segregated waste, either based on citizen activism and/or municipal efforts to set up sustainable systems, before this national consolidated effort for systematic and total waste management became widely known.

State	City	Initiative Name	Implementing Agency
Ladakh (UT)	Leh	Project Tsangda	Rural Development Department
Chhattisgarh	Durg	-	Municipal Corporation
Chhattisgarh	Ambikapur	-	Municipal Corporation
Karnataka	Mysuru	-	City Corporation
Maharashtra	Navi Mumbai	-	Navi Mumbai Municipal Corporation
Andhra Pradesh	Visakhapatnam	-	Municipal Corporation
Karnataka	Bengaluru	-	Bruhat Bengaluru Mahanagara Palike
Madhya Pradesh	Indore	-	Indore Municipal Corporation
Maharashtra	Pune	-	Pune Municipal Corporation
Karnataka	Bengaluru	Bettahalasur Project	TAICT
Tamil Nadu	Madurai	T Kallupatti	Town panchayat
West Bengal	Kolkata	Kolkata Solid Waste Management Improvement Project	Kolkata Metropolitan Development Authority

Types of Trash Management Trash management, to put it simply, is the collection, processing, treatment, and recycling of waste (human waste and animals waste, including industrial waste). Storage, transport, treatment, and disposal of waste are all part of the Waste Management process, as are monitoring, supervision, and control of the development, processing, transit, treatment, and disposal. Here are some of the different types of waste management disposal methods in India.

- Recycling
- Incineration
- Landfill
- Biological Reprocessing
- Animal Feed

Let’s explore these different types of waste management methods with examples in further detail.

Recycling

Recycling is the process of converting waste materials into new materials and objects. The recovery of energy from waste materials is often included in this concept. The recyclability of a material depends on its ability to reacquire the properties it had in its original state.[1] It is an alternative to "conventional" waste disposal that can save material and help lower greenhouse gas emissions. It can also prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials, reducing energy use, air pollution (from incineration) and water pollution (from landfilling).

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy.[2][3] It promotes environmental sustainability by removing raw material input and redirecting waste output in the economic system.[4] There are some ISO standards related to recycling, such as ISO 15270:2008 for plastics waste and ISO 14001:2015 for environmental management control of recycling practice.

Recyclable materials include many kinds of glass, paper, cardboard, metal, plastic, tires, textiles, batteries, and electronics. The composting and other reuse of biodegradable waste—such as food and garden waste—is also a form of recycling.[5] Materials for recycling are either delivered to a household recycling center or picked up from curbside bins, then sorted, cleaned, and reprocessed into new materials for manufacturing new products.

In ideal implementations, recycling a material produces a fresh supply of the same material—for example, used office paper would be converted into new office paper, and used polystyrene foam into new polystyrene. Some types of materials, such as metal cans, can be remanufactured repeatedly without losing their purity.[6] With other materials, this is often difficult or too expensive (compared with producing the same product from raw materials or other sources), so "recycling" of many products and materials involves their *reuse* in producing different materials (for example, paperboard). Another form of recycling is the salvage of constituent materials from complex products, due to either their intrinsic value (such as lead from car batteries and gold from printed circuit boards), or their hazardous nature (e.g. removal and reuse of mercury from thermometers and thermostats).

Incineration

This type of waste management includes the disposal of waste materials by means of burning. The thermal treatment is another name for this disposal method. You may incinerate on a

commercial or human scale and dispose of a broad variety of waste materials. Most countries with limited land consider the incineration process. You may use the power produced by burning waste materials to produce heat, energy or steam. One of the drawbacks of this disposal process is that it can be a source of air pollution.

Landfill

A landfill site, also known as a tip, dump, rubbish dump, garbage dump, or dumping ground, is a site for the disposal of waste materials. Landfill is the oldest and most common form of waste disposal, although the systematic burial of the waste with daily, intermediate and final covers only began in the 1940s. In the past, refuse was simply left in piles or thrown into pits; in archeology this is known as a midden.

Some landfill sites are used for waste management purposes, such as temporary storage, consolidation and transfer, or for various stages of processing waste material, such as sorting, treatment, or recycling. Unless they are stabilized, landfills may undergo severe shaking or soil liquefaction of the ground during an earthquake. Once full the area over a landfill site may be reclaimed for other uses.

Biological Reprocessing

Chemical waste materials, such as kitchen waste and paper goods, can be reused after a procedure called biological reprocessing which is another popular system amongst the varied types of waste management. Multiple physiological systems, including recycling and biomass gasification, are used in biological reprocessing. Composing is a normal biological mechanism that is carried out under control conditions. One of the ends of the stock is natural gas, which is used to produce heat and electricity. Biological reprocessing is commonly used for the disposal of industrial waste.

Animal Feed

Food waste is a serious issue and needs serious consideration. According to the United States Department of Agriculture, between 30 and 40 percent of all food created by the United States is spent on food by retailers and customers. This is a major problem as the food value is estimated to be $161 billion. The nation is leading the world in terms of food waste, and the cause is self-explanatory. Food can be preserved by manure and livestock feed and this is also one of the ecological types of waste management methods.

Waste management's health implications include

Improper garbage management and illicit waste shipments can harm the environment as well as public health. Different handling and disposal actions might have negative consequences, leading in soil, water, and air pollution. Inadequately disposed of or unprocessed garbage might offer major health risks to the people who live near the disposal site. Leaks from the garbage might damage soils and water supplies, as well as cause air pollution from heavy metals and persistent organic pollutants (POPs), posing health risks. Other problems produced by unmanaged or poorly managed garbage disposal that may have a negative impact on inhabitants include landscape deterioration, local water and air pollution, and littering. For health reasons, effectively managing garbage and doing it in an environmentally friendly manner is critical.

Despite the increasing recycling activities, landfills and incinerators are widely used to manage the final phase of waste disposal. As a consequence, existing literature provides evidence mainly for these plants. Recently information on less severe diseases is available also in relation to waste treatment activities, such as mechanical biological treatment (MBT) plants. A number of reviews are already available (Vrijheid, 2000; Hu and Shy, 2001; Rushton, 2003; Dolk and Vrijheid, 2003; Franchini et al., 2004; WHO Regional Office for Europe, 2007; Russi, Borak, and Cullen, 2008; Giusti, 2009; Porta et al., 2009; Mattiello et al., 2013; Ashworth, Elliott and Toledano, 2014); DEFRA, 2004). The conclusion of these reviews is not definitive, with some difficulties in interpreting data from primary studies due to non-homogeneous design, and lack of accurate exposure information and control of potential confounders.

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