

# A Review on household solid waste management Practices and their impact on air, soil and land

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**Abstract-** Most of the developed countries recognized that solid waste management is very crucial for survival. It has been observed that with increasing population growth, urbanization, and industrialization there is a generation of large quantity of household waste. Waste management is very poor and household solid wastes are commonly dumped along roadsides and into open areas, attracting infectious diseases creating serious health and environmental consequences like air, water and land pollution. This paper is a presentation of review on household waste management practices like segregation, burning, disposal practices impacts on air, water and land bodies. The needs of proper waste management, ill effects of improper handling of waste, various issues raised in previous studies are mentioned in the paper. It was noted that proper waste management should be adopted by segregation, disposal and proper waste collection system, so that impact of waste can be minimised on air, water and land with improvement in quality of life.

**Keywords:** Household waste management, segregation, burning, collection, disposal practices

## INTRODUCTION

Household Solid waste is a major concern with health of people living nearby, poorly maintained land fill sites are responsible for ground water pollution because of leachate production. Open dumping of wastes causes breeding of flies, mosquitoes, cockroaches, rats, & other pests, these pests are responsible for spreading of diseases; also open dumping cause's significant air pollution in surrounding area. In addition, MSW management agencies lack the infrastructure and ability to collect and dispose of garbage in a safe manner in order to satisfy the rising demand. In growing countries, rural-

to-urban migration has resulted in unplanned urban settlements, which have placed considerable pressure on municipal authorities. Consequently, dealing with domestic solid waste has become a significant barrier to urban development. However, there is a quality and efficiency mismatch between the demand and supply of these services. Open dumping and waste burning have been related with various public health risks and pollution sources, resulting in the emission of dioxins and other dangerous toxins.

Proper solid waste Management reduces adverse impacts on the environment and human health and supports economic development and improved quality of life. A lot of steps are involved in effectively managing the household waste. These include segregating, disposing, collection, transport, processing, recycling.

## METHODS

The literature review on waste management practises and impact on air, water and land resources was the first stage in locating, summarising, and integrating relevant evidence. The evidence was utilised to build and evaluate a framework that summarises and depicts inter linkages and probable health pathways from solid waste exposure. Gray and peer-reviewed publications were searched. Google scholar, Science direct and Pubmed was searched using a predetermined method for peer-reviewed and indexed material. Solid/municipal waste; solid/municipal waste management (production, disposal); health impact/effects; environment impact. Relevant articles were retrieved. Google Scholar grey literature searches used similar terms. The review begins by explaining global scenario of solid waste management,

waste segregation, disposal practices like open dumping/land filling and burning impact on air, water and land resources.

#### REVIEW OF LITERATURE

Abubakar *et al.* (2022) conducted a survey on “environmental sustainability impacts of solid waste management practices in the global south” and found that Solid waste management is a key responsibility of municipal governments and a measure for good administration. SWM reduces health and environmental impacts, conserves resources, and increases community liveability. Rapid urbanisation, financial and institutional limits increase unsustainable SWM practises, which harm human health and the environment. Through his study he found that waste can have the human and environmental health implications in Global South cities. They also observed that waste is stored in obsolete or poorly maintained containers, and the transportation infrastructure is weak and informal. Uncontrolled dumping, open-air incinerators, and landfills are common disposal options. Such practises cause air and water pollution, land degradation, methane emissions, and climate change. These repercussions have considerable environmental and public health implications for residents, especially marginalised groups.

The most significant factor in sculpting the terrain and regulating the climate is water. Additionally, it is essential for agricultural production. Daily, the water demand is increasing. As the majority of people depend on natural resources for their livelihood and health, it is crucial to monitor the quality of water, as consumption and usage of low-quality water can negatively impact the public's standard of living and health (Mohite and Sarnobbat 2022).

Solid waste management system is a global concern which needs a sustainable SWM primarily in the developing countries (Fadhullah *et al.* 2022). Globally, the volume of garbage is expanding rapidly, even faster than urbanisation. Mulat *et al.* (2019) explained that in 2012, the world's cities created 1.3 billion tonnes of solid trash per year and this amount of rubbish is anticipated to reach 2.2 billion tonnes by 2025. Population growth, urbanisation, and industrial expansions in metropolitan centres have contributed to

a rapid increase in solid wastes, and also especially in the study region of Ethiopia.

Kumar and prakash (2020) conducted a review study and stated that both air and water are essential to life. These two elements play a significant influence in the process of evolution. Air and water purity are a prerequisite for living. Air and water quality are currently impacted by solid waste pollution. Solid waste generates multiple forms of pollution, which disrupts our daily lives. It not only poses a threat to human and animal existence, but also destabilises the environment. Solid waste is a source of the development of harmful microorganisms. Their primary influence is on the air, water, and soil. Thus, in these conditions, the lives of both humans and animals become so tough that their survival is threatened. The amount of rubbish is increasing daily, and the landfill is expanding so rapidly that it threatens to encroach on our safe zone and cause a sewage problem. Both conditions eventually led to a variety of severe diseases.

According to Elbeshbishy and Okoye (2019) improper hazardous waste disposal not only contaminates soil and the local water supply, but also pollutes the air. A region with a poor reputation for a toxic environment may also be prone to a decline in property prices; hence, improper waste disposal can also have an effect on property values. Improper disposal of municipal garbage over the long term can impair soil and water qualities and production. In addition, it produces poisonous gases such as carbon monoxide and methane.

Bhat *et al.* (2018) stated that the environment is harmed by waste, which has a devastating effect on human health and well-being. Humans and animals alike are affected by these negative effects, which can lead to disease outbreaks, a decrease in life expectancy, and an unhealthy environment. Some wastes may decay, but those that don't decay, will generate smell and produce methane gas, which has a considerable impact on greenhouse gas emissions. Air, water, and soil are polluted by wastes that have been dumped. Among the many things that contribute to poor air quality are odours, smoking, and dust. Burning solid waste releases greenhouse gases including carbon dioxide and nitrous oxide, which depleted the ozone layer and has a negative impact on climate change. Additionally, sulphur dioxide and methane are emitted into the atmosphere. Human life

is endangered by the presence of these poisonous compounds.

Varjani *et al.* (2017) analysed that water contamination is another negative impact of waste on the ecosystem. There are around 1400 deaths per day attributed to water and water-related problems/diseases, according to the latest estimates. Toxic waste can harm aquatic life and humans by reducing the pH of water bodies including rivers, streams, and the oceans they enter. Some of these contaminants are particularly lipophilic and less water-soluble (Bobadilla *et al.* 2019) have indicated the existence of hazardous metals in water. Water that has been contaminated by waste from one area can be used as receiving water in another location as well. An inappropriate disposal of waste can also lead to soil pollution. Discarded wastes are unappealing to the eye, and they encourage the spread of disease vectors. Soil organisms and plants are contaminated by metals such as iron, radioactive waste, etc., resulting in lower crop yields.

Around the world, toxic substances from waste generation have become a significant source of pollution. The majority of information supporting their status as environmental contaminants through waste accumulation has come from low-income nations with ineffective or ineffective environmental measures. Children are the most affected by environmental pollution out of the entire world's population because each particle that enters their system has the ability to cause long-term problems as well as early deaths (Kumar *et al.* 2017).

Land is widely employed as a waste treatment recipient, receiving massive amount of waste, according to Majolagbe *et al.* (2017). Land pollution is the degradation of the earth's surface caused by improper farming practises, mineral exploitation, the dumping of industrial waste, and the careless disposal of household solid waste. Even though only a small portion of solid waste is recycled, it is practicable to recycle materials for a lot of municipal and some industrial garbage. However, recovery becomes difficult and expensive when waste is mixed.

Environmental pollution may also be caused by a number of human actions, such as, for example, technological attempts to alter ecosystems (Nadal *et al.* 2016). The pollutants may either be foreign energies or compounds or naturally occurring toxins (Gworek *et al.* 2016). It has always been integrally

linked to a variety of health problems, including the spreading of diseases such as cholera and typhoid, some of which are often regarded as being transmitted through contaminated water sources. (Zhao *et al.* 2015).

Open Burning impact on air, water and land resources: Domestic-open waste burning practises are prevalent in developing nations where garbage collection is becoming a substantial challenge for municipal waste management systems (Hoffer *et al.* 2020). Open waste burning refers to the burning of agricultural wastes, construction scraps, yard debris, and municipal waste (Li *et al.* 2019). Approximately 20% of Mumbai, India's air pollution is attributable to open waste burning (Lal *et al.*, 2016). Typically, the suburbs and the periphery have ample open spaces that permit OWB without bothering neighbours (Daffi *et al.* 2020). In areas with low socioeconomic level, burning emissions are also much higher than in other areas, which may pose a greater threat to rural neighbours. People in these regions also have a sizable backyard in which they can dig trenches for trash disposal (Mihai *et al.* 2019). Before being totally incinerated, municipal solid refuse is then disposed of in the pit and accumulated until it is full. It has been claimed that open burning events occurs about 30% of rural areas and 13% of metropolitan areas. Most individuals also utilise the formal garbage collection system, as well as open dumping, burial, and the disposal of waste into aquatic bodies. People in poor countries continue to mismanage their household garbage, according to this statistic.

More than 50% of rural Thailand's residential garbage is burned, according to Pansuk *et al.* (2018). Organic trash (62.71%), plastics (31.68%), paper and cardboard, glass, metals, leatherwood textiles, and rubber are burned most often (LWTR). Carbonaceous chemicals, acidic gases, and smoke are emitted into the environment when plastic burns. Wood, leaves, and pruning residues can produce chemicals that affect the ecosystem (Alves *et al.* 2019). Due to Thailand's two seasons (wet and dry), residential garbage may vary. Nagpure *et al.* (2015) compared summer and winter burns. People burn more organic (compostable) garbage in the summer. Wood and paper wastes burn better in winter. This phenomenon may vary by community's socioeconomic condition. Rural, urban, and peri-urban environments have varied features, resulting in varying pollution emissions.

According to Zhang *et al.*(2017) the combustion of electrical equipment, such as insulated wires, cables, and circuit boards, is the leading source of dioxins, followed by plastic garbage, garden waste, rubber waste, and mixed home waste. These contaminants are classified as human carcinogens (Triassi *et al.* 2015). Consequently, burning of waste emissions more carcinogenic than wood combustion (Hoffer *et al.* 2020). Burning can emit metals attached to particles, which enhances the risk of cancer for those in the vicinity of burning scenarios. Enhanced concentrations of Zn, Pb, Ti, P, and Ba are detected after waste burning at landfills (Baalbaki et al, 2016). Open burning of waste can also generate other gaseous and particle-bound mutagenic compounds, such as polycyclic aromatic hydrocarbons (PAHs), polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), polychlorinated biphenyls (PCBs), and other toxic compounds (Hsu et al.2016). PAHs were discovered to be the primary contributors to air pollution in the dump. PAHs are also present in the soil due to OWB ashes remaining in the landfill. The PAH concentration in soil and the surrounding environment may exceed the allowable limit (Adesina *et al.* 2020)

#### WASTE LAND FILLING AND OPEN DUMPING IMPACT ON AIR, WATER AND LAND RESOURCES

Mouhoun-Chouaki *et al.* (2019) carried out research on the environmental impact of landfills. Their primary objective was to determine the effect of solid waste disposal on soil quality in Nigerian landfills. Conte *et al.* (2018) investigated the impact of landfills on air pollution in Italy. It was discovered that landfills contribute significantly to air, land, and water pollution.

A study by Arajo *et al.* (2018) revealed that although improper waste disposal causes the emissions of unwelcome environmental pollutants like GHG, simple sanitary landfills produced the highest amount of CO<sub>2</sub> followed by sanitary landfills with CH<sub>4</sub> collection, municipal incineration, and finally the reutilization of woody waste. This gives rise to some optimism that appropriate intervention, such as the controlled release of pollutants and their reutilization, may be a way to lessen harmful emissions.

Environmental pollution is thought to be responsible for 90% of deaths in low-income nations, where it has been shown to have considerable negative consequences on health-related outcomes. Water and air pollution are the two most pervasive types in low-income nations. This is in contrast to fast rising economies, where the main sources of environmental contamination are harmful chemicals and pesticides (Xu *et al.* 2018).

Depending on the operations or methods used, a landfill's influence on the environment can vary. Yadav and Samadder (2018) studied different MSW land filling scenarios, including collection and transportation; recycling, open burning, open dumping, and unsanitary landfilling without energy recovery; composting and landfilling. Each scenario has varying environmental impacts. These activities directly or indirectly contributed most too marine ecotoxicity, global warming, acidification, eutrophication, and human toxicity, and depletion of abiotic resources like fossil fuels and aquatic and terrestrial ecosystem. This shows how different improper disposal activities can cause various serious threats to human health and environment.

Sulfur dioxide (SO<sub>2</sub>) and nitrogen dioxide (NO<sub>2</sub>) are two gases that are emitted by open dumping waste into landfills and have a negative impact on the environment. Inhaling any of these gases may cause throat and nasal irritations, which may lead to the development of asthma. Some of the exhaust fumes can cause respiratory ailments in local residents who live close to such facilities (Cucchiella *et al.* 2017).

The indiscriminate disposal of solid wastes exposes humans to environmental degradation, such as flooding, drainage obstruction, the spread of infectious diseases, cholera, diarrhoea , typhoid fever, and the blockage of waterways, which results in the infestation of flies, ticks, and the breeding of mosquitoes that spread malaria and other diseases (Ezechi *et al.* 2017). Although landfilling is designed to reduce waste, it may typically affect the three media types (land, air, and water). Before the waste is buried in landfills, it is compacted to fill the entire area (Joshi *et al.* 2017). This is done to prevent the substance from coming into touch with the environment. Additionally, it ensures that the waste is kept as dry as possible, minimising its exposure to air so that it does not decay readily.

According to Hossain *et al.* (2014), there are various traditional categories used to categorise landfill pollution. The categories that deal with the receiving air (emissions), water (effluents), and soil may be the most prevalent ones (dumps and disposals). A little more thorough description would distinguish between surface and groundwater, troposphere and stratosphere, and inland and marine waterways. Most of the debate and regulation about pollution is based on these categories, but more and more attention is being paid to how pollution affects more than one medium, such as when air pollution makes lakes and streams more acidic or when sludge and other leftovers from controlling air and water pollution are dumped on land or in the ocean.

### CONCLUSION

To conclude it was observed that landfills are crucial for solid waste disposal. The majority of countries use landfills. Some landfills are lined to prevent leakage into subsurface water. Although landfills are important for trash management, they pollute. Biodiversity, flora, animals, and marine life are affected by landfills. Studies link landfills to mice and other animals. Open burning is linked to municipal trash mismanagement. In many developing countries, environmental consciousness drives this. Local government affects behaviour. Academics and NGOs should promote pro-environmental conduct, overseen by local governments. Further research should focus on strategy analysis to reduce burning and open dumping at the household level and environmental risk/emission estimation analysis of emerging contaminants. Waste can be turned into raw materials for high-quality human products, minimising waste potential and maximising the world's finite resources by reducing unnecessary waste formation. Recycling methods like composting and waste-to-energy should be incorporated. It involves collecting and reusing solid trash such as glass bottles, stainless steel, food and beverage cans, and metals. Recyclable trash should be collected in separate bins and segregated at a facility. This lowers air and water pollution and conserves resources for the future.

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