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2. Admission number: SN202/11/2018
3. Course code: D002
4. Course name: Diploma in Water, Sanitation and Hygiene
5. Name of institution: Strategia Netherlands
6. Date of submission: 30/4/2019
7. Assignment number: 4

**Assignment: 4**

* + - 1. **Explain what municipal solid waste (MSW) means.**

Municipal Solid Waste is a trash, garbage or rubbish which consists of everyday items we use and throw away such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, paint and batteries. This type of waste comes from our homes, schools, hospitals and businesses.

Municipal Solid Waste is defined as refuse from households, non-hazardous solid waste from industrial, commercial and institutional establishments including hospitals, market waste, yard waste and street sweepings.

The composition of municipal solid waste varies greatly from municipality to municipality, and it changes significantly with time. In municipalities which have a well-developed waste recycling system, the waste stream mainly consists of intractable wastes such as plastic film and non-recyclable packaging materials.

In developed areas without significant recycling activity it predominantly includes food wastes, market wastes, yard wastes, plastic containers and product packaging materials, and other miscellaneous solid wastes from residential, commercial, institutional, and industrial sources.

Waste collection is performed by the municipality within a given area. The term residual waste relates to waste left from household sources containing materials that have not been separated out or sent for reprocessing.

**Waste can be classified in several ways but the following list represents a typical classification:**

**Biodegradable waste:** food and kitchen waste, green waste,

**Recyclable material**s: paper, cardboard, glass, bottles, jars, tin cans, aluminum cans, aluminum foil, metals, certain plastics, fabrics, clothes, tires, batteries, etc.

**Inert waste**: construction and demolition waste, dirt, rocks, debris

**Electrical and electronic waste:** electrical appliances, light bulbs, washing machines, TVs, computers, screens, mobile phones, alarm clocks, watch, etc.

**Composite wastes:** waste clothing, Tetra Packs, waste plastics such as toys

Hazardous waste including most paints, chemicals, tires, batteries, light bulbs, electrical appliances, fluorescent lamps, aerosol spray cans, and fertilizers

Toxic waste including pesticides, herbicides, and fungicides

**Biomedical waste**: expired pharmaceutical drugs, etc.

**There are practices that reduce the amount of waste needing to be disposed of;**

1. Source Reduction/Waste Prevention: this is the designing products to reduce the amount of waste that will later need to be thrown away and also to make the resulting waste less toxic.
2. Recycling: This is the recovery of useful materials such as paper, glass, plastic and metals from the trash to be used to make new products, reducing the amount of virgin raw materials needed.
3. Composting: This is the process of collecting organic waste such as food scraps and yard trimmings and storing it under conditions designed to help it break down naturally. This resulting compost can then be used as a natural fertilizer

Source:

* + - 1. **Explain the importance of Municipal Solid Waste properties in Solid Waste Management or treatment**

Municipal Solid Waste Properties are very important as they are used to estimate the volume or weight of waste for transportation, disposal or processing**.** They are also important as they used to determine the percentage contents of various ingredients of the solid waste. They are categorized into three components:

1. **Physical properties:**

This includes the determination of percentage contents of various ingredients of the solid waste and Bulk Density is generally calculated.

Function of location, season, storage time, equipment used, processing (compaction, shredding, Used in volume calculations Bulk density - Collection, transportation, final disposal

The size and distribution of the components of wastes are important for the recovery of materials, especially when mechanical means are used, such as trammel screens and magnetic separators.

Field capacity is critically important in determining the formation of leachate in landfills and

It varies with the degree of applied pressure and the state of decomposition of wastes, but typical values for uncompact commingled wastes from residential and commercial sources are in the range of 50 - 60%.

The permeability (hydraulic conductivity) of compacted solid waste is an important physical property because it governs the movement of liquids & gases in a landfill.

1. **Chemical properties:**

Chemical properties of Municipal Solid Waste are very important in evaluating the alternative processing and recovery options.

Used primarily for combustion and waste to energy (WTE) calculations but can also be used to estimate biological and chemical behaviors.

Waste consists of combustible (i.e. paper) and non-combustible materials (i.e. glass) and knowledge of the energy content of an organic fraction of solid waste is essential for evaluating its potential for use as a fuel in a combustion system

1. **Biological properties**

The most important biological characteristic of the organic fraction of Municipal Solid Waste is that almost all the organic components can be converted biologically to gases and relatively inert organic and inorganic solids.

The production of odors and the generation of flies are also related to the putrescible nature of the organic materials.

Volatile solids (VS), determined by ignition at 550˚C, is often used as a measure of the biodegradability of the organic fraction of Municipal Solid Waste.

Some of the organic constituents of Municipal Solid Waste are highly volatile but low in biodegradability (e.g. Newsprint) due to lignin content.

The rate at which the various components can be degraded varies markedly. For practical purposes, the principal organic waste components in Municipal Solid Waste are often classified as rapidly and slowly decomposable.

* + - 1. **Outline the advantages and disadvantages of source separation of Municipal Solid Waste**

**The following are the advantages of source separation of Municipal Solid Waste**

1. Produces high-quality waste products that can bring a premium price if markets are available and if recovered products meet market specifications.
2. It is the only method currently available for the recovery from MSW of recyclable newspaper, office paper, corrugated cardboard, color-sorted glass, plastics, and rubber.
3. It conserves energy by recovering materials whose production from virgin sources is energy intensive.
4. It requires very little capital investment as compared with centralized resource recovery.
5. Collections are easier for crew – food waste does not stick to the containers and all food waste is emptied from the container.
6. Collection chambers in vehicles are kept clean and chances of spillages/leakages are reduced
7. Potentially higher participation rates achieved
8. Potentially higher capture rates and yields achieved
9. Minimal involvement of site staff
10. Greater storage capacity, therefore, less interruption to deliveries
11. Limited number of skilled forklift operators will be used, therefore, minimizing the chances of any mishaps

**The following are the disadvantages of source separation of Municipal Solid Waste**

1. Uncertainty about cooperation in the short- and long-term by householders, businesses, and others who generate waste.
2. The uncertainty of markets for recovered materials along with the reluctance of consumers of recycled goods to sign long-term purchase contracts (in view of uncertain community participation and the problems associated with recycled materials meeting market specifications).
3. The costs of transporting recovered materials from remote communities to the fabricating plants of potential purchasers.
4. Inadequate attention by the Federal Government to the innovative design of programs, incentives, and contaminant control research so that source separated materials can meet market specifications.
5. The belief that low-income and urban householders will not cooperate with source separation programs.
6. Risk of spillage/leakage from loading shovel during carrying and loading
7. Adds costs to the service if they are supplied free of charge to the waste producers
8. Can be time consuming to be set up distribution if not done by the collection crew
   * + 1. **Discuss the challenges faced in disease surveillance**

**The system faced the following challenges:**

* + - 1. Remotely located health facilities in vast and hard-to-reach districts lacked means to deliver the reports Some districts and health facilities also lacked the resources (motor vehicles, mobile network and access to courier services) to relay the reports to the central authorities.
      2. Managing data originating from disparate sources. Complicated and time consuming multiple reporting formats overburdened peripheral staff.
      3. Protecting confidentiality, and attracting and retaining staff with appropriate skills.
      4. Demands for early detection of disease and visualization.
      5. **Outbreak preparedness**.

The general tendency was to react rather than prepare. Sub-optimal coverage and inactivity of outbreak response teams at sub-national levels, poor co-ordination between the Epidemic Management Committees (EMC) and a generalized lack of written preparedness plans was observed in the field

* + - 1. **Supervision**

Implementing supervisory visits and holding regular IDSR review meetings was a challenge at district levels due to poor co-ordination

* + - 1. **Laboratory function**

Weak lab structures at the periphery and lack of functional networks compromised facilities’ ability to confirm priority diseases, microbial resistance and outbreaks. Capacities for specimen handling, storage, processing and transport (especially CSF) affected specimen quality.

* + - 1. **Resources (financial, human, logistical and equipment)**

Delays in receiving allocated budgets hampered IDSR implementation in most). Start-up costs and mean annual personnel costs were the highest for IDSR implementation. Routine surveillance activities (e.g. detection, report and analysis) absorbed more resources than support activities.

* + - 1. **Co-ordination**

Co-ordination of IDSR with other sectors and surveillance components of other national vertical programmes are the main determinants of its successful integration). National IDSR Task Forces were successfully established in most countries but their functioning was ad hoc. Partial adoption of IDSR technical guidelines restricted optimal results.

* + - 1. **Explain five diseases that can be prevented by observing proper sanitation**

The following diseases can be prevented by ensuring proper hygiene practices in the communities

1. Diarrhea, watery stools at least three times a day with or without blood or slime. Might be accompanied by fever, nausea or vomiting.
2. Cholera, this is a disease with modest fever with severe liquid diarrhea, rice water stools, abdominal spasms, vomiting, rapid weight loss and dehydration and rapid deterioration of condition. It is caused by consumption of contaminated food or water.
3. Typhoid and shigella Dysentery, diarrhea with blood stools, fever, vomiting and abdominal cramps. It is caused by contaminated drinking water or food
4. Malaria, painful muscles and joints with high fever with chills, headache possibly diarrhea and vomiting. It is caused by anopheles mosquitoes in stagnant water bodies
5. Measles, a disease of early childhood characterized by fever and catarrhal symptoms followed by maculopapular rash in mouth. It is caused by crowding and poor hygiene practices

These diseases can be transmitted through:

Consumption of contaminated water or food through environment, washing or cooking

Hand to mouth transmission when water for personal hygiene is reduced

Vectors such as flies and mosquitoes which breed near waste sites and stagnant water

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