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**Assignment Model: FOUR (4)**

* 1. **Waste** is ‘unwanted’ for the person who discards it; a product or material that does not have a value anymore for the first user and is therefore thrown away. But ‘unwanted is subjective and the waste could have value for another person in a different circumstance, or even in a different culture. It is also referred to as rubbish, trash, garbage, or junk depending on the type of material and the regional terminology. There are many large industries that operate primarily or exclusively using waste materials – paper and metals are the commonest-as their industrial feed stocks.

**Municipal Solid Waste**: Are wastes like refuse from households, industrial non-hazardous solid waste, solid waste from commercial and institutional establishments (including hospitals), market waste, yard waste and street dust from sweepings. Night soil and sludge are also included as municipal waste but considered to be the responsibility of municipal liquid waste management system. In situations where hazardous industrial and medical waste are small and scattered, this cannot be categorized as municipal waste since these are quite difficult to separate.

* 1. **Municipal solid waste treatment** seeks to transform waste into forms that are more manageable, reduce volume or reduce the toxicity of waste making it easy to dispose.

The criteria for selection of treatment method depends on the composition, quantity, and form of the waste material

**Methods of treatment and disposal**

Thermal treatment, thermal waste treatment refers to the processes that use heat to treat waste materials.

* **Incineration**: this is the combustion of waste in an excess of oxygen.it is mainly required for medical waste and high-hazard material reducing a municipal waste by 90% and its weight by 75%. After incineration, the wastes are converted to carbon dioxide, water vapor and ash. It lessens transportation costs and decreases harmful greenhouse gas emissions.

Open burning

* **Gasification and Pyrolysis:** these are two similar methods both of which decompose organic waste materials by exposing waste to low amounts of oxygen and very high temperature. Pyrolysis needs absolutely no oxygen while gasification allows a very low amount of oxygen in the process.
* **Open burning:** this is not an environmentally required method but unfortunately still practiced by many local authorities internationally, as it offers an inexpensive solution to solid waste. Here incinerators have no pollution control devices. They release substances such as hex chlorobenzene, dioxin, carbon monoxide, particulate matter, volatile organic compounds, polycyclic aromatic compounds and ash to the environment.

**Biological treatment method:**

**Composting**: this is the most frequently used waste disposal or treatment method which is the controlled aerobic decomposition of organic waste materials by the action of small invertebrates and microorganisms. Most techniques are static pile composting, vermin-composting, windrow composting and in-vessel composting.

**Anaerobic digestion**; uses biological processes to decompose organic materials. Anaerobic digestion however uses an oxygen and bacteria-free environment to decompose the waste material where composting must have air to enable the growth of microbes.

**Damps and landfills**

**Sanitary landfills:** This method is rated the most commonly used waste disposal solution. The landfills are desired to eliminate or reduce the risk of environmental or public health hazards due to waste disposal. In it, land features are used and work as natural buffers between environment and landfill. For example, the landfill area can be comprised of clay soil which is quite resistant to hazardous wastes or is characterized by and absence of surface water bodies or a low water table, preventing the risk of water pollution. This environmentally safe method but comparatively have high cost to others.

**Controlled dumps:** Are more or less the same as sanitary landfills. Dumps comply with many of the requirements for being a sanitary landfill luck other characteristics of a landfill. They have a well-planned capacity but no cell-planning. There may be no or partial gas management, basic record keeping or regular cover.

Bioreactor landfills: Are the result of recent technological research. These landfills use superior microbiological process to speed up waste decomposition. The controlling feature is the continuous addition of liquid to sustain optimal moisture for microbial digestion. The liquid is added by re-circulating the landfill leachate. When the amount of leachate is not adequate, liquid waste such as sewage sludge is used.

**Importance of solid waste management**

**Environmental protection/population health**. Waste is a source of disease transmission, in developing markets flies becomes a public nuisance as a result of waste. When these waste is properly managed, the environment and pupation is protected from infections.

**Cleaner and safe neighborhood**: In an emergency setting, people are congested and programmes of waste collection exists meaning better waste management, the household and the surrounding is kept clean, no vectors and snakes which cause death.

**Higher resource use efficiency**: reducing, reusing and recycling waste is important for the environment, and it can also be profitable. It decreases the amount of waste for disposal, saves space in landfills, and conserves natural resources.

**Savings in waste management**: Population spend money for medication due to diseases being cause as a result of poor waste management. In a situation where waste management is a priority and effective, money has been saved.

**Better business opportunities and economic growth**: Waste management has become a source of employment admitting a huge number of workers. People earn money for leaving resulting to economic growth and development.

**Local ownership and responsibilities/participation**: Communities are knowledgeable about the importance of waste management, the come together, assign who is responsible for a particular waste in an area and they jointly participate to eradicate diseases originating from accumulative waste collectively.

**Reduce environmental pollution**: Waste is a source of pollution to water bodies and the environment. Safe management can stop or reduce pollution. For example, leachate will leak to underground and surface water if not managed well.

**Serves the earth and conserves energy**: Considering gas production from waste, this becomes a source of fuel; the use of this gas conserve the natural resources like trees being use for energy and health worming purposes.

**Cost serving**: Managing the waste your business produces can result in valuable materials to reuse. This can save you money while potentially creating new jobs and business opportunities.

**Workplace safety**: Storing and disposing your rubbish in a wrong place can be harmful to employees or customers. If you work with sharp objects, dangerous fumes and chemicals, you will need special procedures for how you dispose of them.

* 1. **Source separation** is the process by which waste is separated into different elements. ... Wet waste typically refers to organic waste usually generated by eating establishments and are heavy in weight due to dampness. Waste can also be **segregated** on the basis of being biodegradable or non-biodegradable. The plastic, metals, and glass are separated differently and followed by the treatment process planning, (reuse, recycle, reduction and landfilling)

**Advantages of source separation**

**Reuse**: After segregation right from the source of waste production, items that can be reuse like plastic waster are put to use immediately. So source separation facilitates and encourage the reusing of the items.

Recycling: Since waste are put according to their category before disposal,

**Energy recovery**: Bio gas is obtained which can be a source of renewable fuel for direct combustion or generation of electricity.

**High agricultural production**:The byproduct of the anaerobic digestion is used as natural fertilizers. The digestate is rich in plant macro and micro nutrients, which are applied on farmland as fertilizers or soil conditioner.

**Reduced risk of contamination of recyclables**: here there is no cross contamination, for example papers, boxes and glass which are inputs for recycling industries are received clean than when being selected from mixed file of waste.

**High marketing of recyclables** (Hoornweg and Bhada-Tata,2012): industries by recyclables, the market is high for the one that are from a separated source.

Reduces the amount of residential waste and the cost of its management (Favoino,2006)

Decrease costs per unit with the increasing amount of waste collected

* 1. **Disease surveillance** is an information-based activity involving the collection, analysis and interpretation of large volumes of data originating from a variety of sources which can be uses to evaluate the effectiveness of control and preventive health measures.

**Challenges during surveillance**

**Non-sustainable financial resources**: surveillance is a huge project which call for a lot of money, if the responsibility is left to the government it is going to be inconsistent leading to results not being accurate. Some equipment for equipping a central laboratory is expensive unless a grant exist our government can not manage.

**Lack of co-ordination**: Different actors will be involved in doing surveillance; unless coordinated well this activity will not be productive. Lack of coordination is one major factor making project to fail.

**Erratic feedback**: Consultation is a key factor to obtain secondary and primary data; this sometime is unreliable and inconsistent. It makes analysis difficult and provides a lot of doubtful to the persons who need the data. For example USAID donors.

**Data management**: This is critical and calls for effective management. It has to be relevant to the purpose and quality is a priority in data collection. Cleaning and manipulating are not intended to alter data to reach a desired conclusion but to ensure that data accurately reflect the true nature of what has been measured.

**Inadequate supervision from the next level**: The team and the enumerators needs support as a follow up during the taking of the activity. People have different attitudes and supervision checks the quality in all forms of the stages.

**Early detection of emerging diseases**: There is need to improve the efficiency or the need to detect an emerging disease in an earlier stage for early mitigation purposes. Invention has to be carried for methods and analytical ideas has to be collaborated across health actors.

**Inadequate training and turnover of peripheral staff**: For efficient and accurate performance, regular training is needed to build up the competence of the practicing staff. Expert in the field are need to give regular checks to the operational team for monitoring purposes. It may happen that these experts take long to visit causing poor result due to lack of consultancy.

**Inadequate computing resources**: The increase of number of sources and volume of data available for analysis, there is insufficient resources for electronic data storage and processing which delays communication. An emphasis need to be placed on real-time analysis and dissemination of the processed results from data, visual display of the data might be important for quick intervention purposes.

**Health information exchanges**: early sign of a disease can happen in another region, for this to be realized by the central communication system, information and massages need to be circulated frequently probably be a media.

**Weak laboratory capacities** coupled with unavailability of job aids (case definitions/reporting formats)

**Poor availability of communication and transport systems**: logistics is very important during surveillance, personnel and equipment needs transport to cover the large area for the scope. If this is not available, activities cannot be done in time and efficiently. Here roads are also attended too, the poor the road, there will be no access to an area.

* 1. Sanitation refers to the provision of facilities and services for safe disposal of human waste. Inadequate sanitation is a major cause of disease worldwide. Sanitation can also mean maintenance of hygienic conditions through services such as garbage collection and waste disposal. Hygiene itself refers to conditions or practices conducive to maintaining health and preventing diseases, especially through cleanness (WHO)

**Diseases**

**Diarrhea**: Diarrhea is the passing of loose watery stools three or more times a day. It may be acute, persistent or chronic. Dehydration and malabsorption are the complications of diarrhea. Dehydration; body lacks enough fluids and electrolytes to work properly.

**Causes**

Most cases of diarrhea are caused by an infection in the gastrointestinal tract. The main microbes responsible for this infection are bacteria, viruses and parasitic organisms.

The most commonly identified causes of acute diarrhea are bacteria salmonella, campylobacter, shigella and shiga-toxin-producing Escherichia coli.

**Symptoms**

Diarrhea refers to watery stools, but it may be accompanied by other symptoms which include stomach pain, abdominal cramps, bloating, thirst, weight loss and fever.

Diarrhea is a symptom of other conditions, some of which can be serious. Other possible symptoms are blood or pus in the stool, persistent vomiting and dehydration.

**Treatment**

* Loss fluids can be replaced by simply drinking more fluids, or they can be received intravenously in severe cases. Children and older people are more vulnerable to dehydration.
* Use of ORS, oral rehydration solution or salts refers to water that contains salt and glucose. It is absorbed by the small intestine to replace the water and electrolytes lost in the stool. ORS can safely and effectively treat over 90 % of non-severe diarrhea cases (WHO)
* Zinc supplementation reduces the severity and duration of diarrhea in children.

**Cholera**: This is an infectious disease that causes severe watery diarrhea, which can lead to dehydration and even death if untreated. It is caused by eating food or drinking water contaminated with a bacterium vibrio cholerae. The disease is most common in places with poor sanitation, crowding and famine.

**Causes**

Vibrio cholerae, the bacterium that causes cholera, is usually found in food or water contaminated by feces from a person with the infection, common sources include municipal water supplies, ice made from municipal water, foods and drinks sold by street vendors, vegetables grown with water containing human wastes, raw or undercooked fish and seafood caught in water polluted with sewage.

When a person consumes the contaminated food or water, the bacteria release toxin in the intestine that produce severe diarrhea.

**Symptoms**

Cholera incubation period id few hours or as long as five days after infection, the symptoms are diarrhea, vomiting, dehydration, rapid heart rate, loss of skin elasticity, dry mucous membranes, low blood pressure, thirst and muscle cramps.

**Treatment and Prevention**

Always use safe and clean water for drinking, preparation of food or drinks, making ice, brushing your teeth, washing your face and hands, washing dishes and utensils that you use to eat or prepare food, washing fruits and vegetables,

**Typhoid**: Is a bacterial infection that can lead to a higher fever, diarrhea and vomiting. It can be fatal. It is caused by a bacteria salmonella typhi. The infection is often passed on by through contaminated food and drinking water, and it is more prevalent in places where washing is less frequent hand. It can also be passed on by carries who do not know they carry the bacteria.

**Symptoms**

They begin between 6 and 30 days after exposure to the bacteria. The two major symptoms 0f typhoid are fever and rash. Typhoid fever is particularly high, gradually increasing over several days. The rash which does not affect every patient, cosmists of rose-colored spots particularly on the neck and abdomen. Other symptoms can include weakness, abdominal pain, constipation and headaches.

**Causes**

Bacteria s. typhi and spread through food, drinks, and drinking water that are contaminated with infected fecal matter. Washing fruits and vegetables can be a source of infection if contaminated water is used.

**Prevention:** Countries with less access to clean water and washing facilities typically have a higher number of typhoid cases. Typhoid is spread by contact and ingestion of infected human feces. This can happen through infected water source or when handling food.

* drink bottled water, preferably carbonated
* If bottled water cannot be sourced, ensure water is heated on a rolling boil for at least one minute before drinking.
* Be wary of eating anything that has been handled by someone else.
* Avoid eating at street food stands, and only eat food that is still hot.
* Do not have ice in drinks.
* Avoid raw fruit and vegetables, peel fruit yourself, and do not eat the peel.

**Polio:** In full is poliomyelitis also called infantile paralysis. This is an acute viral infectious disease of the nervous system that usually occur in children under the age of five.

**Symptoms:** fever, headache, nausea, fatigue and muscle pains and spasms and sometimes followed by a more serious and permanent paralysis of the muscles in one or more limbs.

**Causes:** Fecal oral; from fecal matter taken into the mouth through contaminated food or fingers. It can also enter by ingestion of droplets expelled from the throat of an infected person.

**Treatment and Vaccination**

Complete bed rest, isolation and careful observation. exercise, and oral vaccination

**Malaria**: Is a mosquito-borne disease and that’s does not spread from person to person (except in pregnancy) but spreads in certain circumstances without a mosquito like blood transfusion. It is life threating and sometimes fatal.

**Symptoms**

The incubation period is about 07-30days from infection showing symptoms like flu, high fever and chills, headaches, nausea and vomiting, general weakness and body aches.

There are three necessary aspects to malaria life cycle

1. The Anopheles mosquito carries the parasite and is where the parasite starts its life cycle.
2. The parasite (plasmodium) has multiple subspecies, each causing a different severity of symptoms and responding to different treatments.
3. The parasite first travels to a human’s liver to grow and multiply. It the travels in the bloodstream and infects and destroys red blood cells.

**Prevention**

Wastes and poor drainage are sources of breeding places for anopheles female mosquitoes, for prevention

* Keep your leaving environment clean (no wastes and stagnant water)
* Sleeping under treated nets
* Community involvement in drainage maintenance
* Awareness on how to prevent malaria
* Clothing, covers most of the exposed skin and shoes that are closed to reduce the risks of bites and all clothes treated with insecticides
* Apply insect repellent to exposed skin.

**Amoebic and bacillary dysentery**: Also called amebiasis is a parasitic disease caused by infection with entamoeba histolytica, the disease may be asymptomic in most individuals. The organism usually produces dysentery and invasive extra intestinal problems. The disease is most common in people who live in tropical areas with poor sanitation.

**Causes**

Infection by the protozoan parasite entamoeba histolytica;it begins when the cystic form is ingested when the person drinks contaminated water or eats contaminated foods, comes in contact with contaminated colonic irrigation devices or contaminated hands of food handlers or by anal sexual practices. The cystic form changes into trophozoites in the illum or colon leading to diarrhea.

Risk factors

* Drinking contaminated water
* Eating contaminated foods
* Association with food handlers whose hands are contaminated
* Anal sexual practices
* Malnourishment
* Pregnancy
* Very young patients
* Travellers to endemic areas

**Symptoms**

* Loose stools and mild abdominal cramping
* Frequent, watery and bloody stools with severe abdominal cramping
* Abdominal tenderness
* Tenesmus
* Flatulence
* Appetite loss
* Weight loss
* Fatigue
* Anemia

**Prevention**

* Stopping the fecal contamination of food and water by improving the sanitation
* Identify and treat food handlers or other carries of the parasite
* Avoiding sexual practices that involve fecal-oral contact
* Avoid malnutrition and alcohol