**POST GRADUATE DIPLOMA IN WASH**

Final Exam

1. Diarrhea among children under 5 is common in many rural villages. What environmental factors or practices may cause diarrhea in young children? Explain three ways to prevent it

**Answer**

Poor sanitation, lack **of** access to clean water supply **and** inadequate personal hygiene are responsible **for** 90% **of diarrheal** disease occurrence,

**Prevention**

* The most important way to avoid diarrhea is to avoid coming into contact with infectious agents that can cause it. This means that good [hand washing](https://www.webmd.com/cold-and-flu/cold-guide/cold-prevention-hand-washing) and hygiene are very important.
* Eat only those fruits or vegetables that are cooked or can be peeled.
* Avoid eating food from street vendors.

1. Think about the possible types of pollution that could be produced from a health center.
   1. List the types of pollution that could be produced, giving one example of each type.
   2. Describe the two main approaches to pollution management. Outline the pollution management methods that could be used for the pollutants you have listed.

##### Answer

a.The types of pollution from a health centre could be air, water and land pollution. Water pollution may occur if sterilising fluids are discharged into a nearby river. Air pollution may arise from the burning of wastes. Land pollution is possible if health centre wastes are not disposed of correctly. Producing algal biofuels could improve or harm water quality depending on the resource input and management used in algae cultivation, weather events, integrity of infrastructure, and processing of spent water. Water-quality concerns associated with commercial-scale production of algal biofuels, if sufficient culture waters are released to natural environments, include eutrophication of waters, contamination of groundwater, and salinization of water sources. Potential water-quality benefits are reduced runoff of herbicides and insecticides compared to corn-grain ethanol or soybean-based biodiesel because of their reduced use, and reduced eutrophication if there are no releases of culture water or if algae are used as a means to remove nutrients from municipal waste, confined animal feeding operations, and other liquid wastes. Water-quality effects will depend on the nutrient content of the algal culture medium; whether feedstock production systems are sealed, artificially lined, or clay lined; and the likelihood of extreme precipitation events. Leakage of culture fluid to groundwater or surface water could occur if the integrity of the pond or trough system is compromised, if flooding occurs, or if spills occur during transfers of fluid during process stages or waste removal, but most of these events could be avoided with proper management.

b.There are two main approaches to pollution management: pollution prevention (which should be used to stop pollution being produced in the first place or reducing any waste generation at the source where possible) and pollution control (the measures taken to control pollution and wastes after they have been generated or produced).

* + Water pollution: chemical waste should not be discharged to a river but disposed of properly.
  + Air pollution: the amount of waste produced should be minimised where possible, by other methods of waste management such as reusing and recycling. If needed, waste burning should be carried out properly to reduce the likelihood of air pollution.
  + Land pollution: again, waste management should be used to minimise the amount of waste produced. Proper waste management facilities should be used, especially as health centre wastes are likely to contain hazardous materials.

1. Give three reasons for incorporating plans for M&E during the early stages of a project’s development.

#### Answer

#### Monitoring and Evaluation (M&E) is a continuous management function to assess if progress is made in achiev­ing expected results, to spot bottlenecks in implementation and to highlight whether there are any unintended effects (positive or negative) from an investment plan, programme or project (“project/plan”) and its activities.

Three possible reasons for incorporating plans for M&E during the early stages of a project’s development are:

* so that progress can be checked at key stages of the project to ensure that plans are being followed, budgets spent appropriately and targets on track to be met
* so that the impacts of the project can be assessed to find out if the project has been effective and provided value for money
* to identify any problems or failures and learn from them so that the next project does not make the same mistakes.

Logic Result-frames or logic frames include-***Impact*** *= improvement in people’s lives - long-term widespread improvement in society* ***Outcome*** *= changes in institutional and behavioral capacities - intermediate effect for beneficiaries,****Deliverables:******Outputs*** *= capital goods, products and services produced* ***Activities/process*** *= tasks undertaken to transform inputs into outputs* ***Inputs*** *= human and material resources*

1. Explain four factors that are important when choosing a sanitation technology

### . Site Specific Environmental Factors

In this thesis, the environmental factors are the key determinants for differentiating coastal communities from other types of communities. These factors, which include the condition of surface water and soil conditions of the coastal areas, have a direct bearing on the options for sanitary means of disposing of human waste for the community.

Surface Water Condition

First, water is not consumed for drinking; 2) the feces are always deposited in water and not on land; and 3) there is sufficient current for dilution. The objective of these conditions is to ensure that the excreta are disposed of properly and to prevent the contact of waste to the community.

Ground Condition

For parts of the community located within the elevated and transition zones, the ground condition is an important consideration in the provision of sanitation systems. The topography of the site of the coastal slums is moderately sloping or rolling. There are cases, however, when some on-site systems are modified to suit conditions of sites characterized by high groundwater level. In the case of the pit latrine, the pit can be raised above the ground level or double pits can be built to increase capacity when excavation is difficult. This prolongs the useful life of the facility and overcomes the difficulties with high water table and groundwater pollution. In the construction of the raised pit latrine, the raised portion should be lined and rendered to prevent the seepage of foul liquid out of the pit.

### b. Community Physical Factors

Community density, circulation and access networks, and available services within the community influence the selection of sanitation technologies. The implications of these factors are discussed below.

Community Density

On-site systems such as pit latrines, aqua privies and septic tanks require adequate space for the infiltration of waste discharged into them. These systems are not suitable for high density settlements, since high density poses danger in terms of wells for drinking water and sanitation facilities to be close together. Water seeping out of pit latrine which are bacterially and chemically contaminated will pollute the surrounding groundwater. The effluent from the septic tank, which did not permeate well through the soil, is still laden with pathogens and contaminates the nearby supply of drinking water. Hence, these systems are suitable only in low-medium density areas. Systems suitable for high density areas include the vault and cartage system, the shallow sewer system and the small bore sewer.

**Circulation and Access Network**

In the selection of sanitation technologies for the community, some systems require methods for transporting waste from the place of defecation to another for waste treatment. In these technologies, waste is emptied manually or sludge is removed by a vacuum suction tanker or carts and is taken away for suitable disposal. The existing access network, consisting of narrow footpaths and walkways on stilts, poses limitations to the use of technologies requiring the use of trucks or carts for transporting waste. Access for trucks within the community is impossible.

In this context, sanitation technologies are classified according to those with waste transportation requirements and those without, with the former group at a disadvantage. Systems with waste or sludge transport requirement include bucket latrines, aqua privies, the septic tanks, the vault and cartage system and the composting toilets. On the other hand, those without transport requirement include the pit latrines, the shallow sewer system and the small bore sewer system.

Proximity and Access to Services

Households located above the waters have the least proximity to the different services that are normally situated on the dry and elevated areas of the site. Unfortunately, households occupying these areas consist of a large percentage of the community. The proximity and accessibility of services such as water supply and communal toilets to the majority of the households affect choice of sanitation options.

* Access to Water Supply and Levels of Service

The in-house connection is limited and water is usually bought or fetched from communal hand pumps and hence, hand-carried. Though some households on both the transition and water zones have water connections from the city lines, water coming from this source is not consistently available and is normally collected and stored in large drums. For the majority of the households carrying water to their homes, the distance traveled by the household member fetching the water from the hand pumps can be as far as 400 meters. Thus, options requiring individual in-house connections or a large amount of water for disposal are not feasible. Options are limited to systems that require at the most communal standpipes or handpumps for water service levels. Other systems that require no water or those in which water is used only for toilet hygiene are highly favorable.

* Access to Communal Toilet

The analysis of the provision of communal toilet to the coastal communities indicates that the households' access and proximity to communal toilets is an important factor influencing its acceptability to the community. From a technical point of view, communal facilities may be considered the most feasible low-cost alternative for providing sanitation to the coastal slums. This facility can serve many people and is more economical on a per capita basis than are individual household facilities. This system consists of a number of latrine cubicles with shower, laundry and clothesline facilities in some cases.

1. Define Sustainability. Explain four factors that can be used to foster sustainability in WASH projects.

Answer

Sustainability is a concept used to ensure that activities result in long term positive impact on the environment and those who live in it

b. Giving reasons explain 5 conditions that will help in improving the water supply situation in your country.

1. Increasing rural water supply infrastructure
2. Having better monitoring of performance and requirements in the water sector.
3. More money and donor funding being devoted to the rural water schemes
4. Planning for revamping defunct water supply delivery systems, rehabilitation and expansion of rural and peri-urban water supply infrastructure
5. Formation of water supply management committees and training on operation and Maintenance
6. What are the key factors to be considered when planning a new landfill in small and medium-sized towns? List at least four factors.

#### Answer

Key factors to consider when planning a landfill in small and medium-sized towns include:

* available land
* required land area based on population size, both current and future, and estimated waste production rate
* distance from the site to the town to be served
* location of rivers that could be polluted
* presence of groundwater below the site
* soil type and geology
* local opinions and beliefs about the site.

b) Explain how incineration differs from open burning

#### Answer

Open burning is uncontrolled. Incineration is burning that is enclosed and controlled. Incineration produces less smoke; the ash is contained and can be removed for burial; it is safer because the burning waste cannot be blown around and spread fire. A higher temperature can be maintained in an incinerator which ensures more of the waste is consumed, leaving little residue.

1. List and briefly describe the measures by which the success or otherwise of a public–private partnership providing water supply services can be assessed.

#### Answer

The following criteria may be used to measure the success of a PPP providing water supply.

* Minimisation of non-revenue water – this should be reduced to 10% Accessibility – the extent of coverage of the population, and the distance to the water point.
* Cost recovery – the cost of providing the water should be claimed back from the population.
* Affordability – the cost of the water needed should be less than 5% of the household’s income.
* .Water quality – the water should meet national standards for quality.
* Operational efficiency – the quantity of water supplied per capita, and the duration of water supply per day.

1. What are the possible interventions to manage the solid waste in an emergency situation? Explain at least three actions that could be taken.

#### Answer

Possible activities to manage solid waste in emergencies are:

* mobilising the community for an initial clean up
* making sure that all households have access to on-site containers for their waste
* in the longer term, arrange a regular solid waste collection service
* make sure waste is taken to a managed disposal site for burial and ensure the waste pit is covered with soil.

1. What are the most important questions you would need to address in a rapid assessment of an emergency?

#### Answer

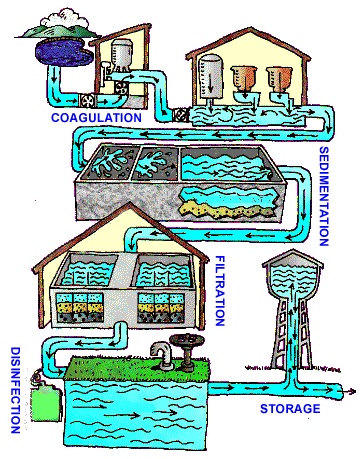
* What sanitation facilities are already available?
* Does the current position have the potential to cause a threat to people’s health?
* Is there space for additional latrine provision?
* What are the local conditions in terms of groundwater, surface water and soil type?

1. Filtration and disinfection are important water treatment processes. Briefly describe each of these processes and explain their role in making water safe to drink

**Filtration-** Once the floc has settled to the bottom of the water supply, the clear water on top will pass through filters of varying compositions (sand, gravel, and charcoal) and pore sizes, in order to remove dissolved particles, such as dust, parasites, bacteria, viruses, and chemicals.

**Disinfection-A**fter the water has been filtered, a disinfectant (for example, chlorine, chloramine) may be added in order to kill any remaining parasites, bacteria, and viruses, and to protect the water from germs when it is piped to homes and businesses.

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**Figure 1 Diagrammatic explanation of the processes(Figure courtesy of EPA)**

1. List the five factors that make a water source ideal to use.

Answer

The following are important factors for an ideal water source:

* Clean, Potable and wholesome
* Free from disease-causing micro-organisms or pathogens
* capable of providing a supply that satisfies the anticipated demand and, in the case of groundwater, the rate of extraction not exceeding the rate of replenishment
* Palatable and good water quality
* near to the consumers
* economical to use
* abstraction having minimal environmental impact.

**Final Assignment**

**Research Paper**

Choose a topic that interests you in the already covered WASH diploma course and in not less than 25 pages. The main parts of your research paper should be the Introduction, where you introduce your topic, the body and conclusion. Ensure its well-researched and supported with relevant examples.

NB: All questions carry 10 marks

Best of Luck!!!!