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Final Exam

Post Graduate Diploma in Water Hygiene and Sanitation

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Questions:

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

According to the WHO fact sheet (2019), Diarrhea is a symptom of infections caused by a host of bacterial, viral and parasitic organisms, most of which are spread by faeces-contaminated water. Rotavirus and *Escherichia coli*, are the two most common etiological agents of moderate-to-severe diarrhoea in low-income countries. Other pathogens such as *cryptosporidium* and *shigella* species may also be important. Location-specific etiologic patterns also need to be considered.

The environmental factors or practices that may cause diarrhea may include

* Inadequate sanitation faculties
* Poor hygiene practices
* Use of contaminated water for drinking, cooking and cleaning.
* Contact with contaminated human faeces, for example, from sewage, septic tanks and latrines or animal
* Storing of prepared food in contaminated or unhygienic conditions.
* Consumption of untreated water contaminated by Fish and seafood from polluted water

The three ways to prevent diarrhea include:

1. Hand washing is one of the most effective ways of preventing the spread of viruses and bacteria that can cause diarrhoea. You should always wash your hands thoroughly after using the toilet, changing nappies, and before meals.
2. Adopt positive hygiene practices in preparing food can also help prevent diarrhoea:
   1. Always put foods that could spoil in the fridge
   2. Ensure that meat is cooked thoroughly
   3. Avoid eating raw meats, fish, and shellfish unless you are sure that they have been freshly prepared and are from a reliable source
   4. Never place cooked meat on surfaces or plates that have held raw meat
3. health education about how infections spread that can help change the wrong beliefs about diarrhea
4. 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.

The types of pollution from a health centre could be air, water and land pollution.

* Water pollution may occur if sterilizing fluids or blood with serious disease causing pathogens are discharged into a nearby river without proper treatment.
* Air pollution may arise from the burning of wastes or release of toxic and dangerous gases.
* Land pollution is possible if health centre wastes are not disposed of correctly. Contaminated needles injure and infect the public.
  1. Describe the two main approaches to pollution management. Outline the pollution management methods that could be used for the pollutants you have listed.

There are two main approaches to pollution management: pollution prevention and pollution control

1. Pollution prevention is used to stop pollution from being produced in the first place or reducing any waste generation at the source where possible.
2. Pollution Control is the measures taken to control pollution and wastes after they have been generated or produced.
   1. Water pollution: chemical waste should not be discharged to a river but disposed of properly.
   2. 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.
   3. 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.
3. Give three reasons for incorporating plans for M&E during the early stages of a project’s development.

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

1. 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
2. so that the impacts of the project can be assessed to find out if the project has been effective and provided value for money
3. to identify any problems or failures and learn from them so that the next project does not make the same mistakes.
4. Explain four factors that are important when choosing a sanitation technology

Factors to consider when choosing a sanitation technology may include:

1. Initial cost of the technology and the costs of O&M: In emergency setting where available funds are spread thin across a number of challenges, the minimal funds budget for implementing WASH intervention will be used to deploy cheap but effective sanitation facilities like VVIP latrines as against waterborne systems.
2. Demand and Use: The setting of the target communities affect he technology selection. In temporary setting, cheap and temporary technologies will be selected.
3. Water availability: The availability of water will inform the technology section. In locations with minimal or expensive water for domestic use, technology selection will tilt towards Dry systems.
4. The availability of technical skills: where there are local craftsmen or technicians with the necessary skills to install and/or carry out O&M of the system, advanced or waterborne systems may be selected.
5. Define Sustainability.

As captured in the UNICEF ExBoard Summary, sustainability is the ability of the programme outputs, outcomes and impacts to persist after the withdrawal of all forms of assistance from the external development agency. It could also mean availability and reliability in terms of optimal functionality of the deployed service or product for a considerable amount of time after support from the implementing partners have been withdrawn. It is important in WASH intervention as improved services and positive hygiene practices are expected to be integrated into the community.

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

1. During the planning stage: Participatory planning, socially inclusive designs and technology choice.
2. During construction stage: Location (site selection), quality assurance (effective management during construction) and focus on functionality.
3. During post-construction stage: Management, operation and maintenance and governance.
4. Across all stages: Funding structure to support O&M activities across the life cycle of the WASH deliverables. This will cater for repair costs in the event of a major breakdown, for example if the digester develops a leak or other unforeseen problem and for O&M.

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

1. **Increase budgetary provisions for water programmes:** To guarantee future populations have reliable access to water and sanitation, the top priority is securing the money to ensure that systems are built and adequately maintained over the years. Funding structure should be developed and enforced to ensure Communities, Local Government Authorities, State and Federal Government actors are will funded to carryout their functions.
2. **Involve of private actors in Water Supply Value Chain: There is need for government to enter into appropriate partnerships with private sector players to help close gaps in the provisioning of safe water to communities far from city centers. The scarce resource has limited the provision of functional water infrastructures only in few city centers leaving the rest of the population to provide for the water needs at very high cost.**
3. **Collaborative:** Currently, those who work on “water services” think almost exclusively in terms of access, and those who work on “water resources” think in terms of sectors and water usage. I think the water service people need to think harder about where the water for increasing coverage is going to come from, and how we can best implement sanitation services that protect water resources.
4. **Protection of Water Sources and Resources:** For a long time we treated water as limitless, and the incentive structures in cities and rural areas pushed people towards unsustainable practices. Water distribution being highly subsidized by governments doesn’t help create awareness about its actual value. We must make measurable efforts to change water-use habits in a global scale.
5. **Invest in staff skills and capacity**: There is need to build capacity and provide quality technology to support activities professionals working in the sector. If well supported, professionals will deploy their skill sets in address water challenges affecting water supply.
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.

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

b) Explain how incineration differs from open burning

Incineration is burning that is enclosed and controlled. Open burning is uncontrolled. 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.

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

* Accessibility – the extent of coverage of the population, and the distance to the water point.
* Affordability – the cost of the water needed should be less than 5% of the household’s income.
* Cost recovery – the cost of providing the water should be claimed back from the population.
* 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.

Possible activities to manage solid waste in emergencies are:

* 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?

* What are the common health-related practices among the affected population and how have these been affected by the emergency?
* What are the current practices on the key hygiene behaviours such as washing hands after defecation?
* What method is being used for disposal of children‘s faeces?
* What practices are being used for storage and handling of water and of food?
* How is the community disposing of their solid waste?
* Does the community have access to water containers with lids/cooking utensils/mosquito nets/soap/sanitary protection/blankets/bathing facilities?

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 is the process where solids are separated from a liquid. In water treatment, the solids that are not separated out in the sedimentation tank are removed by passing the water through beds of sand and gravel. Rapid gravity filters are often used. When the filters are full of trapped solids, they are backwashed. In this process, clean water and air are pumped backwards up the filter to dislodge the trapped impurities, and the water carrying the dirt (referred to as backwash) is pumped into the sewerage system, if there is one. Alternatively, it may be discharged back into the source river after a settlement stage in a sedimentation tank to remove solids.

Chlorination: The most commonly used disinfectant (the chemical used for disinfection) is chlorine, in the form of a liquid (such as sodium hypochlorite, NaOCl) or a gas. It is relatively cheap, and simple to use. When chlorine is added to water it reacts with any pollutants present, including micro-organisms, over a given period of time, referred to as the contact time. The amount of chlorine left after this is called residual chlorine. This stays in the water all the way through the distribution system, protecting it from any micro-organisms that might enter it, until the water reaches the consumers. are other ways of disinfecting water (e.g. by using the gas ozone, or ultraviolet radiation) but these do not protect it from microbial contamination after it has left the water treatment plant. Following disinfection the treated water is pumped into the distribution system.

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

The following are important factors for an ideal water source:

* 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
* good water quality
* near to the consumers
* economical to use
* abstraction having minimal environmental impact.

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