**AFRICA INSTITUTE FOR PROJECT MANAGEMENT STUDIES**

**DIPLOMA IN PUBLIC HEALTH**

**FINAL EXAM**

**BY**

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1. **List the types of people who are most vulnerable to waterborne diseases. Explain your answers why and how to overcome the diseases**

The following are the most vulnerable people to waterborne diseases:

1. Children <5
2. Pregnant mothers
3. Elderly
4. People living with disabilities
5. Malnourished children
6. Single mothers

Water-borne diseases spread by contaminating drinking water systems with feces and urine of infected animals or people. The spread of contaminated water is likely to happen where private and public drinking systems get their water such as surface waters - creeks, rivers, lakes, and rain. These sources of water may be contaminated by infected animals or people.

It May also spread contamination, which has been the cause of a number of dramatic outbreaks of fecal-oral diseases such as typhoid or cholera. There are a number of additional ways in which fecal material may reach a person's mouth such as in food that is contaminated, or the person's hands. Generally, food that is contaminated is the one most common way people become infected. The germs in feces may cause the diseases by even slight contact and transfer. The contamination might happen because of floodwaters, septic fields, water runoff from landfills, and sewer pipes.

The one way to break continued transmission of water-borne diseases is to improve the hygienic behavior of people and provide them with basic needs such as:

* Sanitation
* Drinking water
* Bathing facilities
* Washing facilities

Transmission of malaria is facilitated when large numbers of people sleep outside in hot weather, or sleep in homes that have no protection against mosquitoes especially pregnant mothers, children elderly etc. Malaria mosquitoes, bilharzias snails and tropical black flies can all be controlled with efficient drainage; they all depend on water to complete their respective life cycles. The diseases can be controlled through the following:

* Clean water is a prerequisite for reducing the spread of water-borne diseases. It is well recognized that the prevalence of water-borne diseases may be greatly reduced by providing people with safe, sanitary disposal of feces and provision of clean drinking water.
* Water is disinfected to kill any pathogens that might be present in the water supply and to prevent them from growing again in distribution systems.
* Disinfection is then used in order to prevent the growth of pathogenic organisms and to protect people's health. People need clean water and water supply systems. Without disinfection, the risk of water-borne disease increases.
* The most common methods of killing microorganisms in the water supply are irradiation with ultra-violet radiation, or oxidation with chemicals like chlorine dioxide or ozone, or chlorine.

1. **Suppose that inhabitants of a village obtain water from a spring. What advice would you give to the users about the prevention of contaminants entering the spring**?

**The advice is**: The spring needs to be protected and have one source.

In public health there are certain procedures to be followed to ensure that the spring water is protected and safe to drink and this would be applied with others if a new spring source was to be developed but the same principles will apply to existing spring sources because the protection needs to continue to work into the future.

Before using a spring a thorough sanitary survey needs to be carried out at the site to assess the quantity and quality of water, and the possible contamination. If the results of the sanitary survey are satisfactory, the eye of the spring, the point where the water emerges from the ground should be located by digging out the area around the spring down to the impermeable layer.

The protection can be done by the following:

1. A concrete waterproof protection box, also known as a spring box, should be constructed over the spring to prevent all actual and potential sources of contamination.
2. A retention wall in the front part of the protection box should be constructed to keep water flowing to the delivery pipe.
3. In some situations, if the flow is not constant, a collection box may also be constructed in order to ensure adequate water storage.
4. The intake and overflow pipes should be screened to prevent the entrance of small animals. The spring and collection box, if there is one, should have a watertight top, preferably concrete. Water will move by gravity flow or by means of a properly-installed mechanical pump. An inspection hole should be tightly covered and kept locked.
5. Springs should be protected from flooding and surface water pollution by constructing a deep diversion ditch above and around the spring. The ditch should be constructed so it collects surface water running towards the spring and carries, or diverts, it away. It needs to be deep enough to carry all surface water away, even in a heavy rainstorm. The surrounding area should be fenced to protect it from animals.
6. **The following are pollution sources. Give two specific pollutants for each source.**
7. A residential area:

### Sediments and suspended solids

Sediments and suspended solids consist of fine particles of mostly inorganic material.Inorganic material is derived from non-living sources and includes mud, sand and silt washed into a river as a result of land cultivation, construction, demolition and mining operations, where these take place. One of the most common sources of suspended solids and sediment is soil erosion**,** where the soil is washed away into rivers by rainwater run-off. The presence of solid particulate material suspended in the flowing water is the reason why many rivers look brown in colour, especially in the rainy season. The particles are called suspended solids while they are carried (suspended) in flowing water and sediments when they settle to the bottom. Large quantities of suspended solids may reduce light penetration into the water, which can affect the growth of plants. Sediments may even suffocate organisms on the river bed.

Chemical pollutants

Heavy metals such as arsenic, copper, lead, mercury and cadmium are chemical pollutants that may be found in lakes, rivers and groundwater. These heavy metals can harm aquatic organisms and humans. Farmers who use river water polluted by urban wastes for irrigation in the cultivation of fruits and vegetables may find their crops affected by the accumulation of these chemicals

Pesticides include insecticides, herbicides and fungicides. There are several thousand different types in use and almost all of them are possible causes of water pollution.

Heavy metals and some pesticides are particular problems because they are persistent in the environment, meaning they do not break down and their effects continue over time, even long after their use may have stopped.

Another problem can be acidity. If water becomes acidic or alkaline, beyond normal limits, this will have a damaging effect on aquatic organisms. Acidity and alkalinity of water are determined by measuring its pH. A pH value below 7 is acidic and above 7 is alkaline. Acidic water is not only harmful to life but is also corrosive and can damage pipe work in water distribution systems

1. A metal plating plant:

The following are the pollutants sources:

i) Metal finishing

ii) Plating Industry

Smelting is the process of separating the metal from impurities by heating the concentrate to a high temperature to cause the metal to melt. Smelting the concentrate produces a metal or a high-grade metallic mixture along with a solid waste product called slag.

Metal processing plants and smelters are facilities that extract various metals from ore to create more refined metal products.

Smelting specifically involves heating the ore with reducing agent such as coke, charcoal or other purifying agents.

Metal finishing processes involve treatment of a metal work-piece in order to modify its surface properties, impart a particular attribute to the surface, or produce a decoration.

Plating is a subset of such finishing operations that involves putting a coating of metal over a base metal substrate to give various desirable properties to the object.

Metal coating is another subset of such finishing operations and involves the application of a painter powder coating to a metal work-piece.

Products from metal finishing operations can range from structural steel to jewellery.

The reason(s) for carrying out metal finishing can include:

* Decoration,
* Protection against corrosion,
* Providing resistance to oxidation, high temperatures, or UV radiation,

1. Agricultural activities:

**Pesticides and Fertilizers:** To begin with, the earliest [source of the pollution](https://www.conserve-energy-future.com/PollutionTypes.php) has been pesticides and fertilizers. Modern day pesticides & fertilizers have to deal with the local pests that have existed for hundreds of years along with the new invasive species. And so, they are laden with chemicals that are not found in nature.

Once they have been sprayed, it does not disappear completely. Some of it mixes with the water and seeps into the ground. The rest of is absorbed by the plant itself. As a result, the local streams that are supplied water from the [ground become contaminated](https://www.conserve-energy-future.com/causes-effects-solutions-of-land-pollution.php), as do the animals that eat these crops and plants.

**Contaminated Water:** [Contaminated water](https://www.conserve-energy-future.com/sources-and-causes-of-water-pollution.php) used for irrigation is one further source of pollution. Much of the water we use comes from ground water reservoirs, canals and through the rains. While plenty of it is clean and pure water, other sources are polluted with organic compounds and heavy metals. This happens due to the disposal of industrial and agricultural waste in local bodies of water.

As a result, the crops are exposed to water which has small amounts of mercury, arsenic, lead and cadmium dissolved in it. The process of agricultural pollution becomes harder to fight when such water poisons the livestock and causes crop failure.

**Soil Erosion and Sedimentation:** Further problems are caused by[soil erosion](https://www.conserve-energy-future.com/causes-and-effects-of-soil-pollution.php) and sedimentation. Soil is comprised of many layers and it is only the topmost layer that can support farming or grazing. Due to inefficient farming practices, this soil is left open for erosion and leads to declining fertility each year. Whether eroded by water or wind, all this soil has to be deposited somewhere or the other.

The resulting sedimentation causes soil build up in areas such as rivers, streams, ditches and surrounding fields. And so, the process of agricultural pollution prevents the natural movement of water, aquatic animals and nutrients to other fertile areas.

1. An uncontrolled landfill site:

Solid waste is the number one contributor of landfill [waste disposal](https://www.conserve-energy-future.com/hazardous-waste-disposal-and-companies.php). Homes, schools, restaurants, public places, markets, offices and so on produce a great deal of rubbish, garbage and used materials. The bulk of these wastes eventually end up in the landfills. Examples of the solid waste materials include wood, paper, plastic, broken furniture, glass, grounded cars, obsolete electronic products, and hospital and market waste.

Because most of these waste materials are non-biodegradable, they heap in the landfills where they stay for years. The scenario is even worse for poorly managed waste disposal systems and normally results in damage to the land and the surrounding environment.

Agricultural wastes arise from waste materials generated from animal manure, crop, and farm remains. The solid wastes like the animal manure and other agricultural by products are collected and dumped in the landfills. These agricultural remnants are highly toxic and can [contaminate the land and water resources](https://www.conserve-energy-future.com/staggering-ways-to-stop-water-pollution.php). Once in the landfills, the wastes remain there for years impacting on soil quality and [polluting the land](https://www.conserve-energy-future.com/causes-effects-solutions-of-land-pollution.php).

#### Industry, manufacturing, and construction waste

Industrial processes, construction activities and power plants produce a wide range of solid byproducts and residues. The predominant waste products are generated from oil refineries, power plants, construction works, pharmaceuticals, and agricultural product producers. The solid wastes usually find way to the landfills.

As an example, oil refinery processes produce petroleum hydrocarbon byproducts while construction works generate wood, plastics, and metal wastes. Regardless of the fact that industrial manufacturing, power generation and construction works are regulated, their byproducts and residues from time to time find way to the landfills.

1. Urban surface water run-off

Sediment: Like rural runoff, urban runoff is loaded with sediment. Cities may have less soil erosion than rural areas, but urban areas produce their own distinctive mix of sediment — flakes of metal from rusting vehicles, particles from vehicle exhaust, bits of tires and brake linings, chunks of pavement, and soot from residential areas.

Toxic pollutant: One of the special challenges of urban watersheds is toxic pollution. Toxic pollutants are substances that may cause death, disease or birth defects or that may interfere with reproduction, child development or disease resistance, toxic pollutants of most concern in urban runoff are metals, pesticides and polychlorinated biphenyls.

1. **Explain 5 reasons why emergencies can put people at greater risk of waterborne disease**

It is very true that emergency can put people at greater risk. It May also spread contamination, which has been the cause of a number of dramatic outbreaks of fecal-oral diseases such as typhoid or cholera. There are a number of additional ways in which fecal material may reach a person's mouth such as in food that is contaminated, or the person's hands. Generally, food that is contaminated is the one most common way people become infected. The germs in feces may cause the diseases by even slight contact and transfer. The contamination might happen because of floodwaters, septic fields, water runoff from landfills, and sewer pipes.

Poor sanitation in emergency areas can cause a great risk to the people living in the area due to poor drinking water access, unimproved sanitation and poor hygiene practices can lead to the contaminated water to transmit diseases such as diarrhea, cholera, typhoid and polio.

Poor disposal of human excreta increased the transmutation of related diseases helping through direct and indirect routes. Safe excreta disposal is therefore a major priority, and in most disaster situations should be addressed with as much speed and effort as the provision of safe water supply. The provision of appropriate facilities for defecation is one of a number of emergency responses essential for people‘s dignity, safety, health and well-being.

Poor drinking water is a major contributor to the increasing the spread of water-borne diseases. It is well recognized that the prevalence of water-borne diseases may be greatly increased allowing people to use poor drinking water, poor sanitary disposal of feces and lack of clean drinking water.

If Water is not disinfected to kill pathogens that might be present in the water supply and to prevent them from growing again in distribution systems, people are at risk especially children, pregnant mothers and the elderly because they are able to contact many other disease which may lead even to death.

Failure to use disinfection to prevent the growth of pathogenic organisms to protect people's health can also increased more risk in emergency situations for example IDP Camps. People need clean water and water supply systems. Without disinfection, the risk of water-borne disease increases.

1. **In your own words, what is your understanding of public health and what are its key elements**?

Public health is the science of protecting and improving the health of people and their communities. This work is achieved by promoting healthy lifestyles, researching disease and injury prevention, and detecting, preventing and responding to infectious diseases.

Public health professionals try to prevent problems from happening or recurring through implementing educational programs, recommending policies, administering services and conducting research—in contrast to clinical professionals like doctors and nurses, who focus primarily on treating individuals after they become sick or injured. Public health also works to limit health disparities. A large part of public health is promoting healthcare equity, quality and accessibility.

Key elements of public health:

### Assessment

In public health we Monitor and evaluate health status to identify community health problems, Diagnose and investigate health problems and health hazards in the community.

### Policy development

Here we need to Inform, educate, and empower people about health issues. Mobilize community partnerships to identify and solve health problems. Developing policies and plans that support individual and community health efforts.

### Assurance

* Enforce laws and regulations that protect and ensure public health and safety.
* Link people to needed personal health services and assure the provision of health care when otherwise unavailable.
* Assure a competent public and personal health care workforce.
* Evaluate effectiveness, accessibility, and quality of personal and population-based health services.
* Research for new insights and innovative solutions to health problems.

### Monitor and evaluate health status to identify community health problems

It is essential for public health organizations to monitor and evaluate the health status of populations in order to identify trends and to target health resources. Components of this service include: utilization of appropriate tools to interpret and disseminate data to audiences of interest; collaboration in integrating and managing public health; and accurate and periodic assessment of the community’s health status. Specifically, public health organizations can monitor and evaluate the health status of their populations by creating a disease reporting system, community health profiles, and health surveys

### Diagnose and investigate health problems and health hazards in the community

In order to appropriately allocate public health resources, it is essential to diagnose and investigate health problems and hazards in the community. Components in this service include: population-based screening of diseases; access to public health laboratories capable of completing rapid screening and high volume testing; and epidemiologic investigations of disease outbreaks and patterns of disease.

### Inform, educate, and empower people about health issues

Once public health priorities have been established through monitoring and investigation of health problems in the community, educational activities that promote improved health should be disseminated. Components in this service include: both the availability of health information and educational resources and the presence of health education and health promotion programs. This can be achieved through media advocacy and social marketing

### Mobilize community partnerships to identify and solve health problems

Public health organizations on the local, state and national level can mobilize community partnerships to identify and solve health problems. Components of this service include: building coalitions to utilize the full range of available resources; convening and facilitating partnerships that will undertake defined health improvement projects; and provide assistance to partners and communities to solve health problems. Of particular importance is identification of potential stakeholders who will contribute to or benefit from public health activities

### Develop policies and plans that support individual and community health efforts

Policies can be effective in modifying human behavior and reducing negative health outcomes. Components in this service include: development of policy to guide the practice of public health; alignment of resources and strategies for community health efforts; and systematic health planning strategies to guide community health improvement.

### Enforce laws and regulations that protect and ensure public health and safety

It is important that individuals and organizations comply with existing laws and regulations in order to ensure the overall health and safety of the general public. Components of this service include: reviewing, evaluating, and revising laws and regulations put in place to protect the health and safety of the public; educating persons and organizations about these laws and regulations to improve compliance and encourage enforcement of them; and enforcing actions that protect the health of the public (e.g., protection of drinking water; enforcement of clean air standards; enforcement of laws prohibiting the sale of alcoholic and tobacco products to minors, of laws concerning the use of seat belts and child safety seats; mandating childhood immunizations; facilitating timely follow-ups in the event of hazards and outbreaks of exposure-related diseases; monitoring quality of health services; conducting the timely review of new drugs, biologics, and medical devices; ensuring food safety; and enforcing housing and sanitation codes).

### Link people to needed personal health services and assure the provision of health care when otherwise unavailable

Having access to care when it is needed is important in helping individuals prevent and avoid unfavorable health outcomes and medical costs. At the local level, components of this service include: identifying populations that face barriers to accessing health services and addressing their personal health needs, assuring the linkage of these populations to appropriate health services by coordinating provider services, and developing and implementing interventions that address the barriers they face in attempting to access care. At the state and governance levels, components of this service include: assessing access to and availability of state health services; partnering with public, private, and non-profit sectors to provide a coordinated system of health care; assuring access to this coordinated health care system by using outreach efforts that link individuals to the health services they need; developing and implementing a continuous improvement process to assure the equitable distribution of resources for those in greatest need of these services.

### Assure a competent public and personal health care workforce

Health care workers and staff who are competent (i.e., skilled in the core principles of public health practice) are more likely to provide care and other services more effectively and efficiently compared to those who are not. Components of this service include: making sure that the workforce meets the health needs of the population, maintaining public health workforce standards by developing and implementing efficient licensure and credentialing processes and incorporating core public health competencies into personnel systems, and adopting continuous quality improvement methods and long-term learning opportunities for public health workforce members.

### Evaluate effectiveness, accessibility, and quality of personal and population-based health services

Given scarce resources, it is important to keep track of whether or not programs and/or policies end up producing intended outcomes. Components of this service include: assessing the accessibility, quality and effectiveness of services and programs delivered; providing policymakers with the information they need in order to make well-informed decisions regarding the allocation of scarce resources; tracking efficiency, effectiveness, and quality of services analyzing data on health status and service utilization; and striving to improve the public health system’s capacity to well serve the population. Cost-effectiveness analysis has been proposed as one possible strategy for informing policymakers on how best to allocate health care resources.

### Research for new insights and innovative solutions to health problems

Through research, the health and health care problems that individuals face can be better understood, and therefore be better and more appropriately addressed given the evidence provided by such research efforts. Components of this service include: fostering the development of a continuum of innovative solutions for health programming in terms of both practical field-based efforts as well as academic efforts, establishing a consortium of research institutions and other institutions of higher learning to encourage more collaborative and cross-cutting efforts, and ensuring the public health system’s capacity to perform timely epidemiological and health policy analyze

1. **Discuss how environmental health and sanitation affect the nutritional status of the vulnerable groups**

The most people at risk are women, children under 5, elderly people, disable people, pregnant women and those living with HIV. People may also become vulnerable by reasons of ethnic origin, religious or political affiliation.

Healthy and a well balanced diet are essential for good health. When there is not enough food or if the diet does not contain the right balance of food stuff, people become more prone to illness and become undernourished or malnourished Children in particular are vulnerable to poor nutrition.

Undernourishment and malnourishment can lower their resistance and make them more likely to suffer from infectious diseases .Often children will eat only small amount of food if it is spicy even if it is nutritious and it is important to make children food less spicy than adults food .Also because their stomach are small, children can eat only small portions and need to be fed more frequently than healthy adults. It is also important that children are fed not just foods high in starch or carbohydrate.

A well balance diet usually has a mixture of food with protein for example beans, meat , fish or eggs , carbohydrates such as maize, potatoes, cassava, rice and many other staple foods. Vitamins such as vegetables, fish, fruits or milk and some fats or oils sometimes not all these food are available and it is important that community members ask health workers how to make best use of available foods for balanced diet.

In many situations, nutrition can be improved by changing agricultural or gardening practices. Often even small plots of lands can provide nutritious food provided that the right crops are grown. Health workers or agricultural extension workers can be asked for advice about which crops to grow to provide community members with well balance diet. It is not possible here to give a full discussion of the nutritional value of food or of what constitutes a well balanced diet.

1. **Paul, a resident in the outskirts of your town, consults you about building a latrine in the compound of his house. He is an open-minded man who is keen to improve life for his family. He has a wife and three young children, and his elderly mother also lives with them. He doesn’t have a tap in his house and gets water from a nearby well. The area has heavy soil and the rock below is impermeable.**
2. Which types of latrine are possible choices for him?

Ventilated improved latrine (VIP).

1. Which types of latrine would you recommend, and why?

Ventilated improved latrine (VIP). Because VIP latrine uses little amount of water or sometimes VIP latrine does not need water at all

1. What other advice would you give him about the location, design and construction of the latrine?

VIP is a pit latrine with a black pipe fitted to the pit and a screen at the top outlet of the pipe.VIP is improvement to overcome the disadvantages of simple pit latrine for example fly and mosquito’s nuisance and unpleasant odors.

Location: VIP Latrine should be located 30m away from the water point; it should not be too closer to the house

Design: It is suppose to be 15 feet to the ground. Locally available materials should be used, self closing doors with vent pipes and flies screen.

The walls should be bricks and because of population is only one door

1. **Explain five ways in which urbanization creates challenges for effective Sanitation and solid waste management.**

**Solid waste management** issue is the biggest challenge to the authorities of both small and large cities’ in [developing countries](https://www.sciencedirect.com/topics/engineering/developing-countries). This is mainly due to the increasing generation of such solid waste and the burden posed on the municipal budget. In addition to the high costs, the solid waste management is associated lack of understanding over different factors that affect the entire handling system. An analysis of literature and reported related to waste management in developing countries.

## Sources, composition and characterization of the solid waste

[Municipal solid waste](https://www.sciencedirect.com/topics/engineering/municipal-solid-waste)  is one of the important challenges to the environment. Municipalities; generally; are responsible for the waste management. They have to provide an effective and efficient system to the inhabitants. Nevertheless, they are; often; [facing](https://www.sciencedirect.com/topics/engineering/facings) with many problems beyond the ability of the municipal authority to handle the solid waste management. This is essentially due to [financial resources](https://www.sciencedirect.com/topics/engineering/financial-resource), lack of organization and complexity.

## Disposal of solid waste

It has been reported that improper bin collection practices, collection, transfer and/or transport systems have great effect on the characteristics of the solid wastes. Besides, the poor route of planning, lack of information concerning the collection schedule, number of vehicles for solid waste collection and poor roads  and insufficient infrastructure  can also effect of the characteristics’ of the solid wastes.

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## Management and recycling of solid waste

In terms of pricing for [solid waste disposal](https://www.sciencedirect.com/topics/engineering/solid-waste-disposal), there are indications that high rates of recovery for recycling are associated with tipping fees at the site of disposal. High disposal pricing has the positive effect on recovering the generated solid waste. This goes to the beneficial reuse or the value chains of solid waste. Indeed, management of solid waste collection and disposal is a one of the major problem of urban environment in most countries worldwide today. Management of solid waste solutions must be financially sustainable, technically feasible, socially and legally acceptable as well as environmentally friendly.

## Valorization of solid waste

Increasingly tighter regulations in terms of organic solid waste, as well as increasing the demand for [renewable](https://www.sciencedirect.com/topics/engineering/renewables) chemicals and fuels, recently, are pushing the industrial manufacturers and the environmentalists toward higher sustainability to improve cost-effectiveness and meet customers’ demand. During the past few years, valorization of food [organic waste](https://www.sciencedirect.com/topics/engineering/organic-waste) is one of the important current research areas. It has attracted a great deal of attention as a potential alternative to the conventional [solid waste disposal](https://www.sciencedirect.com/topics/engineering/solid-waste-disposal) of a wide range of residues in landfill sites. In addition, the increasing development of environmental strategies to process such solid waste is an interesting area of increasing importance in our current society. Waste valorization concerns with the process of converting waste materials into more useful products including fuels, materials, and chemicals. This approach is mostly related to waste management for long time.

9**. How do good sanitation and waste management practices bring a positive effect to urban inhabitants? Give examples for effects on**:

1. health

Good sanitation and waste management help to keep people separate from potential sources of pathogens. They reduce the risk of contaminating water supplies with pathogens and discourage the transmission of disease.

Waste management can also play a part in controlling mosquitoes. Mosquitoes need water to breed, but they can also do this successfully in very small temporary puddles of rainwater. Plastic bags and other plastic waste that is carelessly discarded can hold enough water to enable mosquitoes to reproduce. Collecting and disposing of plastic correctly by burial or burning ensures this opportunity for mosquito breeding is removed.

1. education

In education: Healthy children have fewer days off school through illness. When they are at school, healthy children learn better than sick children. Providing good sanitation facilities encourages children to attend school, particularly girls during their menstrual periods.

When healthy children attend a school with well segregated sanitation facilities, they are present more regularly and are better learners. This, in turn, makes them better able to find jobs that demand higher-level skills on finishing school; an advantage to them, their families and the community as a whole. This contributes to wider economic benefits of the country.

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1. economic conditions

Effects on economic conditions: The health benefits promoted by good sanitation and waste make for a more productive community. Less money is spent on healthcare and people lose fewer days off work through caring for the sick.

A healthy community has many economic advantages over an unhealthy one. If people are healthy they will spend less money on health care and the loss of work days due to diarrhea and other related infections is reduced. Illness can affect both the sick person and their family, for example when women have to take time off work to care for sick children.

Improving solid waste management has economic advantages in addition to the health advantages.

1. the environment

Environment: Good sanitation and waste management means that there will be less faeces and waste deposited in public places and less pollution of the water and soil.

Poor sanitation and waste management have direct impacts on the local environment, but human practices can also have broader consequences.

There are obvious local environmental benefits from improved sanitation. This means that defecation only takes place in properly constructed latrines, areas of land are not contaminated with faeces and water courses no longer act as sewers. This in turn allows plant life, fish and other aquatic organisms to flourish.

Improving waste management improves the local environment and also benefits the national and even the global environment. Good waste management means less litter in the streets and in the neighborhoods of waste disposal sites. It also reduces the smell in the streets from decomposing wastes.

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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**.

**Quality of water**: The quality of water can be measured in terms of physical characteristics of water, colour and turbidity. Here it is very important to mention how many times each household or individual had colored water from their household consumption connection.

**Affordability of water:**  This can be measured in terms of cost of water and the consumers’ ability to pay the cost of getting water.

**The cost of water**: This is a way of looking at the water bills if they are verified by either checking the current individual monthly bill or with the individual bill listings at project office for the community water projects

**Accessibility**: The accessibility to water was measured using the distance from the water point, and the type of connectivity to water point.

**Distance from water Access point**: This is a way of looking at the place where the water point is allocated, how far in metres they were from their respective water access points.

**Policy implications**: The study exposed policy gaps in the regulation, management and operations as means to safe and reliable water provision to the people as a right. There was no clear policy governing public private partnership arrangements and accessibility of the water supply.

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NB: ALL QUESTIONS CARRY 10 MARKS

BEST OF LUCK!!