

**Strategia Netherlands**

**Course; Post graduate diploma in Water Hygiene and sanitation (WASH)**

**Assignment 2**

**Admission Number; PGD002**

**Names; Garnop Makur Ghak Kok**

**Date; 10/10/2019**

## **1. Explain six major non-domestic use of water.**

### **Irrigation**

About 70% of water used globally is in irrigation. In Ethiopia, the total area under irrigation is increasing and irrigation channels can be seen in some parts of the country. Spray irrigation, where pressurized water is sprayed over plants to feed them, is often used on large farms but greater efficiency of water use can be achieved by drip-feed irrigation systems. In drip-feed irrigation, water is fed to the roots of plants through narrow pipes dripping water onto the soil surface near the base of the plant. This takes the water directly to the growing crops and reduces losses by evaporation.

### **Industrial use**

In many industries water is essential. Some industries use piped water supplied from water treatment plants while others draw the water themselves from underground sources and treat it on site for use. The water may be used either as part of the production process or as an ingredient, where water is one of the components of the product, for example in a soft-drink plant. In the production process, it can be used for cooling, washing, diluting, boiling or cooking, transportation of raw materials (for example, moving potatoes in a food factory), and as a cleaning agent.

### **Mining use**

Mining activities use huge amounts of water in processing ore to extract minerals. In Ethiopia, mining for gold and other valuable metals is an increasingly important part of the national economy and would not be possible without the use of water.

### **Use in power generation**

The rivers of Ethiopia have enormous potential for generating **hydroelectric power (HEP)**. HEP uses the energy from moving water and converts this to electrical energy. The development of HEP has transformed energy supply in recent years and more schemes are under construction or planned. However, it is important to realize that in HEP the water is not 'used' in the sense of being consumed, because after passing through the HEP plant the water continues on its path in a river channel.

Another process under development in the Rift Valley area of Ethiopia is the use of **geothermal energy**, in which energy is derived from the heat of the Earth. This process involves drilling down into hot layers of underground rock and using this heat to convert water into steam, which is then used to drive generators to produce electricity.

## **Aqua cultural use**

Water can also be used in **aquaculture**, which is the farming of aquatic organisms such as fish, crustaceans and molluscs for food. Fish farming. Obviously needs water for the fish to live in! In this case, water is used to hatch fish eggs under controlled conditions, and the fish are grown to maturity in tanks or ponds, before being sold for food. Although not currently practiced in Ethiopia, the business potential for aquaculture has been recognized and it may be introduced in the future (Rothuis et al., 2012).

## **Recreational use**

Water plays an important role in recreational activities and here again it is not consumed in the process of its use. Boat trips are popular on many of Ethiopia's lakes and several resorts have been built on their shores.

### **2. Briefly describe the important roles that water plays in the human body.**

For almost each one of us, Water is the most easily accessible resource on earth which is why we often take it for granted. Although much has been talked about the importance of H<sub>2</sub>O, very few are aware about the exact role that water plays in the human body.

A human being can survive for a couple of weeks without food but cannot live for more than 7 days in the absence of water. Approximately 60 to 75% of our body mass is water. 70% of our brain, 80% of our blood and almost 90% of our lungs comprises of water. There is no better health drink than Water because it is fat-free with zero cholesterol and no calories.

During summer, people tend to sweat a lot whereby they lose vital minerals which have to be replaced; otherwise the body may experience heat exhaustion and cramps. An adult loses about 2 ½ litres of water every day through normal bodily functions. Keeping the body sufficiently hydrated at all times is the No.1 health advice, although do not go overboard with it. Hyponatremia is a condition that is triggered by over hydration of the body, which causes the sodium in your body to become diluted. This triggers a substantial increase in the water levels of the body which ultimately results in swollen cells.

This makes one wonder about the body's daily requirement of water – How much water should we drink in a day?

Experts state that it is important to change your water consumption habits as per the season. Your body weight and lifestyle choices also play an important role in determining your water intake. In general, 6 to 8 glasses of water intake is recommended per day. Keeping your body sufficiently hydrated on a daily basis can help you:

- Lose weight
- Feel energized
- Keep Constipation & Urinary Tract Infection at bay

- Prevent Kidney stones
- Get glowing skin
- Relieve Headaches

## **Here are the 16 importance roles that water plays in our human body**

### **1. It helps create saliva**

Water is a main component of saliva. Saliva also includes small amounts of electrolytes, mucus, and enzymes. It's essential for breaking down solid food and keeping your mouth healthy. Your body generally produces enough saliva with regular fluid intake. However, your saliva production may decrease as a result of age or certain medications or therapies. If your mouth is drier than usual and increasing your water intake isn't helping, see your doctor.

### **2. It regulates your body temperature**

Staying hydrated is crucial to maintaining your body temperature. Your body loses water through sweat during physical activity and in hot environments. Your sweat keeps your body cool, but your body temperature will rise if you don't replenish the water you lose. That's because your body loses electrolytes and plasma when it's dehydrated. If you're sweating more than usual, make sure you drink plenty of water to avoid dehydration.

### **3. It protects your tissues, spinal cord, and joints**

Water consumption helps lubricate and cushion your joints, spinal cord, and tissues. This will help you enjoy physical activity and lessen discomfort caused by conditions like arthritis

### **4. It helps excrete waste through perspiration, urination, and defecation**

Your body uses water to sweat, urinate, and have bowel movements. Sweat regulates body temperature when you're exercising or in warm temperatures. You need water to replenish the lost fluid from sweat. You also need enough water in your system to have healthy stool and

avoid constipation. Your kidneys are also important for filtering out waste through urination. Adequate water intake helps your kidneys work more efficiently and helps to prevent kidney stones.

### **5. It helps maximize physical performance**

Drinking plenty of water during physical activity is essential. Athletes may perspire up to 6 to 10 percent Trusted Source of body weight during physical activity. Hydration also affects your strength, power, and endurance. You may be more susceptible to the effects of dehydration if you're participating in endurance training or high-intensity sports such as basketball. Negative effects of exercise in the heat without enough water can include serious medical conditions, like decreased blood pressure and hyperthermia. Extreme dehydration can cause seizures and even death.

### **6. It helps prevent constipation**

Eating fiber isn't the only way to prevent constipation. It's also important to maintain your water intake so your bowel movements contain enough water. If you don't consume enough water, magnesium, and fiber, you may be more likely to experience constipation. If you're already constipated, you may find that drinking carbonated water Trusted Source as well as plain water can help ease your symptoms.

### **7. It aids in digestion**

Contrary to what some believe, experts confirm drinking water before, during, and after a meal will help your body break down the food you eat more easily. This will help you digest food more effectively and get the most out of your meals. Research the body adapts to changes in the consistency of food and stomach contents, whether more solid or more liquid.

## **8. It helps with nutrient absorption**

In addition to helping with food breakdown, water also helps dissolve vitamins, minerals, and other nutrients from your food. It then delivers these vitamin components to the rest of your body for use.

## **9. It helps you lose weight**

Studies have linked body fat and weight loss with drinking water in both overweight girls Trusted and women. Drinking more water while dieting and exercising may just help you lose extra pounds.

## **10. It improves blood oxygen circulation**

Water carries helpful nutrients and oxygen to your entire body. Reaching your daily water intake will improve your circulation and have a positive impact on your overall health.

## **11. . It helps fight off illness**

Drinking enough water can help prevent [certain medical conditions](#) Trusted Source. These include:

- constipation
- kidney stones
- exercise-induced asthma
- urinary tract infection
- hypertension

Water also helps you absorb important vitamins, minerals, and nutrients from your food, which will increase your chances of staying healthy.

### **12. It helps boost energy**

Drinking water may activate your metabolism. A boost in metabolism has been associated with a positive impact on energy level. One study found that drinking 500 milliliters of water boosted the metabolic rate by 30 percent in both men and women. These effects appeared to last over an hour.

### **13. It aids in cognitive function**

Proper hydration is key to staying in tip-top cognitive shape. Research Trusted Source indicates that not drinking enough water can negatively impact your focus, alertness, and short-term memory.

### **14. It helps improve mood**

Not getting enough water can also affect your mood. Dehydration may result in fatigue and confusion as well as anxiety.

### **15. It helps keep skin bright**

Adequate water intake will help keep your skin hydrated and may promote collagen production. However, water intake alone isn't enough to reduce the effects of aging. This process is also connected to your genes and overall sun protection.

### **16. It prevents overall dehydration**

Dehydration is the result of your body not having enough water. And because water is imperative to so many bodily functions, dehydration can be very dangerous. Severe dehydration can result in a number of severe complications, including:

- swelling in your brain
- kidney failure
- seizures

Make sure you drink enough water to make up for what's lost through sweat, urination, and bowel movements to avoid dehydration.

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

Each year, waterborne diseases afflict hundreds of millions of people, primarily those living without safe, accessible water in developing countries.

Of the seven most common waterborne diseases in the world, diarrhea is the central symptom. The latest research shows that diarrhea is the second leading cause of death for children under the age of five, causing more childhood deaths than malaria, AIDS, and measles combined.

That's hundreds of thousands of deaths, but there is hope for the future. Experts believe we can end the global water and sanitation crisis in our lifetime.

What are Waterborne Diseases?

Waterborne diseases are illnesses caused by microscopic organisms, like viruses and bacteria that are ingested through contaminated water or by coming in contact with feces.

If every person on the planet was able to practice safe sanitation and hygiene and have access to clean water, these diseases would not exist. Governments, NGOs, and communities themselves have made great strides in the past 20 years to end waterborne diseases. Still, there is much to be done.

Learn about seven waterborne diseases and help prevent them today.

#### **1. Typhoid Fever**

Although rare in industrialized countries, typhoid fever is well-known in extremely poor parts of developing nations; it's estimated that up to 20 million people worldwide suffer from the illness each year. It's spread through contaminated food, unsafe water, and poor sanitation, and it is highly contagious.

Two children bathe in a pond in Cambodia

**Symptoms include:**



- A fever that increases gradually
- Muscle aches
- Fatigue
- Sweating
- Diarrhea or constipation

## **Prevention and Treatment**

Vaccines are recommended for people who are traveling in areas where poor sanitation and unsafe water are common. The vaccine can be injected via a shot or taken orally for a number of days. To prevent it, refrain from drinking any water that isn't bottled and sealed, and do not eat food from villages or street vendors. Typhoid is treated with antibiotics.

## **2. Cholera**

Cholera is commonly found in humanitarian emergencies or marginalized villages where poverty and poor sanitation are rampant. The disease is spread through contaminated water and causes severe dehydration and diarrhea. Cholera can be fatal within days or even hours of exposure to the bacteria, but only 1 in 10 people will develop life-threatening symptoms.

### **Symptoms include:**

- Nausea
- Vomiting
- Diarrhea
- Muscle cramps

## **Prevention and Treatment**

Cholera is a waterborne illness that's easily prevented when traveling. Wash your hands often, only eat foods that are completely cooked and hot (no sushi), and only eat vegetables you can peel yourself, like avocados, bananas, and oranges. Of course, drink safe water.

Life water teaches proper hand washing in three developing countries.

When hand washing is unavailable, cholera can impact an entire village. In developing countries like Ethiopia, data shows that 97% of households do not have means to wash their hands properly, meaning they don't have safe water, soap, and a facility to wash. This makes hygiene management and disease prevention nearly impossible for these communities.

Life water helps prevent cholera in remote villages by teaching families how to construct their own hand washing devices. To date, 5,970 homes in Ethiopia alone have built their own hand washing station (called a "tippy\_tap") using locally-sourced materials.

### **3. Giardia**

This waterborne disease is shared through contaminated water, most often in ponds and streams, but it can also be found in a town's water supply, swimming pools, and more. The infection is caused by a parasite and typically clears up after a few weeks. However, it's possible for those who have been exposed will experience intestinal problems for years to come.

#### **Symptoms include:**

- Abdominal pain
- Cramps and bloating
- Diarrhea
- Nausea
- Weight loss

#### **Prevention and Treatment**

While there is no vaccine for giardia, there are simple ways to avoid the infection. Wash your hands with soap often, don't swallow water while swimming, and drink only bottled water.

With time, the immune system will typically beat giardia on its own. But, if symptoms worsen, doctors prescribe anti-parasite and antibiotic medications.

Water-poor communities cannot protect themselves from illnesses like giardia, and treatment for this illness can come at a high cost for a family living in poverty. For these reasons, Life water's programs focus on long-term prevention. This includes constructing safe water sources and teaching health practices, one house at a time, until the entire community has the resources and the knowledge to prevent waterborne illness.

When families learn how to construct their own hand washing facilities, bathrooms, and dish drying racks, they take control of their health. They check off a list of basic health practices, and they become certified Life water "Healthy\_Homes."

### **4. Dysentery**

An intestinal infection, dysentery is a waterborne disease characterized by severe diarrhea as well as blood or mucus in the stool. Dysentery is good reason to always wash your hands, as the disease is spread mainly through poor hygiene. It can be caused by bacteria, viruses, or parasites in unsafe food and water and by people coming in contact with fecal matter. If someone experiencing dysentery cannot replace fluids quickly enough, their life could be at risk.

#### **Symptoms include:**

- Stomach cramps and pain
- Diarrhea

- Fever
- Nausea
- Vomiting
- Dehydration

## **Prevention and Treatment**

To prevent dysentery, wash your hands with soap frequently, order all drinks without ice, don't eat food sold by street vendors, and only eat fruits you can peel. Drink only sealed, bottled water while traveling in places with higher dysentery risk, such as communities where proper hygiene practices are uncommon.

Mild dysentery usually clears up with rest and fluids, but over-the-counter medications such as Pepto-Bismol can help with stomach cramping. More severe cases can be treated with antibiotics, although some strains of the disease are resistant.

### **5. Escherichia Coli (E. coli)**

E. coli is a bacteria with various strains, some dangerous and some beneficial. For example, E. coli bacteria are important in creating a healthy intestinal tract.

However, if animal waste has found its way into farmland where produce is grown or if strains of E. coli are spread through the process of making ground beef, those who consume these foods could experience symptoms of the waterborne illness. The bacteria are also found in unsafe water sources around the globe where human water sources and cattle coexist.

Symptoms of dangerous strains of E. coli are similar to that of dysentery and other waterborne diseases. Most bouts of E. coli pass within a week, but older people and young children have a greater chance of developing life-threatening symptoms. Anyone believed to have been exposed to contaminated food or water should contact a doctor if diarrhea contains blood.

## **Prevention and Treatment**

As always, avoid water possibly contaminated by human and/or animal feces (like ponds, rivers, and swamps). If you are going to eat ground beef, cook thoroughly. Wash fruits and vegetables well, wash hands often, and drink only safe water. To treat the disease, drink plenty of safe water, rest, and take over-the-counter diarrheal medication. While these are simple prevention and treatment tips, there are many remote communities in Uganda who have no choice but to drink from swamps. A woman and her child gather water from the swamp in Kikomera Biri village. Life water staff are serving the village of Kikomera Biri, Uganda, where families gather water from a swamp. The results of water testing showed an extremely high risk for dangerous pathogens like typhoid, harmful strains of E. coli, and other waterborne diseases. Unless this community—which is already experiencing extreme poverty—pays for a taxi to drive into town for expensive, bottled water, they have no choice but to keep drinking from the swamp.

## **6. Hepatitis A**

Hepatitis A is a liver infection caused by consuming contaminated food and water or by coming in close contact with someone who has the infection. People who travel in developing countries often or work in rural communities with poor sanitation and hygiene management are most exposed to the disease.

### **Symptoms include:**

- Fatigue
- Clay-colored bowel movements
- Jaundice
- Nausea and vomiting
- Abdominal pain, especially near your liver
- Loss of appetite
- Sudden fever

The infection usually goes away in a few weeks, but it's possible that it can become severe and last several months.

### **Prevention and Treatment**

The best way to prevent hepatitis A is by getting the vaccine. Eat only foods that are thoroughly cooked and served hot, and avoid eating anything at room temperature. Only eat fruit that you can peel and that you have peeled yourself. Don't eat from food vendors and don't eat runny eggs or raw/rare meat. For a full list of dos and don'ts, visit the CDC's page on Hepatitis A [here](#).

Once a person has hepatitis A, they build immunity and will likely never get it again. However, the symptoms are serious, often forcing people to take time off work or school to recover. If you have contracted hepatitis A, rest, avoid drinking alcohol, and drink plenty of fluids. The disease will run its course, and full recovery is expected after three months.

## **7. Salmonella**

Most cases of salmonella come from ingesting food or water contaminated with feces. Undercooked meat, egg products, fruits, and vegetables can also carry the disease. Most people don't develop complications, but children, pregnant women, older adults, and people with weakened immune systems are most at risk.

### **Symptoms include:**

- Blood in stool
- Chills

- Headache
- Diarrhea

## **Prevention and Treatment**

When preparing your own food, make sure to cook thoroughly and store or freeze within 30 minutes of use. Avoid touching birds or reptiles, and as always, wash your hands frequently.

Salmonella infection dehydrates the body. Treat it by drinking fluids and electrolytes. More serious infections can require hospitalization and antibiotics.

Prevent Waterborne Diseases for Good: Give with Life water

There are many parts in the world where waterborne diseases are rampant, deadly, and knowledge about prevention is not widely available. For over 40 years, Life water has sought out these places, working with communities to teach vital sanitation and health practices and constructing custom water technologies in places where water access is most difficult.

Over and over again, cholera is prevented and typhoid eradicated. Children no longer battle waterborne illness, and parents go back to work.

When you become a monthly giving partner with Life water, you give safe water to one person for life every month. You'll receive real-time updates on the status of their community's progress and photos to share with friends and family.

You can help eliminate waterborne diseases for good. Join us today.

### **4. 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?**

Whether the spring originates from shallow or deep rock layers, animals should be excluded from the surrounding area by a stock-proof fence. 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 that 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.

Small springs are typically protected by a 'spring box' which is constructed of brick, masonry or concrete, and is built around the spring so that water flows directly out of the box into a pipe or cistern, without being exposed to outside pollution such as run-off, bird droppings and animals.

The spring box should have a watertight cover with a lock. Larger springs serving towns are protected in a similar way. Many surface water sources are used for drinking water purposes, protection is vital. Generally, three basic strategies exist for protection (UNEP 2010).

- **Prevention:** No discharge of waste, pollutants or untreated water from domestic, industrial or agricultural use; optimized water use and practices in agriculture in order to stop nutrients from entering aquatic systems (e.g. establishing buffer zones).
  - **Treatment:** treatment of polluted water prior to discharge; storm water management: ensuring that run-off cannot transport pollutants into water bodies.
  - **Restore ecosystems:** Enable or support natural rehabilitation processes.
- here may not be many opportunities to develop new spring sources but, if the opportunity does arise, there are certain procedures to follow to ensure the spring water is protected and safe to drink. You would be working 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.

Different types of spring protection can be constructed but in general they are as follows:

- 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.
- A retention wall in the front part of the protection box should be constructed to keep water flowing to the delivery pipe.
- In some situations, if the flow is not constant, a collection box may also be constructed in order to ensure adequate water storage.
- 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.

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

**5. The following are pollution sources. Give two specific pollutants for each source.**

a) A residential area:

- ✓ Poorly Maintained Septic Systems
- ✓ Improper Disposal Of Paint, Oil, or Other Chemicals

b) A metal plating plant:

c) Agricultural activities:

- ✓ Bacteria and parasites from animal waste can get into drinking **water** which can **cause** illness and death
- ✓ Runoff from barnyards, feedlots and cropland carries away manure, fertilizers, ammonia, pesticides, livestock waste, oil, toxins from farm equipment, soil and sediment.

d) An uncontrolled landfill site:

- ✓ Waste blown by the wind as its tipped on deposited the land fill site
- ✓ Dust generated from the surface of the landfill and when the waste is tipped or unloaded

e) Urban surface water run-off

- ✓ Toxic runoff can pollute surface waters, like rivers and lakes, as well as seep into underground groundwater supplies. Storm water runoff is the runoff drained into creeks, bays, and other water sources after a storm. Storm water runoff includes all debris, chemicals, and other pollutants picked up by the rain or snow.
- ✓ Pollution generally results from land runoff, precipitation, atmospheric deposition, drainage, seepage or hydrologic modification. Oil, grease and toxic chemicals from urban runoff and energy production. Sediment from improperly managed construction sites, crop and forest lands, and eroding stream banks

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