**Post Graduate Diploma in Water Hygiene and Sanitation (WASH)**

**WASH Assignment 5**

**Prepared by:**

**S. M. Tareq Bin Jamil Neoaz**

**Email: tareq.bin.jamil@gmail.com**

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**Assignments**

**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.**

1. ***Which types of latrine are possible choices for him?***
2. ***Which types of latrine would you recommend, and why?***
3. ***What other advice would you give him about the location, design and construction of the latrine?***

**Answer:**

* 1. Paul doesn’t have a piped water supply in his house and the area has heavy soil and rock below is impermeable, he should choose to install a dry latrine system or less water used latrine. The possible choices are an Arborloo or a urine-diverting latrine.
  2. A urine-diverting dry toilet (UDDT) would be suitable. UDDT is a toilet that operates without water and has a divider so that the user, with little effort, can divert the urine away from the faeces. The UDDT is built such that urine is collected and drained from the front area of the toilet, while faeces fall through a large chute (hole) in the back. Depending on the Collection and Storage/Treatment technology that follows, drying material such as lime, ash or earth should be added into the same hole after defecating. The urine is kept for 24 hours; after which it is mixed with three parts water to be used as a very effective fertilizer. Soil or ash is added to the latrine after each use and the faeces are composted. After approximately 12 months, pathogenic micro-organisms will have died off and the composted faeces can be used as a soil conditioner (helping the soil to retain moisture) for household gardening or urban agriculture.
  3. It is important that the two sections of the toilet are well separated to ensure that a) faeces do not fall into and clog the urine collection area in the front, and that b) urine does not splash down into the dry area of the toilet. There are also 3-hole separating toilets that allow anal cleansing water to go into a third, dedicated basin separate from the urine drain and faeces collection. Both a pedestal and a squat slab can be used to separate urine from faeces depending on user preference. Urine tends to rust most metals; therefore, metals should be avoided in the construction and piping of the UDDT. To limit scaling, all connections (pipes) to storage tanks should be kept as short as possible; whenever they exist, pipes should be installed with at least a 1% slope, and sharp angles (90°) should be avoided. A pipe diameter of 50 mm is sufficient for steep slopes and where maintenance is easy. Larger diameter pipes (> 75mm) should be used elsewhere, especially for minimum slopes, and where access is difficult. To prevent odours from coming back up the pipe, an odour seal should be installed at the urine drain.

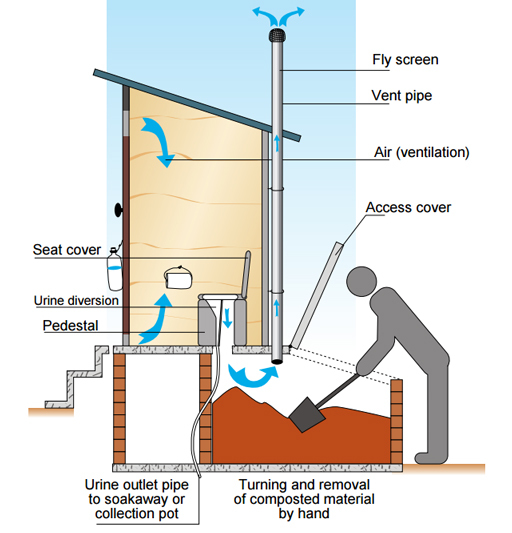


Figure: Basic components of a urine-diverting latrine.

*adapted from PGD WASH module.*

**2. Nancy is a laboratory technician. She is analysing a sample of wastewater collected from a pipe that discharges effluent into a river. Name two tests Nancy could perform to assess the physical characteristics of the effluent.**

**(b)As part of the analysis she also does a BOD test on the sample and gets an unusually high result. What does the high BOD tell her about the wastewater? What effect could it have on the river?**

**Answer:**

To assess the physical characteristics, Nancy could perform a **suspended solids test**. She could also measure the temperature of the sample and assess the odour.

***Suspended solid***

Non-settleable suspended solids consist of particles, which are too small to sink to the bottom within a reasonable (technical) time. SS is detected by filtration of a sample. Suspended solids are an important parameter because they cause turbidity in the water and may cause physical clogging of pipes, filters, valves and pumps.

***Temperature***

Temperature is important because bacterial growth increases with higher temperature,

principally, limits notwithstanding. Due to low energy gains as a result of “incomplete”

anaerobic decomposition, aerobic processes are less sensitive to low temperatures

than anaerobic processes. This is obvious from the fact that biogas is still oxidiseable and is therefore an energy-rich end product. Temperatures between 25° and 35°C are most ideal for anaerobic digestion. 18° to 25°C is also good enough.

Higher temperatures are also favourable for aerobic bacteria growth, but are disadvantageous

for oxygen transfer. The cooler the environment the more oxygen can be dissolved in water and thereby, more oxygen will be absorbed from the air. This is the reason why ponds may become anaerobic in the height of summer.

b)

The BOD (Biochemical Oxygen Demand) is always a fraction of the COD. It describes what can be oxidised biologically, this is with the help of bacteria. It is equal to the organic fraction of the COD. Under standardised laboratory conditions at 20°C it takes about 20 days to activate the total carbonaceous BOD (=BODultimate, BODtotal). In order to save time, the BOD analysis stops after 5 days. The result is named BOD5, which is simply called the BOD, in practice. The BOD5 is a certain fraction (approximately 50 to 70%) of the absolute BOD. This fraction is different for each wastewater. The ratio of BODtotal to BOD5 is wider with difficult degradable wastewater, and thus, it is also wider with partly treated wastewater.

A high BOD test result would tell Nancy that there was a lot of organic matter in the sample. If this was discharged into the river it would remove oxygen from the water, which would harm fish and other organisms living in the river.

**3. What is the purpose of the report of a rapid assessment and who should receive copies of the report? Explain the contents of Rapid Assessment Report**

**Answer**

An assessment of WASH priority risks and needs should be undertaken before any humanitarian intervention.

In an emergency, a rapid assessment will provide information as to whether to intervene and if so, the type and scale of activities and priorities for resource allocation. Balance the need for detailed assessment with the humanitarian imperative of saving lives.

The purpose of the report is to summarise the results from the assessment and indicate how well its aims have been achieved. After permission from the funders has been obtained, it should be sent to all those who had an interest in its findings. Apart from the funders, recipients could include:

* the kebele administration
* community representatives
* the local Health Extension Workers team
* any non-governmental organisations (NGOs) or funding organisations who might be willing to finance or support a follow-on programme
* any local WASH programmes.

The assessment report is in the form of a six-page summary made up of text tables, charts and photographs. It presents the main findings as a series of bullet points on the first page

**4. Explain five ways in which urbanisation creates challenges for effective sanitation and solid waste management.**

**Answer:**

The main challenges from urbanisation are caused by many people living very close together which puts pressure on all urban services. The rate of increase in population is very fast and the development of infrastructure for water supply and sanitation services cannot maintain the same pace of change. People arriving in cities often live in informal settlements which are developed without planning or control and lack essential facilities for the people who live there.

**Challenges to sanitation and solid waste management**

**Physical constraints:**

The major constraint to waste management includes physical and economic problems. Physical constraints to sanitation and waste management include lack of comprehensive planning, inadequate infrastructure and development crisis. Comprehensive physical planning

incorporates conceiving the plan and considering various aspects of the plan of the urban area in terms of waste generation and disposal.

**Inadequate infrastructure:**

Many Local Government Areas lack the capacity to meet infrastructural services for waste generation in rapidly growing areas. When vehicles to evacuate waste and other infrastructures are not provided or inadequate from the Local Government to the State Government, there will be problem in handling the waste generated by the populace

(Agumbnwamba, et al., 1998).

**Development crisis:**

The expansion of urban development to urban fringes poses a threat to sustainable development and management of environmental resources. Plan policies to accommodate population growth are inadequately made (Agunwamba, 1998).

**Budgeting:**

The Federal Government’s budget for environmental protection is inadequate. This makes waste management allocation to be so negligible, leading to poor waste management. It was found that a great part of the budget (77%) was spent on collection and haulage, leaving a minor amount (23%) for waste disposal (Agunwamba, et al., 1998).

**Over population:**

When an area is densely populated, the quantity of waste being generated will be much. The populace disposes the waste both in approved and unapproved sites, thereby causing the problem of waste management in the urban areas (Agagu, 2009).

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

1. **health**
2. **education**
3. **economic conditions**
4. **the environment**

Answer:

* Effects on 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.
* Effects on 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.
* 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.
* Effects on the 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.

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