DIPLOMA IN WATER SANITATION AND HYGIENE

ASSIGNMENT THREE

BY

DR. CHUKWU NORBERT SUNDAY

QUESTION 1. Why is community-based management essential in management of water resources?

ANSWER: Community-based management of rural water resources according to McCommon et al (1990) & WHO (1996) is assuming responsibility, control and authority of water supply by the beneficiary community. Before community management, there ought to be community participation--the community must have been consulted, involved in the planning and execution of the water project. The community must also have acquired technical ability, managerial skill or means to hire personnel to provide it.

According to WHO (1987) community management of water resources concept was born due to increasing evidence that systems are more sustainable when designed, established and operated by the community from lessons learnt between 1980 and 1985 when unit cost of providing rural water rose by 24 percent. Meanwhile the flow of fund was dwindling, and many completed water projects were in disrepair or abandoned. This state of affair stimulated many experts to question the economic sense of centrally managed water schemes and the result was the concept of community management as an alternative. It further states that community management should be a management system which requires collaboration of the government, donor agency and the community and none is dominant with clearly stated different roles, understanding and acceptance of the roles of other parties. According to McGarry (1991) & Korten (1987) without delineation of the roles it may be difficult to implement community-based management concept effectively.

The community-base management is essential because water is community resource along side land, forest and livestock. The harmony among these resources will only be assured when there is sustainability in their balanced management by the community (UNICEF 1999). Nigam (1996) concurred that water resources management is better left in the hands of the community because for centuries this has been the norm with stable balance accommodating all the competing factors until the introduction of pressure due to advances in technology, wide spread exploitation, pollution, population explosion, and emphasis on increasing consumption rather than conservation.

Successful community management of water resources can be an '' entry point'' to achieving other heights from experience, co-operation, organisational and mobilization skills gained. This was the case in Zambia where UNICEF drought relief programmes snowballed into comprehensive and highly successful water, sanitation, health and environmental

components and has become the yardstick for government and other donor partners according to UNICEF (1999).

Interestingly UNICEF (1999) further stipulates that some of the skills required for successful community management of water resources are already available in some communities thereby making community-based management a cost effective and viable option and enhances their bargaining power through transformation from passive receivers to partners or clients. The donor agency or government transforms from ''benefactor'' to ''facilitator''

WHO (1987) advocates community-based management of water resources because: (1) A community-oriented management approach is more effective and sustainable than a technology-oriented approach. (2) A community-oriented approach increases at all stages the involvement of users with enormous benefits. (3) Operation and maintenance of water facilities are continuing fundamental problems. (4) Community-based management increases the roles women and community in water related decision making. (5) Community-base management raises emphasis on promotion than provision.

The benefits of community-based water management according to WHO (1987) are: (1) It results to greater sustainability which in turn leads to improved water, better health and time saving. (2) It enhances community identification and ownership which in turn lead to greater willingness to pay for services, acceptance of changes to practices and making further improvements (3) It tailors programmes to real needs and discourages top-down approaches which most often fail to adapt to local realities (4) It increases potential for achievement by synergizing external and internal resources and taps into abundant untapped local resources.

The down side of community-based community management is that if the roles of the collaborators are not well delineated conflicts could result and lead to the collapse of the project.

The constraints to community-based management according to WHO (1987) are: (1) Fear by agencies and governments that communities' organisational and management skills are limited. (2) Projects may take longer time to complete. (3) Traditional political leaders may perceive strong communities managing their facilities well as treats to their authority (4) The communities may find in difficult to shift from ''passive receivers'' to ''active contributors'' especially those with government or agency funded and managed facilities.

To achieve community management requires: (1) Planning, ownership and control (2) Legislation (3) Cost recovery (3) Supporting system (4) Skill and organisational transfer to the client-community.

In summary, the concept of community-based management came into being to stimulate community involvement in running their affairs order than allowing those who do not understand the internal working of the community to impose their will from outside thereby giving the people what they do not need. This concept stands on the tripod of responsibility, authority and control.

Commented [I1]: Good

QUESTION 2. With examples discuss the differences between community management and community participation.

ANSWER. According to McCommon et al (1990) & WHO (1996), the concept of community-based management refers to assumption of responsibility, authority and control of a facility or project by the beneficiary community whereas WHO (1996) says that concept of community participation is active role a beneficiary community plays in affairs concerning it through sharing and exercising political and economic power. On the other hand, Paul (1987) says that community participation is an active way by which beneficiary community influences the direction and execution of a developmental project with a sole aim of enhancing the well being in form of income, personal growth, self-reliance or values of the community.

Both the concepts of community participation and management according to WHO (1996) were as a fallout of lessons learnt during International Drinking Water Supply and Sanitation Decade (IDWSSD), 1981—1990.The summation of the two concepts is called community involvement (McCommon et al, 1990)

Even though the two concepts are inseparable and can be said to be a continuum—participation results to management, still differences exist between them.

COMMUNITY PARTICIPATION concept is an active process and a means to an end—community management. By definition the community through this process ‘’shares and exercises political and economic power’’ with the government and in the case of donor agency, the community shares economic power. Power according to dictionary.com is ability to perform or accomplish an act. In community participation the community gains and earns recognition by the government or donor agency as a partner and not just ‘’a mere

recipient''. According to McCommon et al (1990), community participation in relation to development project or programme, dwells on participation of the beneficiary rather than external imposition. These authors further state that the World Bank, the United States for International Development agency (USAID) and the Water and Sanitation Health Project (WASH) in their recent reports opine that the concept of community participation may have great potential for improving development planning and sustainability. According to Paul (1987), the hallmark of community participation is the collaborative involvement of members of beneficiary community in groups through decision, advice and actions on issues which can be best resolved by joint effort.

According to Bamberger (1986) community participation can be divided into local organisational development and indigenous local participation. The former is externally inspired participatory approach whereas the later evolves spontaneously without external contribution. Example of local organisational development type of community participation is externally initiated Rural Water Supply and Sanitation (RWSS) which mostly dwells on technology and system coverage. Here the project staff organise the beneficiary community-water committee, negotiate agreement with local leaders, and provide limited essential technical training and health education. The primary objective is to meet the construction schedule whereas in indigenous participatory RWSS, the objectives are capacity building and organisation. This approach is designed to improve problem solving capacity of the community through behavioural change using the vehicle of orientation and training. The priority here is human resources development.

On the other hand, Whyte & IDWSSD (1986) classified community participation into ten: (1) Consultation --giving the community some voice in decision making through discussion with the whole community or their representatives who consult widely with community before arriving at a decision with government or donor agency(2) A financial contribution by the community towards the implementation of the project (3) Self-help projects by groups of beneficiaries—some individuals pay cash or contribute labour for the implementation of the project. At the completion of the project their services therefrom are rebated while others pay more (4) Self-help projects involving the whole community—every member of the community contributes labour to augment the external help (5) Community specialised workers—the community members trained through external help and technical supervision are selected to perform some tasks. For example, health workers, teachers or operators of

the water supply system (6) Mass action—every member of the community is involved without external input as seen in draining of waste water or unblocking of drainage (7) Collective behaviour change—collective decision to change negative customs or habits. Examples are controlling of domestic animals, reviewing of burial or marital expenditures (8) Autonomous community projects –the community raises funds to pay for external services of professionals that are not available in the community such vaccination of pets (9) Approaches to self-sufficiency—this is self-reliance, labour and materials are sourced locally (10) Endogenous development—the community internally generates ideas and projects but may seek outside help for implementation.

According to McCommon et al (1990) community participation is made-up of feasible combinations of various objectives, levels of intensity and instruments.

The objectives are the goals of the project and they include: (1) Sharing of project cost—beneficiary community contributes money or labour to augment the inputs of the donor (2) Increasing project efficiency through community assistance in project planning and implementation (3) Increasing project effectiveness through having a say in the project design and implementation by the beneficiary community (4)Building capacity through sharing in the management or operational responsibilities by the beneficiary community (5) Increase empowerment through power sharing and increase in political awareness and influence by the community.

Intensity of the community participation is the impact the community makes in the project and it depends on the degree of sophistication of the technology needed for the project and level of skill in the beneficiary community. According to Paul (1987), intensity is of four levels: (1) Information sharing—this is the lowest level of intensity where the agency or government only shares information of what the project is all about with little or no contribution from the community. Even though it is the lowest level of intensity it could have a profound effect in some projects like family planning and nutritional programmes. (2) Consultation—here the agency or the government dialogues with the beneficiary community and incorporates their inputs into the project design and implementation. The participation of the community is greater and success rate is higher. (3) Decision making—this is of higher level than information and consultation. It affords the beneficiary community much control or influence on the project. (4) Initiation of action—this is the

highest level of community participation. In this case the community identifies a project of general interest and benefit and goes ahead to carry it out without any external help.
Instruments of community participation are the means or devices required to organise or sustain community participation in a project. There are three instruments: (1) Agency project field workers—they operate at grassroot to interact with the beneficiary community and sell the importance and relevance of the project to the community. Agricultural and irrigation projects require agency field workers. (2) Community workers/committees—the project agency picks them from the beneficiary community to act as mobilizers in consultation with the community. The community identifies with the community workers or the committee and push the intensity higher. This kind of instrument is beneficial in primary health care project. (3) User groups—this Is used in projects with small number of beneficiaries or of specialized nature (farmers and mothers with small babies). This type of instrument can arise from exogenous or endogenous influence and can push intensity high.
The objectives, intensities and instruments interact to produce community participation. If a project has higher/complex objectives of community participation, it also needs greater levels of intensity and more powerful instruments and vice versa.
According to McCommon et al (1990), the experience of World Bank projects shows that: (1) Community participation is appropriate when the objectives of the project are empowerment of the people and capacity building (2) Designing projects requires input of the beneficiaries to identify their needs. (3) The implementation of projects requires frequent dialogue and negotiations among beneficiaries.
They also note that it is difficult to incorporate community participation into projects in the presence of: (1) absence of tradition supportive of community participation (2) Inadequate technology (3) Beneficiaries perceive donor or government as satisfactory source of implementation (4) Donor or government refuses to build community participation project into design.
Examples of community participation-oriented projects according to Paul (1987) are: (1) First Indonesian population and family planning projects (2) Bangladesh population project (3) Indonesian nutrition project (4) Tamil Nadu nutrition project (5) Dominican Republic population and health project.
COMMUNITY MANAGEMENT concept on the other hand is the ‘’end’’ of the process—community participation. It is a resultant effect of successful community participation. It can

be said that community participation is the ''parent'' and ''fore-runner'' of community management. The community has to be involved in a project from stages of design, planning, implementation to evaluation, acquire required organizational and managerial skills before it can manage the project through assumption of responsibility, authority and control. Community management therefore is synonymous with sustainability and maintenance after community participation objectives of capacity building and empowerment in the presence of decision level of intensity. McCommon et al (1990) opine that community participation concept is the process by which beneficiary is involved in developmental activities whereas community management concept implies capability and willingness to take charge and determine the development affecting the community by the community. This concept is applied in community water and sanitation projects and stands on the tripod of responsibility, authority and control. They further aver that participation refers that the community performs routine operational tasks under a predefined system by an external agency whereas management implies that in addition the community levies tariff schedules and institutionalizes its own form of fee collection.

There are ten preconditions for the concept of community management to occur and remain. They are: (1) Community demand for improved system (2) Required information for the community to make informed decision (3)Technology and services must meet community's needs and ability to finance, manage and maintain them (4) Understanding of options by the community and willingness to maximize their use (5) Willingness of the community to invest in capital and recurrent costs.(6) Community empowerment to control the system (7) Presence of institutional capacity to manage the system's development and operation (8) Policy framework to permit and support the community. (9) Availability of human resources to run the projects (10) Availability of effective external support services from donor or government.

Community management concept is made up five levels and they include: Level 1 which is the baseline for the community. The donor or the government plays the major roles here in the development, operation and the maintenance of the system even though the community may be consulted.

Level 2 implies that the community has somewhat level of capacity to manage even though it is still below average. Most water and sanitation projects that have social and promotional components fall into this level. Here the donor or government retains the responsibility,

authority and control over most aspect of the system development and the community acts in a subordinate and supportive manner.

Level 3 is the stage that the collaborative relationship between the community and the donor or government has taken shape. Participation takes place at this level management. The donor agency or government delegates sufficient authority and control encourages the community to take a joint responsibility for development, operation and management to achieve empowerment and capacity building objectives.

Level 4 is the stage where the community has had above average empowerment, skills and capacity to manage the project and the donor agency or the government technically and financially supports the community.

At level 5 the beneficiary community takes full control, responsibility and authority of the running of the system and the donor or the government becomes the enabler to ensure that all the resources needed are in place.

Examples of community management orientated projects according to McCommon et al (1990) are: (1) From Pump to People --Sierra Leone (2) Community Training for Problem Solving—Togo (3) Community Participation Through Organisation-Malawi (4) Provision of Water through NGO Activities—Guatemala (5) Promoting Demand for Sanitation—Philippines (6) community Management from the Start—Kenya (7) Community Management Without Direct Participation—United States of America.

In summary, the concepts of community participation and management according to WHO (1996) are after effects of International Drinking Water Supply and Sanitation Decade (IDWSSD), 1981-1990. The summation of the two concepts according to McCommon et al (1990) is called community involvement.

McCommon et al (1990) & WHO (1996) opine that community management is assumption of responsibility, authority and control of a facility by a community whereas WHO (1996) refers community participation as an active role a beneficiary community plays in affairs concerning it through sharing and exercising political and economic power.

According to Bamberger (1986) community participation can be divided into two, organisational development and indigenous participation whereas Whyte & IDWSSD (1986) classified it into consultation, financial contribution by the community, self-help project by groups in the community, self-help project by the whole community, community specialized workers, mass action, collective behaviour change, autonomous community project,

approach to self sufficiency and endogenous development. McCommon et al (1990) opine that community participation is made up of feasible combinations of five objectives, four levels of intensity and three instruments. Higher community participation objectives combine with higher levels of intensity and instruments and vice versa.
Community management is not a process but an end which occurs when the beneficiary community has acquired organisational and managerial skills. McCommon et al (1990) & WHO (1996) say that community management is assumption of responsibility, authority and control of a facility or a project by a beneficial community. There are ten preconditions that must be met before community management can take effect. Community management has five levels, level 1 is the lowest and level five is the highest.

Commented [I2]: Good use of in-text citation

QUESTION 3: Give five maintenance problems and difficulties. How can you overcome maintenance difficulties in water supply system management?
ANSWER: OxfordDictionaries.com (2018) defines maintenance as (1) ''process of preserving a condition or situation or state of being preserved'' (2) '' Process of keeping something in good condition'' From above definitions one can safely reframe above questions as: Give five problems and difficulties in preservation of water supply system management. How can you overcome preservation difficulties in water system management?
Maintenance according to Arloroff et al (1987) can be community, donor or government managed. Sometimes it can be a mixture of community and donor or government managed Water system is all the different materials put together for purpose of lifting water from source to consumers— pipes, taps, pumps. For the sake of this question, pump (handpump) maintenance difficulties and problems will be concentrated upon since its absence, malfunctioning or breakdown can impair the functionality of other parts of the system. Pump is often the part that wears and tears affect most and maintaining and keeping it in working condition is surrounded with problems and difficulties which may be institutional or technical. According to UNICEF (1999), most of the failures in water supply projects are due to maintenance issues over a long term of which institutional are greater than technical problems.
Five main maintenance problems are: (1) Centralization of maintenance (2) Lack of skill (3) Lack of spare parts and tools (4) Lack of funds (5) Choice of unsuitable technology. Problems 1—4 are called institutional and problem 5 is technical.

Centralization of pump maintenance according to Arlosoroff et al (1987) results to long response time, paucity of spare parts for pumps and vehicles and poor service satisfaction due to low budgets, inadequate management and poor workers' motivation. In few cases centralization is effective, it is expensive.

Lack of maintenance and management skills are causing the failure of the water system. Pump technology is foreign to third world where it is being used and lack of technology transfer, community participation and management make it hard for the beneficiary community to learn how repair even the least problem.

Even when the user community has the basic skill to repair a minor pump fault it may be let down by lack spare parts and tools due to lack of fund to purchase them or the delay caused because they are to be imported.

Choice of unsuitable technology according to UNICEF (1999), leads to maintenance difficulties and problems. Handpumps are not always suitable for heavy use which they are put to in communal facilities.

Maintenance difficulties in water system supply can be overcome by concept of village level operation and maintenance (VLOM). According to Arlsorrof et al (1987), developing countries' government have realised the disadvantages of centralization of maintenance and embraced VLOM. The authors further aver that VLOM is the strong involvement of the user community in the maintenance of the pump since experience has shown that centralized system of maintenance requires operation vehicles and crew to move out from a base camp to repair and keep pumps in working conditions. The large capital outlay required for this exercise has proven unsustainable. VLOM though is a better alternative to centralized maintenance model, can only work when: (1) The pumps are easily maintained by a village caretaker that requires minimal skills and few tools (2) Pumps are locally manufactured so as to ensure availability of spare parts (3) pumps are field tested and assured of robustness and reliability (4) Cost effectiveness

Another panacea to maintenance difficulties is the introduction of community participation as well as community management early in the project—consultation of the user community to know their priority and choice, design, plan, execute, monitor and evaluate based on their choice and priority.

Maintenance difficulties can be ameliorated by factoring in the costs of establishment, operation and maintenance in the design of the project and discuss them with user community.

To minimize the difficulties of maintenance occasioned by wrong technological choice, UNICEF (1999) advices that selection and procurement of pumps should be based on maximum standardization on one or a small number of types that are strong, fit for local condition, simple and maintenance can be undertaken by user community members with minimum tools and training. National quality assurance and inspection modalities should be established in all countries with large number of handpump programmes using international standard and quality control procedures to ensure a consistent level of quality in the handpumps used in the water supply programmes.

Other maintenance management difficulty mitigating acts are adequate training of the selected members of the user community on maintenance by the donor or the government and to encourage the user community to imbibe the spirit of ownership and share part of the maintenance cost.

Local production of the spare parts if possible and when not possible ordering the spare part ahead of time and removal of bureaucratic bottle-neck will go a long way to cushion maintenance management difficulties.

In summary maintenance problems and difficulties are, centralization, lack of skills, lack tools and spare parts and paucity of funds. Maintenance management difficulties can be overcome by concept of VLOM, early introduction of community participation and management, standardization and narrowing of national pump choice to one or two, adequate training of the user community by government or donor on maintenance, local manufacturing of spare parts or ordering of spare part ahead of time when local production is not possible.

Commented [I3]: This is good

QUESTION 4: What are water technologies available in your area? Explain five

ANSWER: Technology according to Collins Dictionary (2018) is the method, system, and device which is the result of scientific knowledge being employed for practical purpose. Water technologies are those scientific knowledges employed in extraction, lifting, treating, conveying, storing and distribution of water from the source to man for consumption in appealing and acceptable form.

The water technologies in my area are of various types according to the geographical location, hydrogeology and terrain. For the purpose of this write-up I will list them under extractive, pump, storage and distribution and treatment.

A: Extractive technologies; Roof catchment, Spring-box, Hand digging(well), Hand drilling (well), cable tool rig, and rotary rig.

B: Pump technologies: Handpump (lift), Diesel and Petrol pumps, and Electric pumps (submersible)

C: Storage and Distribution; Poly Vinyl Chloride pipes, High Density Polyethylene pipes and tanks.

D: Treatment; Chlorine, Boiling, Sand filters.

Explanation of five of above technologies are thus:

Roof Catchment Technology: This the type of technology employed in the northern part of my country where there is no surface water body or the surface water is polluted or the underground water is deep or not enough to be extracted for public use. In Enugu City this technology is also in use.

The technology consists of guttering aluminium sheets fitted to edges of roofing sheets of the house. The guttering sheets are connected together into a big funnel in which a sieve is fitted. The big funnel is connected to large-bore polyvinylchloride (PVC) pipes that are in-turn connected to high density polyethylene thank or underground tank from which the water is drawn. In some cases, for those who can afford it the water can be pumped into an over-head tank and be distributed in the house with pipe-system by gravity.

The technology depends on abundance of rain to function. In my country there is enough rainfall and the technology is working

Hand Digging of Wells: This technology is widely used in the southern part of my country because the water table is shallow and static water level (SWL) does not change.

The technology involves digging a circular hole 1—1.5 metres diameter with pick-axe and bailing out the soil with shovel until certain depth is reached where shovel-assisted bailing is no longer possible. At this depth bucket and pulley system will be used until the underground water level is reached –25 to 40m. To make the working easier and speedier at the proximity of the water table, electric pumping machine is used to bail the water to the surface. On getting to the water table level, stacks of pre-formed circular concrete casts of

about 1-1.3 meter are lowered into the well with the help of pulley system and winch or manually using ropes.

The concrete rings protect the well from collapsing and muddling the water when using buckets to bail water for use.

After lowering the concrete rings, filtration bed made with sharp sand and washed river stones is lowered to form the base of the well. Concrete head-wall and apron are built around the mouth of the well and covered with concrete circular slab.

Water is fetched with aluminium pail to which rope is attached or connected to winch.

The advantages of this technology are, cheapness in capital, operation and maintenance costs, use of local labour and materials, community ownership enhancement and enhanced level of service.

The downsides are, danger to the workers, easy to be polluted, danger to public especially the children and can result to deaths and injuries from accidental fall into the well if not closed, suitable for only soft and semi-hard geological formations and areas with high underground water level.

Spring-Box: This simple basic technology is vastly used in my area because of abundance of springs and artesian wells in our hilly topography for protecting the water source from contamination and to increase yield.

This technology consists of building a rectangular or square concrete box around the spring or artesian well. The size of the box depends on the yield, the space around the spring and the level of service. The collector pipe that connects the spring and the box is fenestrated and equipped with filter. The floor of the box is covered with washed river gravel and overflow pipe is installed to control pressure when the box is filled. An aperture is made on the roof and closed with slab as an entrance for cleaning and repair of the box. A wall and channels are made around the box to prevent erosion encroachment on the foundation of the box and to prevent weakening the foundation from run-off water from the box.

The spring box can serve as reservoir from which water can be piped to homes by gravity or connected to storage tank with tap or standpipes for public use.

Pump Technology: Electric pump (submersible) is a dynamic type of pump which is popular in Nigeria because of extensive use of water bore-hole system for both commercial and private purposes. It is a kind of pump that works when submerged in water. A pump according to All-pumps (2016) is a device which moves fluids mechanically from one place to

another. According to Grundfos (2018) there are two types of submersible pumps: (1) Submerged pump with submerged motor, (2) Submerged pump with dry motor whose motor is connected to the pump by long shaft.

Submersible pump is a unit comprising of a motor and a pump connected to a riser pipe with non-return valve.

After required depth of borehole is dug, casing with the sand and gravel filters installed, the submersible and its riser pipe are lowered into the casing with high tensile nylon cord which anchors the pump to installation pit cover on the surface. Care must be taken to ensure that the pump does not touch the casing of the borehole and the draw-down should not be below the pump—the difference between the static water level (SWL) and dynamic water level (DWL). The power to the motor is fed through water-tight cable that is connected to the power source.

When the power is switched on the motor revs and the pump comes on lifting water at a great speed into the over-head storage tank from where all the connected points are supplied by gravity.

Advantages of submersible pump are: (1) Easy to use and operate (2) Can haul large volume of water in a short time (3) Depth of the well is never a barrier (4) It can be used to pump water for large population.

Disadvantages are: (1) Large capital, operation and maintenance outlay (2) It cannot work in places without steady power or additional cost will be needed to power it with generator. (3) It may be useless in places where draw- down is below the lowest point of the pump.

Tank (Storage) Technology: This technology comes in different forms -metal, aluminium, concrete and plastic. The aluminium and metal types are more expensive and later can easily corrode. The plastic type is cheaper and readily available whereas the concrete version is outdated. For the purpose of this discussion I will dwell on plastic tanks

Tanks are needed in situations where the water is pumped from deep boreholes, when many people are to be served, in emergencies when water is tankered, as a component of roof catchment system, and as water-security storage in places that depend on commercial tankers for water supply.

Plastic tanks come in different sizes—250L, 500L. 1000L, 5000L, 10000L. The volume of the tank to be used depends on the level of service intended and finance. The available tanks are made from medium density polyethylene (MDPE) or high-density polyethylene (HDPE).

Tanks are usually placed on an elevated platform and water pumped in with the electric pump. The water in the tank then flows to the connected areas via gravity.
Advantages of tanks are: (1) Water is brought closer to people and there is increased use (2) They improve water security (3) Increase in quantity of water used improves hygiene and health.
The down side is that it requires large capital outlay for procurement
In summary the water technologies in my area are (1) Extractive technology—Spring-box, roof catchment, hand dug and drill well technique, mechanised borehole rig (2) Pump technologies—handpump, electric pumps, diesel and petrol pumps (3) Storage and distribution technology—PVC and MDPE pipes, tanks (4) Treatment technology—chlorine, sand filters and boiling.

Commented [I4]: Good

QUESTION 5: How do you ensure cost effectiveness in water supply?
ANSWER: Cost effectiveness according to Paul (1987) refers to degree a project meets it objective in relation to its cost.
Water being source of life and major resource for good health and sanitation, its extraction, treatment and supply projects need to be done in cost effective way. For supply of water to be cost effective, variables that affect cost will have to be examined. Such variables according UNICEF (1999) are as follow: (1) Technology choice (2) level of service (3) labour and cost of materials (4) Accessibility and water source (5) Efficiency and cost effectiveness of project management (6) Community management (7) Involvement of women.
It further states that cost variations between water supply interventions in a region and successful cost reductions in individual project show that cost effectiveness can improve if appropriate measures are introduced. The measures to ensure cost effectiveness of water supply are thus: (1) Good system management (2) Capacity building (3) Institution of community management and women participation (4) Good technical and logistical consideration (5) Local sourcing of materials, manufacturing of equipment and spare parts (6) Tariff reduction (7) Efficient use local contractors.
Good system management: A system is the total sum of the constituents. The water project system constitutes of planning, purchasing of materials and labour, hydrogeological survey, choice of water source, consultation of the beneficiary community and integrating their view in planning, organisation of the project, implementation, monitoring, evaluation and

factoring in running and maintenance costs. If above issues are properly co-ordinated and the labour, equipment and materials can be sourced locally with improved productivity, cost effectiveness can be achieved. Any nation that can do this will have cost effective water supply.

Capacity building: According to FOA (2018) capacity building refers to enhancing the knowledge and skills of individuals whose work results majorly depends on the performance of the organizations which they work. If the knowledge and skills of these individuals are improved the output of the organisation will improve. According to Paul (1987) capacity building is effort aimed at strengthening the skills and knowledge of beneficiary community so as to take on responsibilities for managing segment of the project themselves. He states further that World Bank in most of its water projects did not lay emphasis on empowerment and capacity building hence the results were mixture of failure and success.

If beneficiary community's capacity is enhanced it leads to effectiveness and sustainability.

Institution of community management and women participation: Factoring in community responsibility, authority and control of the project in its design and contractual agreement as well as accommodating women who are the major users and fetchers of water will lead to cost effectiveness.

Technical and logistical consideration: In water project, the highest problems are the drilling operation and drilling success rate. Correct hydrogeological survey, correct choice of drilling equipment and movement of the rig will lead to cost effectiveness. Proper hydrogeological survey, will lead to correct choice of equipment and faster movement of the rigs. Improper survey is the major cause of many government water programmes failure according to UNICEF (1999)

Timely availability of materials, especially the imported items via advance planning will improve cost effectiveness. Reduction in equipment downtime and provision of back-up will also enhance cost effectiveness and productivity.

Local sourcing of materials, manufacturing of equipment and spare parts: Local sourcing, manufacturing of equipment and spare parts will bring down the cost of the project and speed up the completion. It will also impact positively on the operation and maintenance costs and the cost effectiveness.

Tariff reduction and cancellation: Reduction or cancellation of tariff on imported water project materials will automatically reduce the cost of the project and improve its cost effectiveness.

Efficient use of local contractors: The use of local contractors will improve cost effectiveness , turnaround time, local pride and confidence. For this to happen, conducive environment has to be created for people to invest knowing that they will have return on their investment because of huge capital outlay required. The market size has to there also to improve the economics of scale.

In summary cost effectiveness in water supply can be ensured through good system management, capacity building, instituting community management and women participation, enhancing technical and logistical considerations, improving local manufacturing of materials, equipment and spare parts, reduction and cancellation of tariffs and use of local contractors.

Commented [I5]: Well explained

References

1.McCommon C, Warner D, & Yohalem D (1990) Community management of water rural water supply and sanitation services: Water and Sanitation Programme discussion paper series; no.4 World Bank, Washington DC. Retrieved from http://documents.worldbank.org/curated/en/174491468780008395/Community-management-of-rural-water-supply-and-sanitation-services

2.World Health Organisation (1996) Community management of rural water supply and sanitation systems points for practitioners, World Health Organisation Regional Office for Africa, Brazzaville, Congo. Retrieved from http://www.ircwash.org/sites/default/file/205.1-96CO.13904.pdf

3.World Health Organisation. Community Water Supply and Sanitation Unit (1987) The International Drinking Water Supply and Sanitation Decade: Review of mid-Decade progress, WHO, Geneva Switzerland. Retrieved from http://www.who.int/iris/handle/10665/61566

4. United Nation Children's Emergency Fund (1999) A Water Handbook: Water, Environment and Sanitation Technical Guideline Series-No.2. UNICEF, United Nations Plaza TA-26A, New York, NY 10017)

5.Nigam A (1996) Towards Sustainable Financing of Water Supply and Sanitation Through Community Based Management of the Water Environment, UNICEF United Nations Plaza, TA-26A, New Year NY 10017

6.McGarry M (1991) Water Supply and Sanitation in 1990s, Water International Vol.16, pp 153—160

7.Korten D (1987) Community Management Asian experiences and perspectives, Kumarian Press

8.Paul S (1987) Community participation in developing project: The World Bank discussion papers; no. WDP6 Washington DC. Retrieved from http://documents.worldbank.org/curated/en/850911-468766244486/Community-participation-in-development-projects-the-World-Bank-experience

9.Dictionary Unabridged (2018) Define Power at Dictionary .com, Random House Inc. Retrieved from http://www.dictionary.com/browse/powder

10.Bamberger M (1986) The Role of Community Participation in Development, Planning and Management: Economic Development Institute of World Bank; An EDI policy seminar report no.13 Washington DC. Retrieved from http://documents.worldbank.org/curated/en/605351468739506877/pdf/multi-page.pdf

11.White A & IDWSSD (1986) Guidelines for planning community participation activities in water supply and sanitation projects: WHO offset publication; no.96, Geneva. Retrieved from http://www.who.int/iris/handle/10665/40445

12.Arlosoroff S, Tschanneri G, et al (1987) Community Water Supply: The handpump option, The World Bank Washington DC. Retrieved from http://documents.worldbank.org/curated/en/299321468765272889/Community-water-supply-the-handpump-option

13.Oxford Dictionary (2018) Definitions of maintenance in English, Oxford University Press Retrieved from http://enoxforddictionaries.com/definition/maintenance

14.Collins Advanced English Dictionary (2018) Definition of technology, HarperCollins Publishers. Retrieved from http://collinsdictionary.com/dictionary/english/technology

15.All_Pumps (2016) Classification of Pumps, 100 Silverwater Road Silverwater NSW 2128 Australia. Retrieved fromhttp://www.allpumps.com.au

16.Grundfos2018() Submersible pump—clear water, Poul Due Jensens Vej 7 DK-8850 Bjerringbro, Denmark. Retrieved from http://www.grundfos.com/service-support/encyclopaedia-search/submersible-pump-clean-water html

17.Food and Agricultural Organisation (2018) Our Vision: FAO Capacity Development, Rome Italy

Commented [I6]: Good but use more academic sources

section	
comments	● This is good work ● Use more academic sources for referencing
Total score	**88/100**