Civil and Environmental Research
ISSN 2224-5790 (Paper) ISSN 2225-0514 (Online)
Vol.8, No.4, 2016

Determinants of Household Participation in Water Source Management in Ethiopia

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Abstract
Access to safe drinking water supplies and sanitation services in Ethiopia are among the lowest in Sub-Saharan Africa. While governmental and non- governmental organizations have been implementing water supply and sanitation projects in recent years, many fail shortly after construction due improper management. In this review I examine socio-economic, institutional and exogenous factors which affect households' participation in the management of water sources. The results show that households' demand for sustainable water services are positively affected by users' participation during the project design and implementation, advocacy provided by the project and greater household income. Thus, for drinking water systems to be sustainable these factors should be included in planning water supply projects.

Abbreviations

ADF	African Development Fund
CSA	Central Statistical Agency
DRA	Demand Responsive Approach
ETB	Ethiopian Birr
EWSSS	Ethiopia Water Supply and Sewage Service
IWRM	Integrated Water Resource Management
MDGs	Millennium Development Goals
MoWRs	Ministry of Water Resources
NAS	National Academy of Science
ORDE	Organization for Rehabilitation and Development in Ethiopia
WAE	Water Aid Ethiopia
WHO	World Health Organization
WUCs	Water use committees

1. Introduction

1.1. Background

Ethiopia has abundant water resources. It is estimated that per capita renewable fresh water resources total 1,924 m3 year-1. The exact groundwater potential of the country is unknown, but it has been estimated to be approximately 2.6 billion m3 (ADF, 2005). Despite this abundance, many Ethiopian people have suffered from a lack of access to safe drinking water for centuries. The majority of drinking water sources in rural Ethiopia are still rivers, streams, hand-dug wells, and intermittent springs, none of which are protected from flooding or livestock, wildlife, and human contamination. As open-air defecation continues to be a culturally and socially accepted practice in nearly all rural and semi-urban areas, solid and liquid wastes accumulate at drainage gullies and along riversides, dangerously affecting the quality of the drinking water. A poor household have limited awareness of water quality concerns and often neither considers nor utilizes treatment options when using water from these unprotected sources. Health conditions of people directly affect the socio-economic affairs of individual households (Mintene*t al., 2002*).

Despite many years of development efforts, access to safe water supplies and sanitation services in the world continues to be extremely marginal. Over 1.2 billion people worldwide (Klawitter and Qazzaz, 2005); the majorities living in developing nations, particularly in sub-Saharan Africa, still do not have access to clean water facilities. The national safe water coverage of Ethiopia is among the lowest in sub-Saharan Africa. As of 2004, the national coverage of Ethiopia was estimated at only 36.7%, with a rural coverage, 24.2 % and urban coverage about 82.5% (ADF, 2005).

As part of the solution to the lack of coverage, governmental, non- governmental, international and local organizations from all over the world have tried to promote safe water supply and sanitation programs for many year. In the Oromiya region, for example, about 35% of the rural water systems are not properly functioning at this time (WAE, 2008). ADF (2005) predicts that by the end of 2015, about 26,300 hand-dug wells, and 18,900 protected springs will be developed in Ethiopia. If the current trends are allowed to continue, a minimum of 15,820 rural water facilities will be completely non-functional which significantly lowers the effective coverage. Gleitsmann (2005) suggested that sustainability of water supply systems is dependent upon the degree to which the technology corresponds to the needs of the users and the users' ability and willingness to

maintain and protect it over time. According to Harvey and Reed (2006), low sustainability rates are related to community issues such as limited demand, perceived lack of ownership, limited community education, and limited sustainability of community management structures, such as water use committees (WUCs).

The participation of communities based on their willingness to contribute increases effectiveness, efficiency, empowerment, equity, coverage and the overall sustainability of water supply projects. Community members' contributions might take the form of money, labour, material, equipment, or participation in project-related decision-making and meetings (Bhandari*et al., 2007*; Mengesha*et al., 2002*).

Although the Ministry of Water Resources (MoWRs), along with the support of many international and local organizations, is actively involved at the grassroots level to improve the situation, clean water supply coverage is still in its infancy in many parts of this country, particularly in rural areas, where 84% of the population lives (ADF, 2005). The ongoing efforts, which are measured based on the performance in achieving short term objectives need to be re-engineered to raise their output by 2000% to meet the water and sanitation Millennium Development Goals (MDGs) by 2015 (WAE, 2008). The topography of Ethiopia is characterized by rugged terrain, and women often are forced to travel long distances, requiring several hours round-trip, walking up and down steep inclines while carrying large containers full of water on their backs. These containers with full water can weigh up to 65 kilograms. The duration of waiting time at the water sources to collect water is also overly lengthy (Mengesha*et al., 2002*)

1.2. Justification Of seminar

1.2.1. Statement Problem

Lack of access to safe and clean water is locked in the heart of the poverty. Even though the issue of water is observed as a general problem for both the urban and the rural population, women breathe greatest burden because of their social gender roles including collecting water for their households (Rose, 2009).Because of their task of water provision at the households, women and children suffer from disease, have limited participation in education, and both income generating activities and engagement in cultural and political issues are often compromised.

Several studies have been carried out to analyze people's perception and attitude about the drinking water source quality and accessibility. Creating good community awareness about water source management issues and the associated problems like sanitation and hygiene services is important to alleviate health effects but it remains below the expected rate of coverage

By the year 2015, the national water supply and sanitation program under its millennium development goal planned to increase the coverage of water supply and sanitation by 64% and 54% respectively. It has been said that the chances of achieving the Millennium Development Goal of halving the proportion of people without access to safe water by 2015 will be seriously lowered unless levels of sustainability can be greatly improved (Haysom, 2006; Harvey *et.al,* 2007).

1.2.2. Significance of seminar

The purpose of this review is to assess household water use practices, household-level determinants of water use, communities' attitudes towards water safety, and the benefits of safe local water supply.

The status of selected rural water supply structures, institutional approaches followed to enhance the sustainability of water facilities, and community contributions for water source protection and maintenance, and its determinants. Understanding these aspects of rural water supply systems and generating useful knowledge base can give an insight into developing a useful strategy that can potentially address large scale non-sustainability of newly installed water facilities in developing countries, including Ethiopia. And it also prepare me for writing research paper

1.3. Objective of the seminar

1.3.1. General Objective

- ✓ The general objective of this seminar is to review the community participation and determinants of house hold participation in water source management in Ethiopia.

1.3.2. Specific objective

- ✓ To review on the source of water that are used for house hold
- ✓ To review on major problems or factors related to household water use in the Ethiopia
- ✓ To examine the socio-economic characteristics of a household in relation to the conserve for water.

2. Determinants of Household in Water Source Management in Ethiopia

2.1. Definition of water

Water can be termed as an essential environmental resource. From an anthropogenic perspective, its most important role lies in human sustenance. Human utilize water directly for many purpose; municipal water supply, sanitation, irrigation, transportation, industrial water supply, energy generation (hydroelectric) and recreation.

Water plays an absolutely necessary and irreplaceable role in many ecosystem services, such as habitat creation, nutrient cycling, the hydrological cycle and climate regulation (Butler and Fayyaz, 2006).

2.2. Sources of water for human consumption

Although water covers about 70% of the earth, less than 1% is available as fresh water for human use. The vast majority of the water is found in the ocean, too salty to drink and unfit for many other applications. Of the fresh water available on earth about 2/3rd is frozen in ice capes and galleries, which leaves only a small fraction accessible for human use. There are two major sources of fresh water, surface and ground water. (NAS, 2009)

a) **Surface water**: it is a primary source for human who includes river, lake, stream and fresh water wet land. Surface water is naturally replenished by perception and naturally lost through discharge to the oceans, evaporation and sub-surface seepage. Although the only natural input to any surface water system is perception within its water shed, the total quality of water in that system at any given time is dependent on many other factors. These factors include storage capacity in lakes, wetlands and artificial reservoirs. Human activities have devastating impact on these factors. They increase storage capacity by constructing reservoirs and decrease it by draining wet lands.

b) **Ground water**: It is the second largest sources of fresh water. This is water that lay under the surface. It exists almost everywhere in the world. In some places, however people have to dig much deeper to access it than other places .In some places, it might be accessible but it might not be healthy for human consumption, if it is not treated. The level of ground water is supplied, in part, by precipitation when rain falls it sinks down in to the ground. It is often collected in aquifers, which are natural water storage compartment formed between the rocks under the surface

2.3. Factors affecting household for water consumption

2.3.1. Physical and demographic factors

One of the factors, which affect the use of water within each household, is the physical distance of housing units from the water point. It is widely known that distance involved in fetching water is inversely related to per capital consumption of water. Large distance involves considerable energy and time expenditure, which limits the frequency of fetching and the size of containers and hence reduces the per capital daily water consumption. (Teshome, 2007)

A study made by (Mesert, 2012). In Simde district in Ethiopia suggest that the per capita water use is negative and significantly determined by the distance of water source from the households (i.e. keeping other factors constant, as the distance of water source from a household increases, the per capita water use significantly decreases. This implies that water facilities should be accessible to all segments of the population to better satisfy daily water requirement of residents. It also shows that convince of location of water source is a significant determinant of water use at household level. This means that households located nearer to water source are likely to use more than others located farther away.

In dealing with the demographic factors like age and sex, Dessalegn (2012) suggest that a one unit increase in age (one year) the daily per capita consumption decreases. It terms of sex female headed households will have lower per capita daily water consumption than the male headed households.

2.3.2. Socio-economic factors

Among the enormous socio-economic factor that affect household waters consumption pattern the most significant one's are household size, household income, and level of education, monthly expenditure of a household and profession of a household head.

Household size and level of education

When there is an increase in household size, the probability of collecting more water for large household size than individual household. As a result there is a positive relationship between household size and total consumption. However the per capita water consumption decreases with an increase in household size. When considering the supply necessary to meet the needs of large family, there is a problem of access and adequacy .This implies that there is a negative relationship between household size and per capita daily water consumption.(mesert.2012).

Further investigation of review shows that as household size increases, the amount of water used per day significantly decreases this suggest that, although larger households increase the frequency of travel per day to water sources, they still are not able to increase the available water at the house hold enough to satisfy the daily requirement of their individual hose hold members. The significant decrease in per capita daily water use because of additional household members might be explained by the fact that available water at house hold level is limited by the factor such as distance and waiting time at the water source. Thus additional members share this limited amount, clearly reducing per capital daily water use (Aschlew, 2009)

As indicated by Teshome (2007), the educational level of a house head is positively related with the per capita daily water consumption. Households with less educated head consume less water than a house hold

whose head is more educated. This is because the higher the educational level of ahead of family, the higher the awareness about the benefits that could be gained from water.

Household's income and monthly expenditure

A study made by Teshome (2007), revealed that there is a positive relationship between monthly income and per capital daily water consumption. This result confirms with economic theory which states that an individual's demand for a particular commodity depends on his/her income and quantity demanded are positively related, except in the case of inferior goods. The result of the survey shows that higher income groups have higher per capital daily water consumption than lower income group.

According to Dessalegn (2012), monthly expenditure of a house hold was found to have a positive relation with the per capita daily water consumption of house hold because family members of better household are more likely to have frequent bath, showering, frequent washes of cloth and more water for cooking as compared with worse off house hold taking in to consideration the household life style and sanitation preference of better- off house hold.

Sources of water and housing characteristics

Factor like the size of the house and access to appliance like shower, both rooms, washing machines also influence water demand. It is evidenced that house owner ship is likely to increase household's decision to have private piped connection as a primary source of water and is likely to increase the daily per capital water consumption. Primary sources of water like private pipe users have 9 liter more daily per capital water consumption than households who use other sources of water

2.4. Household Water Use Practices

In rural area Over 66% of the surveyed households depend entirely on the improved sources developed by ORDE to provide water for household purposes, stating that they do not have alternative sources in their proximity. Less than 30% report that they have one or two additional alternatives in their vicinity. In most rural area the considerable labor involved in water collection is almost exclusively done by women and children. Only 6 % of the husbands are responsible for collecting water. This clearly shows that gender plays a significant role in domestic water management. Household's report that individuals responsible for fetching water, mostly women, travel to the water sources on average three times a day to collect water. ADF (2005) indicated that women in rural areas often travel long distances to collect water, accounting for two to six hours per day. The report further states that this exposes women to "all sorts of hazards". As the amount of time spent on water collection increases, women's involvement in other economically beneficial activities significantly decreases. For the majority of the villages, rules are enforced by the WUCs that limit the quantity of water allocated for each household per day based on the household size.

A regression was run to examine the household-level determinants of water use such as, convenience of location, family size and waiting time at the water source .The result suggests that wealthier families use more water per day and the amount of water collected by households is positively correlated to family size, and waiting time at the water source has a negative impact on water use. It also shows that that convenience of location of the water source is also a significant determinant of water use at household level. This means that those households located nearer to the water source are likely to use water more than others located farther away.

2.5. Determinants of total household water use per day at household level Determinants

WHO limit that, if a household has the six family members, is located 0.43 kilometers away from the water source, and the waiting time at source is 25 minutes, then the per capita water consumption is reduced to about 11.6 liters per day. It is clearly observed that the per capita water use is negatively and significantly determined by the distance of water source from household (i.e., keeping other factors constant, as the distance of a water source from the household increases by a kilometer, the per capita water use significantly decreases by 6.2 litters). This implies that water facilities should be as accessible as possible to all segments of the population to better satisfy daily water requirements of individual residents. This also reduces children's and women's burden of work and saves time spent for collecting water. The time saved may allow children to properly attend school, and women to be engaged in other productive activities that lead to better living standards of households (ADF, 2005).

2.6. Use of Water from the Sources for Livestock Watering and Micro-scale Irrigation

While the fundamental priority of water use from the improved water sources is for human consumption, at many of the protected springs, the taps are used not only for domestic water needs. Cattle troughs are constructed as well for animal watering. In Ethiopia most of rural areas a water source designed considering the needs for the rural livelihoods in addition to the domestic water demands by the households. The natural water sources in the rural area, such as rivers, are seasonal and livestock do not have adequate water access during the dry season. Hence, households use the cattle troughs at water sources to water their livestock. Very recently, attempts have

also been made to link water supply to income-generating activities such as in horticultural development. The WUCs in the rural Ethiopia have enforced regulations that require households using water for irrigation to safeguard the water source by turns. Thus, that the additional benefits involve additional responsibility, which address the equity of water access, as a number of other households do not have water access for irrigation Davis, J. &Liyer, P. (2002).

Literature on rural water supply shows that water supplies can potentially be built to provide a range of services beyond the domestic supply as noted above. These are usually termed as "multiple-use water supply systems". Multiple-use water supply services are intended to meet the domestic and productive demands of the poor in more comprehensive manner. If appropriately planned, designed and managed, they have a much greater potential to reduce poverty, to lesson health hazards and to circumvent livelihood vulnerability of rural households. They can also facilitate gender equity, cost recovery, and hence sustainability of the water facilities (Fontein, 2007).

Clearly, efforts are underway in the villages to promote integrated water resource management that focuses on sustainable water resource development and efficient use of water on an equitable basis. This underscores an increasing recognition of water as economic and social good, which, in part, is behind the current moves toward more proficient use through integrated management between competing demands and livelihoods. Because these efforts are carried out at different levels in the observed water facilities, water for multiple-uses seems to depend on the capacity (quantity) of water supply and geographical location of the water sources (Sutton, 2005).

2.7. Households' Attitude towards Water Quality

In Ethiopia, many rural areas of Households' perceptions about water quality indicate that knowledge about quality is somewhat limited. About 38% of the participants mention that 'clean water' is water free from harmful pathogens and chemical toxicity, whereas 41% of the respondents report that 'clarity to the eyes' is the sole indicator of safety. 12% and 8%, respectively, explain that 'test and odor' and 'being piped' are indicators of water quality. Accordingly, 59% of the respondents believe that the water from their source is 'safe' or 'highly safe' for them for all household purposes. Respondents who believe that the water from their source is not safe mention that the cause is flood waters entering into the tank (31%), which suggests that environmental mitigation such as flood protection, drainage canals and catchments rehabilitation are underlying concerns of the households. About 8% believe that the cause of poor quality is livestock contamination, indicating that well-built fencing and full-time caretaking are required. About 16% report that there have been one or two incidences of waterborne diseases during the last 12 months within their individual household(WHO,2005).

A significant number of respondents believe that the incidence of illness has significantly decreased after the construction of the water sources. To compare the safety perceptions of the households towards water from their sources to its scientific quality, and to examine the technical quality of water from the sources, a laboratory testing was carried out on selected drinking water quality parameters. The results depict that important elements for chemical quality of water from all the sample sources are under the World Health Organization (WHO) guideline values.(Kleemeier, 2000; Biswas, 2005)

However, the bacteriological results show that four sources have 4, 5, 6 and 8 total coliform colonies per 100 milliliters exceeding the WHO standards, which do not allow any fecal or total colonies in drinking water. The results indicate that rural households in the study area have fair knowledge, judgment and water quality perceptions of improved water supply sources. The majority of respondents store collected water in a big jar made of clay which is washed and smoked beforehand. Only 3% of the households boil water as a treatment. A significant percentage of households believe that adequate protection of the water sources improves the quality of the water from the sources. (Gleitsmann, 2005)

2.8. Household Contributions of Cash and Labor for the Protection and Maintenance of Water Sources and Its Determinants

Although safe water coverage in rural areas (of developing countries) is very limited, the cost of investment in water projects and their operation and maintenance is getting sufficiently high that governments, donors and implementing organizations can no longer afford them all (Kleemeier, 2000; Biswas, 2005). One of the daunting(to discourage) challenges in the water supply sector is securing resources to manage and maintain frequently breaking water facilities and keeping the water sources operating in a sustainable manner. In part as a solution to this phenomenon, and for two other additional reasons, project- implementing organizations require at least operation and maintenance costs to be covered by user households. The first justification is often stated as "management at the lowest appropriate level", which assumes management by the beneficiaries is easier and logical, and the other perspective treats water as "economic good" for which people should be willing and able to pay. In contrast, other international water policies and water management strategies conceptualize water as a renewable resource that is a free gift of nature to all human beings (Bhandari*et al.*, 2007).

However, its utilization entails cost in terms of access, storage and management. Approaches that endorse management of rural water supply sources by user communities are generally known as "community management" (Schouten and Moriarty, 2003; Steve and Khan, 2004).

Community management is a management theory that advocates DRA based on the principle that demand for improved and sustained water services induces the involvement of beneficiaries, and this in turn reduces entailed cost in terms of initial capital outlay as well as costs of operation and maintenance. These approaches also better target the real needs of communities by incorporating indigenous knowledge at the grassroots level. They also aim at building local capacity in extending and replicating the existing services (Kleemeier, 2000).

The household head gender has a negative relationship with both cash payments and labor contributions but is not significant based on the conventional statistics. This is different from the initial proposition that women would participate more in water source management through cash and labor contributions (Khan, 2004).

It is more likely that they have other priorities than paying or working for water source management, which seeks their voluntary participation (although this effect should be at least somewhat controlled by the income variable). Likewise, the age of household head appears to have an insignificant and negative relationship with both cash and labor contributions. Household head educational level is insignificantly associated with cash payments, and labour contributions, contrary to the initial assumptions. Furthermore, household size has a negative impact on cash payments but a positive with the labor contributions. This seems reasonable, as households with large family size are concentrated more within low-resource categories (ADF, 2005).

However, the reason for the latter case could be that bigger households can easily afford labor for water source management as they have enough for farming and other productive activities. Total household income also influences the payment of cash and provision of labor, both with positive signs, as expected. This result is consistent with basic economic theory, which states that individual's demand for most commodities or services depends on income (Mbata, 2006). This also implies that poor households may not make payment for water a priority, as they may have to make choices to spend their limited financial resources for subsistence needs. The parameter value for advocacy provided was also a significant factor for the labor contributions with the positive sign as expected, but not on cash contributions. This suggests that advocacy to create awareness about the opportunities in promoting protection and maintenance of water sources is an important component of the support framework as it positively affects the households' motivation to provide labor for water source management.

The number of alternative water sources in close proximity also influenced the payment of cash by the households at high significance level, and has the expected negative sign. This suggests that the existence of alternative water sources such as rivers, undeveloped springs and home-made wells decreases households' willingness to make cash payments for sustained water services. However, at the same time, it significantly and positively increases the labor contributions. This implies that an increasing presence of alternative water sources in a village decreases cash and increases labor which would be available for water source protection and maintenance, and hence one offsets the other. Thus, further and detailed research is required to clearly determine the effect of alternative water sources in water source sustainability (Mbata, 2006).

The households' level of trust in water use committees influences significantly the cash payments with a positive sign, as expected. This tells us that households with high level of trust in water use committees that the money raised would be used for the intended purpose contributes more. Convenience of location of the water sources is found to have a positive but insignificant impact on both cash and labor contributions. The regression results also indicate that incidence of water born diseases has a positive but insignificant relationship with both contributions. This finding supports the view that households do not link the quality of water from improved sources with the incidence of water-borne diseases. Thus, more educational efforts may be required to better utilize the effect of this parameter on the sustainability issues. The level of household participation during the service establishment phase is significantly associated with the variations of both the cash payments and the labor contributions across households. The coefficients demonstrate the expected positive signs. This finding suggests that incorporation of households in early phases of the project cycle will have a positive implication for future sustainability outcomes.

3. Conclusions and Recommendations

3.1. Conclusion

This review has been undertaken to help further understanding of the complex nature of rural water supply issues such as water use practices, attitudes towards drinking water quality, the technical quality of water from improved water sources, the status of improved water facilities, and institutional approaches followed to enhance the sustainability of these facilities. Further, it has tried to identify the leading determinants of household participation in managing their water supply sources and recommend possible solutions to the large-scale breakdown of water supply sources in Ethiopia.

Water quality analysis from sample sources was also carried out. The results brought forth the

following major findings. Gender plays significant role in household water management. Water use at the household level is positively and significantly determined by household size and convenience of location. The observed outcomes also suggest that wealthier families use more water per day, and water use has a negative relationship with waiting time at the water source (i.e., higher water use means less waiting time at the source). These results suggest that water sources need to be located within a reasonable distance to all beneficiaries and additional facilities may also be constructed to reduce the waiting time at the sources to better satisfy daily domestic water requirements. Decreasing the waiting time at the water sources will provide more time for women to be engaged in other (productive) activities.

Household perceptions about water quality were found to be somewhat informed. Nearly 38% mentioned that 'clean water' is water free from harmful pathogens and chemical toxicity, and 41 % report that clarity to the eyes is the sole indicator of safety. Following this, about three-fifths of the respondents believe that the water from their source is 'safe' or 'highly safe' for all household purposes. To test this belief of the households, a laboratory water quality analysis was carried out on selected and important drinking water quality parameters. The chemical and bacteriological quality analysis of sample water sources depict that the chemical quality of all the water from all sample sources, and the bacteriological quality of water from the half are under WHO standard values. This result suggests that rural communities have somewhat accurate knowledge, judgment, and water quality perceptions of improved water supply sources.

Increasing efforts on community water education enhances households' awareness about water quality issues. Teaching them to differentiate the 'actual' from the 'perceived' quality of water and helping them to realize the benefits of improved water management can ensure better participation in water source management initiatives. Considering the fact that some the sources have some total coliform colonies, it is apparent that efforts are necessary to improve the safety of water from the sources. This can be made through the use of source disinfection mechanisms such as chlorination or point-of-use disinfection mechanisms such as boiling to decrease the bacteriological health hazards. Complete non-functionality and non-protection of water sources were not observed in any of the sample water sources. Among those functioning with some breakdowns, the majority had exhibited disrepairs of the faucets and valves, which can easily be repaired. Additionally, three-fourths of the surroundings of water sources were characterized as 'not neat at all'. This clearly reduces the safety of the water and increases health hazards when this can easily be remedied through adequate water source protection and management. Catchments rehabilitation was done around the surroundings of less than half of the water sources.

Although there was a fairly good level of functionality, it does not seem likely that the existing efforts are up to the required level to enhance the sustainability of improved water services for the community. Thus, more concerted strategies must be formulated to achieve long-term participation of households to ensure satisfactory water services of adequate quantity and acceptable quality. The estimated annual contributions indicate that the amounts currently provided on average by the households are not likely to be sufficient for adequate management of the water sources.

3.2. Recommendation

From the preceding review it is clear that the yield of the water source and pipeline network is not enough to satisfy the needs of the community. This and related factors invite under idea help to recommend ways and means of improving water supply system. Thus, the following measures should be taken in order to improve water consumption rate of the community of house hold.

- One of the problems of household water supply system is its frequent interruption. Thus, in order to solve the shortage of water, government should expand sustainable water supply project.
- It is better to construct dams as an additional source of water at the time of interruption. And also the quality of pipelines and boreholes should be rehabilitated
- One of the causes for low pre-capital water consumption is high price of tap water from water sellers. Most of the respondents suggest that the price charged by venders is fluctuating .Thus to provide adequate water to a large number of people at minimum cost, EWSS has to install additional public stand pipes.
- Since a positive relationship exists between educational level and water consumption, the EWSSS has to launch strong public awareness and orient the community on economical use of the available water supply. `

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