Value of improvements in Water Supply Reliability in Zanzibar Town

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Abstract

The rapid growth of Zanzibar Town and the worsening economic situation over the past two decades are putting significant strain on all social services and infrastructure. This includes the provision of water service to the town's inhabitants. In the past three decades the water supply situation in Zanzibar Town has been deteriorating. Both the quantity and quality of supplied water have decreased. Currently, the shortage of water for home and other uses is a chronic problem in the town. This shortage has resulted in and compounded other socio-economic issues and has contributed to other environmental problems. For example, Zanzibar has been experiencing cholera outbreaks each year since 1978, and cholera is associated with consumption of unclean water[1]. In a broader study, Thompson et al (2002) noted that "diarrhoea is the most important public health problem affected by water and sanitation in East Africa."

The situation of the water supply in Zanzibar is very similar to that of other developing countries (Lee 1994, Whittington 1996, Savedoff and Spiller 1999, Mujwahuzi 2002, Thompson et al 2002). For instance, it is comparable to the deterioration of water quality and the degeneration of water supply services in Colombo, Sri Lanka (Kurukulasuriya and Mendelsohn, 2001).

The water shortage and the drop in water quality in Zanzibar town have been caused and aggravated by multiple factors. These include an aged and poorly maintained water supply system, rapid urban expansion, limited natural supply sources, and the degradation of watersheds. The problems are further exacerbated by the current government policy of providing "free" water service to domestic water consumers and places of worship. The government has adopted this policy based on the premise that water is a human right and a necessity, that it should not be sold and bought as are other commodities. Furthermore the government argues that the majority of the town's inhabitants are too poor to afford the services. In addition, it is generally considered that it is the responsibility of the government to provide its citizens with water services.

[1] This connection is made without reference to any study that establishes a link between water shortage and environmental health in Zanzibar Town.

The policy has laudable intentions of providing the public with access to water at no or minimum costs. However, over time one of main outcomes of the policy has been the deterioration of the quality of the services provided. The water supply infrastructure is not maintained and has not been expanded partly because the government does not have enough funds to support the efficient management and delivery of water services. Also it is possible that the current policy is harming rather than helping the very society that it intends to assist. In fact, research has shown that in similar situations, such as in Haiti, the burden of coping with a deteriorating water system is often more acutely felt by the poorer households (Whittington 1991). It is clear that the government of Zanzibar - in spite of maintaining a policy of providing free water services – has no financial capability to support an efficiently and effectively functioning water supply system for the people of Zanzibar Town and Zanzibar as a whole.

This study is an attempt to establish the value of water supply services to the people of Zanzibar Town by measuring their Willingness to Pay (WTP) for reliable water supply services, so as to provide basis for change of the financing policy for water supply services management.

This study was conducted using the Contingent Valuation (CV) method; 300 people in Zanzibar Town were interviewed. The interview responses were then analyzed to establish the value of the water supply services to the town's inhabitants. The results of this study have shown that contrary to the government's belief, the people of Zanzibar Town put value in the water services that they receive. Thus, they are willing to pay for improved water services but will generally be reluctant to pay for the poor services that are currently being provided.

This study recommends that it is important that the government realize the fact that there is immediate need for asking the domestic consumers to financially support the management of the water supply system. The government should introduce a charge for water services so as funds can be raised to support the management of water services in Zanzibar Town. The result of this study indicates that the people are willing to pay for water services; thus, the government of Zanzibar should change its policy of "free water for everyone" and institute charges for the provision of water services.

Nevertheless, it is not clear whether a change of policy would result in improved water services because the existing government revenue collection structure is centralized and there is no guarantee that the funds that will be collected will be invested in water supply services. The tariff level and amount of revenue projected in this report may not reflect the real cost of running the town's water supply services. Even with these uncertainties the recommendations are made as a contribution in developing a realistic water service management policy. It is a contribution to starting a change of policies and perceptions of water services management. For these policy recommendations to work calls for the overhaul of water supply services management and administration.

Introduction

Background

In the past two decades the water supply situation in Zanzibar Town, along with other social services, has been deteriorating. The water shortage and drop in water quality in Zanzibar Town have been caused and aggravated by multiple factors. These include an aged and poorly maintained water supply system, rapid urban expansion, limited natural supply sources, and the degradation of watersheds. The level of services in the town is far from satisfactory. This unsatisfactory situation is attributed more to the poor condition of the distribution networks than to the inadequacy of the actual supply (DWD and FinnIDA, 1994).

The problems are further exacerbated by the current government policy of providing "free" water service to the general public for domestic use. In spite of the laudable intentions of the policy to provide the society with access to water at no or minimum costs, over time one of the main outcomes of the policy has been the deterioration of the quality of water supply services provided. The Zanzibar government has taken a populist political decision of not charging for water services. This policy is used as a political tool that is intended to let the people believe that the government cares for their welfare. On the other hand, it is a policy that is built upon the common argument that water is a natural resource and basic human requirement, and that people should not pay for its provision (Perry, Rock and Seckler 1997, Rogers et al 2002). This policy may also be due to the influence of Arab culture, which views water as a free and precious good to be made available to everyone (White et al 1972).

This last argument cannot be substantiated because in Zanzibar people paid for piped water before independence and up to 1980 when fees were abolished (Plancenter 1991, Mkonsult 1999). One additional fact that is overlooked in this policy is that piped water delivery is not a natural system. It is a man-made infrastructure that needs investment in financial and other resources to build, operate, maintain and sustain. The investments turn water into an economic good and not only a social service.

The policy of free water for all and of the government's resistance to charging for water services is not peculiar to Zanzibar. For example, a study in India found that people are willing to pay for improved water services, but the policy makers are unwilling to charge because they fear that people will not want to pay or are too poor to pay (UNDP 1999). However, wherever this policy has been adopted, the long-term result is policy failure that is manifested by service deterioration.

Due to policy failure it is clear that the water sector in Zanzibar is unsustainable and that the goal of free water for all is unattainable. This outcome is due to the fact that the government cannot afford to continue to subsidize the delivery of water services. Therefore, domestic consumers, who consume about 65% of all the produced piped water, must participate in maintaining and sustaining the operation of the water supply system by contributing the necessary financial resources for the servicing sector (M-konsult, 1999).

This study was conducted using Contingent Valuation (CV) method. Contingent Valuation surveys have been carried out for various purposes in different parts of the world. Some CVs have been done to understand methodological issues (e.g., Cummings et al 1986, Loomis et al 1989, Whittington et al 1992). The method has also been used to provide more understanding of policy and advice on policy decisions (FAO, 2000). This CV survey is concerned with providing recommendations that can be used as policy decisions. The survey was conducted in Zanzibar Town to measure the people’s willingness to pay for improvement in the reliability of water supply services. It is an attempt to contribute in efforts towards the development of a functioning, effective and efficient water supply services system in Zanzibar. This study is concerned with providing policy recommendations because it is clear that the water services provision problems in Zanzibar are largely due to the failure of the current policies.

The goal of this study is **to establish the value of water supply services to the people of Zanzibar Town by measuring their Willingness to Pay (WTP) for reliable water supply services, so as to provide basis for change of the financing policy for the provision of water supply services.**

There are many questions that must be answered when considering Zanzibar's water supply policy. These may include; who benefits from the current "free water" policy but limited water system maintenance? Would people benefit more if revenues from water were used to maintain the system? Would the people be willing to pay for a reliable and safe water supply? How much would they be willing to pay? If people are not willing to pay for municipal water, how do they propose that the investments to maintain and expand the system should be met? If they pay, would the fees generated cover the costs of the required investments? Will people be able to afford the tariffs to be charged? What kind of investment should be given priority? Should the priority be the rehabilitation of the current system? Or Expansion of the system to the areas that have no access to piped water? Or should the investment be a combination of both rehabilitation and expansion? What are alternative financing mechanisms?

This study is concerned with answering the question "Are people of Zanzibar Town willing to pay for improved water supply services?" so as to establish the value of the improvements of the water services provision in Zanzibar Town. In this study "improvements of water supply services" means "improvement in water availability reliability." "Reliability" means availability of water at a point of consumption (household or public stand-pipe) for 24 hrs a day, 7 days a week, 365 days a year.

Perspectives on water supply services Provision in Zanzibar

According to M-Konsult Ltd. (1999), piped water supply in Zanzibar - that today serves about 75% of the town's population - dates back to the 1920's with the development of Mtoni and Bububu springs. Utilization of Water services in Zanzibar used to be charged until 1982 when tariffs for domestic users were abolished. The abolition was adopted when the state of the economy had started to take a downward spiral and life was becoming harder for common people. Thus, the government adopted the policy so as to appease the populace. The

economy has continued to deteriorate and the provision of water services has continued to significantly worsen. Nonetheless, the government has continued with the policy even though it is clear that it suffers from a substantial shortage of funds. For example, in 1997/98 the Zanzibar government treasury released TSh 30 million only for development of water supply against the requirement of TSh 100 million (M-Konsult, 1999). This shortage of funds creates an inability to develop new sources for the increasing urban population, and hastens deterioration of the existing infrastructure. The water sector in Zanzibar is plagued with malaise common to many publicly managed utility organizations in the world. These include a low rate of cost recovery, low productivity, high debt burden, poor quality of service and low coverage (Fauconnier 1999).

Today, in Zanzibar the water services provision fulfills all the conditions of socially managed water services. The conditions include commitment to state ownership of the principal water services utilities, consideration of water as a fundamental right that households should have access without paying a price, creation of a department of water as a statutory organization, and non-metering of water that flows to households (Merret, 1997). As it has happened elsewhere in the world – for example Europe- the long-term subsidization of the water supply services has encouraged the perception that the basic water services are free services (OECD, 1989).

The social values upheld by the government overlook the contention that water is an economic good. While it is true that water is an essential social good, it also is an economic good because it is both scarce and has alternative uses (Perry, Rock & Seckler, 1997). Additionally Briscoe (1996) has stated that "water is an economic good because it has value to users, who are willing to pay for it." Thus water should be treated as social good only just as far as attaining basic level of services; beyond that, additional supplies should be allocated by market forces (Perry, Rock & Seckler, 1997). However, Roth (2001) argues that water should not be subjected to standard market force because it is a necessary good that has no possible substitute for its use.

This is to say that, yes; the Zanzibar government should be considerate to its populace but that it should also face the economic realities in the sustainable management of water supply services. Thus, careful consideration of both social responsibility and economic realities is needed in devising right policies. The government should realize that the best way to utilize

water to the best and most valued uses is to put a price on it, although, of course, tariff structure should meet a balance of local social, political and economic goals (Milliken, 1977; Rogers et al., 2002).

Though the government is not charging for water services, a substantial number of water consumers in Zanzibar Town already incur costs in accessing water for household use. The kinds and magnitude of costs incurred vary from one household to another and by seasons. The variations are influenced by several factors that include household location, wealth, and volume of consumption. The costs include investment in electric water pumps and paying water vendors. The existence of water vendors in the service provision system in Zanzibar is comparable to what is happening in other cities in Africa where water vendors coexist with the publicly owned water department or private concessionaire (Collingnon and Vẻzina 2000). The vendors resell the piped water by delivering it to households by carts, bicycles or other means (Whittington et al., 1989). Most water that is sold by the vendors is collected from public standpipes, but some vendors get their water from households with piped water connections or wells. In addition, some residents dig private wells or construct catchment facilities as an alternative to obtaining piped water (Noll, Shirley &Cowan, 2000).

Another manifestation of people's investment in the water services is the formation of cooperatives to drill and manage bore holes, a Zanzibar example being Sebleni Muungano Sogea (SEMUSO) co-operative. Community members from localities of Sebleni, Muungano and Sogea formed the cooperative to alleviate the water shortage in their locality after they had suffered long-term water shortage. All these patterns of responses should send a clear message to the government that there is a significant failure of policies that govern the town's water supply services.

The water services management situation in Zanzibar today is in crisis. The situation can be described as an example of the common conflicts within the urban water supply sector in many developing countries (Lee, 1994). The conflicts include financial constraints versus the desire for improved infrastructure; the need for cost recovery versus the desire to provide free services. Where the available financial resources are meager, the conflicts are manifested in the form of resources allocation competition between the need for system expansion versus maintenance and operation of the existing system (Lee, 1994).

This crisis situation can be described by a phenomenon known as "Low-level Equilibria." As described by Savedoff and Spiller (1999), the phenomenon is attained when water prices are kept low or non-existent (as is the case in Zanzibar), when government funding is limited and when service coverage is low and all the interested stakeholders do not want to change their positions. While the situation described by Savedoff and Spiller (1999) is for Latin American countries, it fits very well with the current situation in Zanzibar where government opportunism has lead to the near-collapse of the water service provision.

The long-term continuation of this condition has significant economic, social, and environmental costs, most of which are already faced by Zanzibar Town inhabitants. For example, people in different localities spend substantial amounts of time every day searching for water, time that would otherwise be used productively elsewhere. The Zanzibar government should take bold steps to move out of this "Low-level Equilibria" trap. Among the measures recommended by Savedoff and Spiller (1999) include:

- Government discretion should be limited in price setting.
- Water resource management organization should have financial and managerial autonomy.
- Functioning regulatory mechanism should be in place.

The fact that the water service management in the town is faced with all the above discussed problems is a major indicator that countrywide the sector is suffering from many problems. Currently many water projects in the country significantly depend upon financial aid from foreign countries. The government should, therefore, build a strategy to get out of this long-term dependence on other nations to support the most basic of the services that a country – or a town as in this case - should be able to deliver to its citizens. Water pricing is one major solution to get out of this perennial dependence on other nations.

Water consumption Projections in Zanzibar

Water demand for Zanzibar Municipality will increase from 30,000 m^3 per day in 1995 to 90,000 m^3 per day in 2015 (Abdallah, 1994). However, most households get only intermittent supply or none at all for some days. The water production capability has been worsening with time. This can be explained by the fact that the total average daily production in Zanzibar

urban areas is about 20,500 m^3, though the capacity is rated at more than the required 30,000m^3 (M-Konsult, 1999). If Abdallah's (1994) projection is accurate, it is clear that Zanzibar is heading towards a very severe water crisis. That projection alone should be a cause for implementing measures that will ensure conservation and encourage people to value water resources. Two other reasons that should encourage wise use of water resources are, first, it is not clear from where the supply for this demand will come . Second, since Zanzibar Town's supply source is mostly ground water, it is important that this source is managed in sustainable manner[2].

[2] During this study I could not find information on aquifers content or estimates on volume of water withdrawals from the aquifers.

Theoretical Economic basis of this study

This study is based on the understanding of theoretical responses to basic economic principles related to the influence of price as well as the change in quality of services to change in consumer demand. The principles that underlie these concepts are, first, if positive price is introduced the demand (consumption) will be reduced. It is difficult, however, to estimate the magnitude of the fall in demand due to the price introduction. Second, an improvement in service provision will result in increased consumption. Similarly, the change is difficult to estimate. Thus, it is difficult to say with certainty the effects these factors will have on water consumers' response. At the moment the desire is both to improve the quality of water supply service by increasing the amount of water available and to introduce a positive price to water services delivery. It is uncertain what the resultant effects will be if this combination of measures is carried out.

Research Methodology

As has been explained elsewhere in this document, the value of water services in Zanzibar Town was estimated by using Contingent Valuation (CV) method to measure willingness to pay (WTP). Domestic water consumers were asked questions on their willingness to pay for water services.

> *CV is a survey-based stated preference methodology that provides respondents the opportunity to make an economic decision concerning the relevant non-market good. Values for the good are then inferred from the induced economic decision. In CV individual respondents are asked hypothetical questions about how much would they be willing to pay to access a resource or goods* (Carson et al., 2001).

This method has been used widely in estimating hypothetical goods or services and has received widespread attention in economic literature (Cameron, 1987; Whittington, 1992; World Bank, 1999; Kurukulasuriya and Mendelsohn, 2001).

The households mean Willingness to Pay (WTP) is the variable of interest that is calculated from the CV method. To calculate the mean WTP, the sample average is the best (i.e., lower variance estimator) (FAO, 2000). However, this requires that data be following normal distribution (FAO, 2000). Unfortunately, in many CV studies - including this one - the WTP distribution is not normal. In these circumstances, then, the maximum likelihood estimate (MLE) of mean WTP is more statistically efficient (FAO, 2000). Nevertheless, to use the MLE method requires that WTP distribution be specified. However, some researchers have developed ways to estimate mean WTP without the constraint of a given distribution (Giraud et al., 2001; Haab & McConnel, 1997; Creel & Loomis, 1997; Creel, 1995, Kristrom, 1990; Turnbull, 1976). Besides, Giraud et al, (2001) argue that there is no single clearly superior method to compute WTP estimates from discrete response, which means that, variations notwithstanding, several of the methodologies that have been used will give a reasonable WTP estimate. In this study a sample mean WTP is calculated from all respondents who have expressed their willingness to pay and revealed their value for the water services.

The internal validity of the WTP can be checked by regressing WTP on income, vector of prices faced by individual (household), and alternative quality of good or services (FAO, 2000). The regression is used to show that WTP correlates in predictable ways with socio-economic variables (FAO, 2000)..

WTP responses are then statistically analyzed to obtain an estimate of mean WTP, which is multiplied by (N) the size of the population affected by the proposed policy. Total WTP can then be compared with the cost of implementation of the policy to determine whether the proposed policy passes a benefit cost test (FAO, 2000).

As a result of the inherent weakness of CV, it has been suggested that the method used to elicit willingness to pay is crucial (Kurukulasuriya, 2001). According to Cameron and James (1987), there are three different approaches to asking the CV questions. The differences in approaches emanate from response elicitation methods. Thus, the naming of the approaches is based on the method used to ask questions. Hence we have:

- Open ended (discrete choice method), where the respondents are simply asked to name the sum they are willing to pay.

- Sequential bids (referendum or dichotomous choice), where respondents are asked whether or not they would pay or accept some specified sum (the question is then repeated using a higher or lower amount, depending on the initial response).
- Close ended, where the respondents are asked whether or not they would pay a single predetermined amount. In this approach the sum is varied across respondents.

It has been suggested that the open-ended question approach can only be used as a pilot tool to establish appropriate bidding figures to be used in other approaches (Cameron & Quiggin, 1994; Sal-Salazar &Garcia-Menendez, 2001). Similarly, Whittington et al., (1990) and FAO (2000) have argued in favor of the dichotomous choice method. In the same vein while arguing for the strength of referendum type of elicitation, NOAA panel opinionated that "open-ended questions are unlikely to provide most reliable valuations" (Arrow et al., 1993).

In spite of these contentions, this study elicited responses by using the open-ended question. This method was selected because of resource limitations. It was not possible to run a pilot survey large enough to provide the appropriate bidding figure and then conduct another survey for the actual data collection. The respondents were asked what they would pay for water supply services at the current service level and what they would pay if the services were to be improved.

Strengths and Weaknesses of CV method

It is not the intention of this study to analyze the methodological issues of the CV method. However, it is useful to highlight some strengths and weaknesses, as well as controversies, of the method. The intention here is to provide basic understanding and appreciation of the limitation of the methodology to readers of this report.

Like many other research methodologies CV has its strengths and weaknesses. In this section some of the strengths and weaknesses are briefly discussed. Detailed discussions of these can be found in Carson & Mitchell (1994), Carson et al. (1996), FAO (2000) and Carson et al. (2001).

Strengths (Advantages)

Contingent Valuation method is preferred because of its rigorous theoretical basis. Among the advantages of the method include the fact that:

- It is based on actual face-to-face surveys. Thus they provide proof that consumers are willing to pay for better services. It can measure WTP in a range of scenarios, the output of which can be incorporated into technical and financial plans for future augmentation. Since it uses hypothetical scenarios, it can provide WTP even for the systems that do not currently exists (UNDP, 1999).

- CV method is flexible; that facilitates valuation of a wide variety of non-market goods, including those not currently provided (Carson et al., 2001).

- Contingent valuation remains the only technique capable of placing value on commodities that have large non-use component of value, and when improvements to be valued are outside of the range of valuable data (FAO. 2000). In recent years several agencies have taken CV method as a means of assessing the demand for improvement of water supply among other uses (FAO. 2000).

- Contingent valuation method is the most popular method for estimating the benefits provided by public and non-market goods (Saz-Salazar & Garcia-Menendez, 2001). It is a hypothetical method based on the information people reveal when asked directly about the value of a particular public good studied (Carson and Mitchell, 1994; Saz-Salazar & Garcia-Menendez, 2001). The CV method can be used to support a political decision that directly affects the provision of public good (*ex ante valuation*).

Disadvantages or Inherent weakness of Contingent valuation

In spite of the advantages, the CV method has been criticized, and even among proponents of the methodology it is recognized that the method has its weaknesses. For example, CV has been challenged that it does not conform to economic theories (Carson et al., 1996). Some of these weaknesses are briefly narrated below:

- The CV method is based on stated preference and not revealed preference. This fact then leads to a question of truthful statement (revelation) of preferences. When a consumer

responds to a CV questions and states his/her preference or willingness to pay, it usually is not certain that he/she will actually pay the stated amount for the goods or services in question (Carson et al., 2001; Hartwick & Olewiler, 1998). It has been argued that the quality of stated preference data is inferior to observing revealed preference, thus the CV method is highly flawed (FAO, 2000). This flaw can be avoided by clearly explaining to respondent the good or service to be valued, how it will be delivered to the public, and what are realistic expectations of payment (Carson et al., 2001).

- CV surveys are considered complex, time consuming and expensive to implement (Carson et al., 2001).

- Two major limitations which CV shares with other neo-classical preference based approaches to economic value are: (a.) WTP measures are inherently limited by the wealth of a respondent; (b.) Preference of the future generation is not explicitly considered.

- CV surveys are vulnerable to the warm glow effect. The warm glow effect is a form of interviewer bias. It occurs if a respondent in a CV survey attempts to please an interviewer by agreeing to pay some amount when he or she would not do so otherwise, except for the utility gain associated with telling the interviewer (Carson et al., 2001).

- It is frequently claimed that familiarity with a good is a necessary prerequisite to providing "meaningful responses" to CV questions. Personal experience or familiarity is a factor in the decision-making process when consumers make use of related experiences in making choices. Therefore, CV survey designers need to ensure that prospective consumers understand what they are being asked to value, how it will be provided, and how it will be paid for (Mitchell and Carson, 1989; Whittington et al., 1990). This message should be clear to all respondents regardless of their variation in life experience and educational background (Mitchell and Carson, 1989).

- It has been argued that CV is a scope-insensitive methodology, in that it does not address the effect of change in the quantity of goods or services offered to the willingness of respondents to pay for the services. This has been disproved (Carson et al., 2001).

Careful study design and implementation can resolve many of the alleged problems with the CV methods (Carson et al., 2001). In spite of the weaknesses, objective and readily identifiable criteria are available by which the quality of CV study can be judged (Carson et al., 2001).

Study Site

The Island of Zanzibar is situated between latitudes 5º 40' and 6º 30' and longitude 39º East. It is about 85km (53 miles) long and at its broadest point it is 39 km (24 miles) wide. Its area is about 1660 km^2 (640 square miles)[3].

Administratively, Zanzibar is subdivided into three regions: North, South and Urban/West. This study was conducted in Zanzibar Town, which is in the Urban district of the Urban/West Region. The district is further subdivided into thirty Shehias. Shehia are the smallest administrative subdivision in any of the Zanzibar district. In this study ten Shehias were sampled. The Shehias were Nyerere, Mwembemakumbi, Jang'ombe, Chumbuni, Rahaleo, Kilimani, Kwahani, Malindi, Shangani and Amani. The distribution of selected Shehias were aimed at covering a geographical cross section of the district, to capture the variation in magnitude of the impact of water services problems and by implication variation in people's affluence. Each Shehia is further subdivided in a number of enumeration areas. Enumeration areas are subdivisions that apportion Shehias into population census tracts.

Study Units

In this study the primary study unit is a household. It is estimated that Zanzibar Town has 32,000 households. The data for this study were gathered from a sample survey of 300 households (0.94 % of the town's households). To get that sample, in each shehia -regardless of shehia size - 30 households were randomly picked and interviewed. It was ensured that each enumeration area in each of the shehia was represented in the survey. This was important in order to gain variability in responses. In some incidences, however, the locality leaders (Shehas) who were the point of entry to the community would insist that we get a balance of representatives from members of different political parties. This may have reduced the randomness of the sample because the households were targeted based on their political affiliation. However, this limitation is not expected to affect the study results. The interviewees were either heads of households or spouses. Ideally the study targeted a person who manages household finances. Unfortunately this was not always possible. However all

[3] http://www.allaboutzanzibar.com/indepth/ecology/01-geography/id-01-03-geography.htm

the interviewees were mature people who have significant responsibility and knowledge in household affairs, including finances.

Interview approach

The interview approach used was in-person on a one-on-one basis, with the aid of a questionnaire (Appendix 1). This was deemed appropriate due to several limitations of other approaches in developing countries, which include low literacy and low level of telephone ownership (FAO, 2000). Nonetheless, in-person interviews are generally used to produce highest quality WTP data (FAO, 2000). The questions were asked in such away that the respondents were given full responsibility and freedom to decide on the value and provision of other information (Open ended).

The questions asked in the questionnaire can be grouped into three sets:

i. Socioeconomic and demographic characteristics of the household,
ii. Characteristics of the current water source and availability, and
iii. The attitude of the household in paying for water services.

Data Analysis

Analysis of the data was carried out at three levels. First, the socio-economic and demographic data were summarized. Second, the mean willingness to pay was calculated; and third, the WTP values were regressed against the household demographic and socio-economic variables to gain understanding of the influence of the variables on WTP.

This study implements maximum likelihood estimate (MLE) and ordinary least square (OLS) regression models to statistically estimate the influence (determinants) of different household socio-economic and other variables on the household decision on WTP and the appropriate amount that consumers are willing to pay for water services. The probit model (MLE) to evaluate the effect of several variables on a household response to the binary question of whether the household is WTP or not for each scenario is applied (Cameron and James, 1987). The OLS model is used to evaluate the effect of the socioeconomic variables on the

continuous variable. In this study the continuous variable is the amount households are willing to pay.

RESULTS

The results of the study are presented here in three major components. The first component is the summary of household demography and socioeconomic situation, the second is the presentation of the willingness to pay, and the third is regression of WTP against selected demographic and socioeconomic factors of households.

Household Demography and Socio-economic Status

Gender

As is shown in Table 1 according to this survey 47 % of respondents were males and 53% percent were females. This is in spite of the fact that only 22 % are female-headed households and male-headed households are 78 %. The reason could be that a good number of women in Zanzibar are housewives and that is the reason that the number of female respondents is higher than male.

Table 1: Gender of Respondents and Heads of Households

GENDER OF REPONDENTS	FREQ	PERCENT (%)	HEAD OF HOUSEHOLD	FREQ.	PERCENT (%)
Male	141	47	Male	235	78
Female	159	53	Female	65	22
Total	300	100	Total	300	100

Household size

According to this survey mean household size is seven people. However, the range of number of people in households is wide; it is between 1 person to 20 persons per household.

Employment

On employment the analyses of the survey data shows that 59 % of head of households are employed as salaried labor and the other 41 % are either self employed or have no employment. Those without employment include retired people and the elderly.

Income

Although only 209 revealed their income, the majority of the respondents are low-income earners. Table 2 shows that 40 % of respondents earn an average of TSh. 15,000 which means they earn TSh. 30000 ($30) or less per month, 46 % earn TSh. 60,000 ($60) or less per month. The remaining 14 % average monthly earning of TSh 90,000 and above. It was not possible to get actual household incomes because most of the respondents did not want to reveal their exact income figures.

Table 2: Household income by categories

INCOME CATEGORIES	FREQ.	PERCENT (%)
0- 30,000	84	40
30000 - 60000	97	46
60,000 - 120,000	27	13
120000 +	1	1
Total	209	100

Education

It was found that about 79 % of the head of sampled households population are literate and have at least seven years of schooling; the remaining 21% are illiterate or have had one year of schooling or less. These results are summarized in table 3.

Table 3: Years in schooling as a proxy measure of level of education attained.

Education (Years in school)	Frequency	Percent (%)
0	62	21
7 - 10	96	32
11 - 14	134	44
15 +	8	3

Total	**300**	**100**

Water Problems

Looking at water problems, this study found that 90 % of households have experienced water problems of one kind or the other. These include erratic supply, no water from the desired point of consumption, and regular but inadequate flow. Only 10 % of the households consider themselves not to have any water supply problems. It should be noted, however, that the households that have reported not to have any problems either have wells or large water storage facilities within their households. These results compare with other observations within the region. For example, Thompson et al., (2001) while studying water management issues in East Africa found out that the reliability of piped water system has declined significantly over the last three decades.

Since most people have experienced water problems with water availability at the point of consumption, an attempt was made to find out the magnitude of the problem. Table 4 summarizes the problem. Only 21 % of the respondents said that they receive water for seven days a week. Out of these only nine percent receive water for between 15 and 24 hours a day. More than 85 % have experienced shortages of various types and magnitude.

Table 4: Comparison of Water Availability in a week

	Hours of Water Availability per day							
Water Availability days per week	No Problem (% response)	1 - 5 hrs (% response)	5 - 10 hrs (% response)	10 -15 hrs (% response)	15 – 24 hrs (% response)	No response (% response)	Do not know (% response)	Total %
No Problem	20.7	0.0	0.0	0.0	0.0	0.0	0.0	**20.7**
1	0.0	4.7	1.7	1.3	0.3	0.0	0.7	**8.7**
2	0.0	5.7	8.0	3.0	0.7	0.0	0.3	**17.7**
3	0.0	2.7	4.0	1.3	1.0	0.3	0.3	**9.7**
4	0.0	3.7	2.7	0.7	0.3	0.0	0.0	**7.3**
5	0.0	2.7	1.3	1.3	0.7	0.0	0.0	**6.0**
6	0.0	1.0	2.0	1.3	0.3	0.0	0.0	**4.7**
7	0.0	4.3	4.3	4.0	9.0	0.0	0.0	**21.7**
I do not know	0.0	2.3	0.3	0.0	0.3	0.0	0.7	**3.7**
Total %	**20.7**	**27.0**	**24.3**	**13.0**	**12.7**	**0.3**	**2.0**	**100.0**

Household water consumption

Based on respondents' estimates, the mean daily consumption of water per household was calculated as 215 liters, table 5. Considering that on average a household has seven people, it can be deduced then that daily per capita consumption is about 30 liters. Since there are no water meters or other means to accurately record the actual household consumption, these daily consumption figures should be viewed as perceived amounts and should be used just as indicators of level of consumption.

Nonetheless, the per capita consumption in Zanzibar is low compared to per capita consumption in the nearest city (Dar es Salaam). Mujwahuzi (2001) found that per capita water consumption of piped water in Dar es Salaam is 80.2 liters. Even though Abdallah (1994) suggested that the daily consumption of 30 liters per capita is an amount within the "lifeline rate" of consumption (i.e., 25 – 40 liter per capita per day), the amount is below the United Nations's targeted absolute minimum of 50 liters per day (Gleick, 2000).

The consumption in Zanzibar could be improved if loss of piped water could be curbed through infrastructure improvement. Pricing would also be a useful tool to encourage water conservation and a way to generate funds to maintain the system (Koss &Khawaja, 2001; Rogers et al., 2002). As it has been discussed elsewhere in this report, the shortage of water in Zanzibar town is more due to an inefficient supply system than to the unavailability of water in its natural sources (M-Konsult,1999). This situation is common in developing countries. For example Lee (1994) reported that "about 50 % of the water that is treated and distributed at public expense in developing countries is unaccounted for by sales."

Table 5: Water consumption per household

Respondents (n)	Mean Daily consumption (Liter/hh)	Std. Dev	Minimum (liters)	Maximum (liters)
300	215.2	66.8	50	300

Willingness to Pay for Water Services

This part of the result is an outcome of the analysis of the response from the two main questions asked during the survey. Are people willing to pay for current service? Are they willing to pay for improved services? These results answer the major concern: Are people of Zanzibar Town willing to pay for water services? The answer is, yes; people are willing to

pay for reliable water supply services. However, they are willing to pay more for improved services than they are for current services level. As it can be seen in table 6 and table 7, the mean willingness to pay for current service level at TSh 1,322.50 ($1.50) per month[4] is lower than the mean WTP of TSh 1582.40 ($1.8) per month for improved services. In addition only 33 % of respondents agreed to pay for the current service level as opposed to 57 % who said that they are willing to pay for improved services. Figure 1 and figure 2 are the rendition of the distribution of WTP amount as was revealed by the respondents.

These results compare very well to those obtained by M-konsult (1999) when they analyzed potentials of introducing water tariffs in Zanzibar. They found that urban households in Zanzibar are willing to contribute to the improvement and bring water services to a functional level. The results of that survey showed that 61% of the respondents in Zanzibar town were willing to pay for water supply services. They recommended that the people should pay TSh 1000 – 1200 per month. This suggestion was based on the World Health Organization WHO and World Bank affordability criteria that a family should not spend more than 5 – 6 % of its income for water services (Merret, 1997; M-Konsult, 1999). The amount that respondents are willing to pay as established in this study (TSh 1582.40 per month) is equivalent to 5.3% of TSh. 30,000, the minimum monthly wage of a Zanzibar government employee. These findings are within the range that would be expected in similar situations. For instance FAO (2001) mentions that depending upon various factors, household water expenditure in developing countries ranges from 2 to 18 percent of household income.

[4] Exchange rate used: US $ 1 = TSh 1,000 (January 2003)

Table 6: Willingness to Pay for current service level

Respondents (n)	Percent of Respondents (%)	Mean WTP for Current Services (TSh/month)	Std Dev.	Minimum WTP (TSh/month)	Maximum WTP (TSh/month)
100	33.33	1322.5	1146.32	100	5000

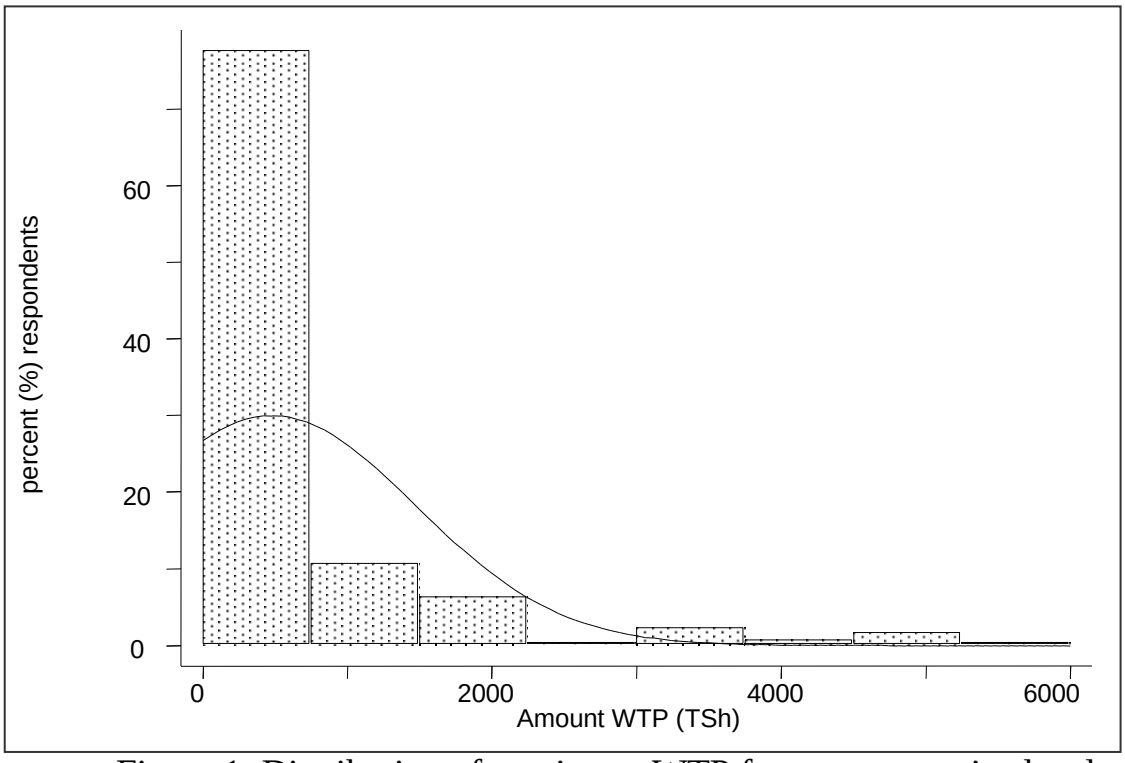

Figure 1: Distribution of maximum WTP for current service level

Table 7: WTP for improved services

Respondents (n)	Percent of Respondents (%)	Mean WTP for Improved Services (TSh/month)	Std Dev	Minimum WTP (TSh/month)	Maximum WTP (TSh/month)
173	57.7	1582.37	1216.19	100	6000

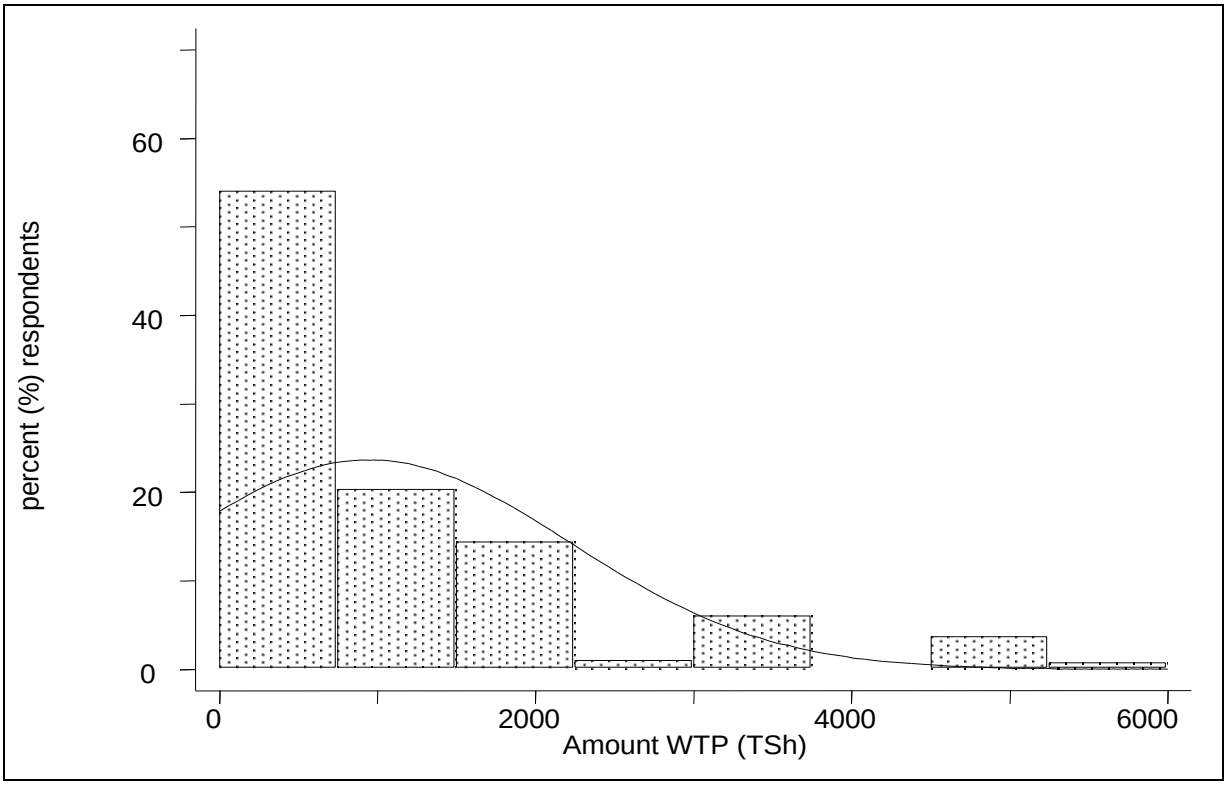

Figure 2: Distribution of maximum WTP for improved Services

Reasons for not willing to Pay

For various reasons a proportion of respondents in all CV analyses would refuse to pay for any amount for services or goods in question (Bradley et al., 1999). If the reasons for not paying are dissension regarding a procedural aspect of the CV, the response is called a protest response, which has to be censored from the collected data (Bradley et al., 1999). However, if a respondent refused to pay for mitigating reasons (e.g., too poor to pay) that is not a protest response. This is not a protest response because a respondent is giving an

answer based on his/her inability to pay and "money is not a perfect indicator of utility since some people have more of it than others" (Green and Tunstall, 1991).

Therefore, where respondents said that they are not willing to pay for water supply services, this study tried to find out why. This was intended to gauge the attitudes of individuals who are not willing to pay as to how they are influenced by the government policy of none payment for water services. While it cannot be directly determined as to how much the responses are affected by the policy, the answers given by respondents mostly fall within what is promulgated by the government policy. From the results of this study, we can say that only 6 % of respondents can be classified as a "protest zero." These are the ones who did not give any reasons or who are classified to have a given "other reasons" for not willing to pay. Since this number is small, it does not merit any further analysis and it was not censored from analysis as recommended by Bradley et al. (1999), but it is worthwhile to note that protest responses are potentially part of this survey. The bulk of zero responses in this study are not considered protest responses because they have given mitigating reasons for not willing to pay for the water services. Table 6 below summarizes the findings:

Table 8: Reasons for not willing to pay.

REASONS FOR NOT WTP	NUMBER OF RESPONDENTS	PERCENT (%)
Government Responsibility	38	32
Poor I can't afford	73	62
Other reasons	6	5
No reasons	1	1
Total	**118**	**100**

Regression analysis

To comprehend household decision making on the WTP for both the current service level and the improved service level as shown in Figure 1 and Figure 2, an Ordinary Least Square (OLS) and Maximum Likelihood Estimate (MLE) analyses were undertaken. The analyses were conducted to statistically comprehend how different households' demographic and socioeconomic factors have influenced household decisions on whether they are willing to pay or not and also how those factors influence households' decisions on how much they are willing to pay. The hypothesis that is being tested in these analyses is that a household's

socioeconomic factors and past investments in water services do influence household decisions on WTP.

This study collected several household demographic and socioeconomic factors as well as household water management information. Some of these factors are used in the analyses as variable to describe household decision, table 9.

Table 9: Description of Variable used in Regression Models

Variable	**Description**
Income	Household's average monthly income.
Payforwa	Past payment for water services**.**
Connecti	If household is connected to water pipeline services**.**
Dostore	Whether a household stores water in or around the house.
Timefetch	Time a household spends to fetch water form a water point.
Disfrsou	Distance from household to water source**.**
Hhsize	Household size.
Gender	Gender of respondent.
Educate	Education level of respondent.
Dayconsu	Average household water consumption.
Availpro	Whether household has experienced availability problem.

These variables are used because they were deemed most likely to contribute to and influence in household decision-making concerning finance and expenditure. The following is detailed explanation and reasons for inclusion of individual variables into the regression models:

To start with, **Income** is used because it is considered that the amount of money a household is willing to pay for water services will depend upon how much a household earn and what the household expenditures are. We are looking at the household's disposable income.

The variable **payforwa** is used in the analyses because it is assumed that the household's history of paying for water services will influence its decision on WTP. It is expected that a household that has a history of paying for the services will be more WTP than a household that has no history of paying for the services.

The variable **connecti** is used because it is assumed that those households that have invested in getting piped water into their households will be willing to pay more than those that have no connection in their households**.** Of course there is a link between whether a household has connection to the town's supply system and the household income, but the income and connection are treated separately since it is possible that other factors than money may influence the household decision to get connected or not.

The **dostore** factor is used in the analysis because it is potentially double-edged. On one hand, it can be a measure that if the household is ready to trade the discomfort of having bulk storage in the household for more reliable water supply that will flow in a tap. On the other hand, individuals with bulk storage may be willing to pay less for piped water because of the potential of storing water from other sources.

Time that a household uses to fetch water (**timefetch)** is incorporated in the model because it is an investment a household makes to get water; thus, it has monetary implication. This is expected to influence the model in terms of opportunity cost that a household would be willing to pay for reliable services so as to acquire time for other productive uses instead of water fetching activity.

The **disfrsou** is included in the model for similar reasons as the *timefetch***.** It is assumed that the longer the distance the less motivating for a household to follow water services. Thus a household that has to fetch water from longer distance will be more willing to pay for the water services than a household that has to cover a shorter or no distance to fetch water.

Furthermore, variable **hhsize** is incorporated in the model because household size has a direct effect on the amount of water that a household consumes. Depending upon age distribution and occupation of household members, it may also reflect household income. On the other hand, one may look at this factor as a size of labor that can be used to bring water to a household; thus, it may influence the WTP of a household.

The variable **gender** is included as a factor in the models because it is generally believed that where there is water shortage or water service reliability problems - as is the case in Zanzibar

- women take the heavy burden of collecting water for a household. It is thus expected that women have higher WTP then men. The models in this study attempt to verify this.

It is generally considered that households with higher education have higher awareness of the value of water resources; thus, they have higher WTP then less educated persons. Therefore, the variable **Educate** is a factor that is included in the models.

Average household water consumption (**dayconsu**) is another factor that is included in the model. This is because the households with higher water consumption will ideally have to spend more efforts to bring water to their households; thus, in times of shortage it would spend a lot more effort in fetching water. Thus, it is assumed that willingness to pay of households with higher daily consumption may be greater than willingness to pay of households with lower consumption.

Another factor that is included in the models is whether a household has experienced availability problems (**availpro**) or not – most of the respondents in this study have experienced water availability problems. It is assumed that if people have experienced water shortages, they will be willing to pay to alleviate the problems than if they had not experienced any problems. Alternatively, however, it is also possible that they may be very cautious and less confident in the promised reliability of piped water and may be willing to pay less.

Several attempts were made to fit eleven demographic and socioeconomic variables into the regression models and test for the significance of the variables in influencing household decision. The tests were made at 0.05 level of significance. The models that are tabulated in tables 10, 11, 12 and 13 are the best that could be constructed.

Table 10: Probit model estimates of Influence of household socio-economic variable on household decision on willingness to pay for current service level

Number of obs =	300
Pseudo R^2 =	0.1149

wtpcurr	Units	dF/dx	Coef.	Std. Err.	z	P>|z|
income	TSh/Months	0.000	0.000	0.000	-0.98	0.328
educate	Years	0.009	0.025	0.007	1.22	0.221

gender*	Male/Female	-0.005	-0.014	0.060	-0.08	0.933
hhsize	People in a hh	0.003	0.010	0.010	0.36	0.72
dayconsu	Liters/day	0.000	0.000	0.001	0.08	0.937
availpro*	Yes/No	-0.054	-0.156	0.100	-0.51	0.607
payforwa*	**Yes/No**	**0.183**	**0.517**	**0.057**	**3.19**	**0.001**
connecti*	**Yes/No**	**-0.244**	**-0.648**	**0.075**	**-3.31**	**0.001**
dostore*	Yes/No	-0.052	-0.142	0.137	-0.39	0.699
timefetc	**Hours/day**	**0.002**	**0.005**	**0.001**	**3.13**	**0.002**
disfrsou	Kilometres/day	-0.049	-0.138	0.079	-0.62	0.536

(*) dF/dx is for discrete change of dummy variable from 0 to 1
Z and P>|z| are the test of the underlying coefficient being 0
Bold = significant at p > 0.05

Table 10 presents results of probit analysis between household decision on WTP for the current service level and household socio-economic and demographic variables. The model summarized in the table is based on probit analysis. In this model the variables *payforwa*, *connecti* and *timefetch* are significantly correlated with the household decision to pay for the water at the current service level.

That is to say that these three factors have influence on the household decision to pay for water services. However, while *payforwa* and *timefetch* have positive coefficient, the *connecti* negatively correlated to the household decision to pay for water services. This means that if a household has a history of paying for water services, it will be more likely to pay for water services even at the current service level. Such a household is 18 % more likely - compared to a household that has never paid - to express a positive willingness to pay for water supply at the current level of services.

Similarly, if the household spends a lot of time to fetch water, it is more likely to be willing to pay for water services even at the current service level. The results may be interpreted thus: for every additional hour a household spends per day in fetching water, a household is 0.2 % more likely to express willingness to pay for water services at the current services level, as compared to household that spends fewer hours.

Contrarily, a household that is connected to piped water services is 24 % less likely to be willing to pay for water services at the current service level. This is a counterintuitive result. However, it may be explained by the fact that most people who have tap connection into their households may not have had experience of paying for water services because most of the houses in the newly expanding areas of the town were built in the past 20 years. It is within

that period when the water charges were abolished in Zanzibar. Alternatively, this may be explaining the frustration of the households that; in spite of their efforts and investments in bringing piped water into their households, they still do not get the services they desired. Besides, the result may be due to noises in the data.

Other tested factors have not shown any statistically significant influence on the household decision about willingness to pay for the current service level.

Table 11: Probit model estimates of Influence of household socio-economic variable on household decision willingness to pay for Improved Service level

Number of obs =	300
Pseudo R^2 =	0.0949

wtpimpr	Units	dF/dx	Coef.	Std. Err.	z	P>|z|
income	TSh/Months	0.000	0.000	0.000	0.92	0.356
educate	**Years**	**0.020**	**0.051**	**0.008**	**2.64**	**0.008**
gender*	Male/Female	-0.046	-0.118	0.063	-0.73	0.465
hhsize	People in a hh	0.011	0.028	0.010	1.07	0.282
dayconsu	Liters/day	-0.001	-0.002	0.001	-1.1	0.27
availpro*	**Yes/No**	**-0.280**	**-0.718**	**0.104**	**-2.53**	**0.011**
payforwa*	**Yes/No**	**0.118**	**0.306**	**0.060**	**1.94**	**0.053**
connecti*	Yes/No	-0.130	-0.344	0.072	-1.72	0.085
dostore*	Yes/No	0.031	0.079	0.141	0.22	0.825
timefetc	Hours/day	0.001	0.002	0.001	1.51	0.131
disfrsou	Kilometers/day	-0.027	-0.070	0.074	-0.36	0.715

(*) dF/dx is for discrete change of dummy variable from 0 to 1
z and P>|z| are the test of the underlying coefficient being 0
Bold = significant p > 0.05

Table 11 presents results of probit analysis between household socio-economic and demographic variables and a household's decision on WTP for improved service level. In this model four variables are significantly correlated with the household decision to pay for improved services. These are *educate, payforwa*, and *availpro.* While *educate and payforwa* have positive coefficient, *availpro* has a negative coefficient.

The (*educate*) results can be interpreted that for each additional year of education of the respondent, it is 2% more likely that the household will be willing to pay for water services. Similarly, if a household has a history of paying for water services (*payforwa),* it is 12 % more likely that it will be willing to pay for improved water services. Conversely, if a household is facing water availability problems (*availpro*) even if it is connected to piped water services, *it will be 28 % less likely to be willing to pay for improved* water services. Other variables in the models do not seem to have any influence on the household's decision on willingness to pay for improved services.

Table 12: Influence of household socio-economic variable on amount WTP current service level

Number of obs = 300				
R-squared = 0.0519				
amtwtpcu	Coef.	Std. Err.	t	P>|t|
income	0.0005	0.0026	0.18	0.859
educate	4.6041	14.5728	0.32	0.752
Gender	55.8042	121.8994	0.46	0.647
hhsize	-6.0873	19.6903	-0.31	0.757
dayconsu	1.4040	1.0376	1.35	0.177
availpro	-185.0135	206.1425	-0.90	0.370
payforwa	115.6837	117.7971	0.98	0.327
connecti	-195.3256	148.4417	-1.32	0.189
dostore	-84.7552	273.9249	-0.31	0.757
timefetc	**2.8446**	**1.2136**	**2.34**	**0.020**
disfrsou	-97.5530	146.0731	-0.67	0.505
_cons	211.7337	342.3159	0.62	0.537

Bold = significant at p > 0.05

Table 12 presents results of an OLS analysis of households' decisions on the amount of money they are willing to pat for current service level and household socio-economic and demographic variables. In this test only one factor (*timefetch*) is significant at 0.05 level. The results can be interpreted that for each hour that a household spends on fetching water, it is willing to pay TSh 2.80 more per month for the current level of water service. Other variables that have been tested have not shown significant influence in the household's decision on the amount they are willing to pay for the current level of water services provision.

Table 13: OLS model estimates of influence of household socio-economic variable on the amount a household is willing to pay for improved service level

Number of obs = 300				
R^2 = 0.0494				
imamtwtp	**Coef.**	**Std. Err.**	**t**	**P>|t|**
income	0.004791	0.003	1.48	0.141
educate	15.07041	18.499	0.81	0.416
gender	2.26615	154.747	0.01	0.988
hhsize	1.615457	24.996	0.06	0.949
dayconsu	0.919833	1.317	0.70	0.486
availpro	**-613.868**	**261.691**	**-2.35**	**0.020**
payforwa	135.4625	149.539	0.91	0.366

connecti	-81.1689	188.442	-0.43	0.667
dostore	26.65895	347.738	0.08	0.939
timefetc	0.914456	1.541	0.59	0.553
disfrsou	49.78817	185.435	0.27	0.789
_cons	437.5828	434.558	1.01	0.315

Bold = significant at p > 0.05

Table 13 presents results of OLS analysis between household decision on amount of money a household is WTP for improved service level and household socio-economic and demographic variables. In this model only one factor (*availpro*) is significant at 0.05 level. At this level it can be interpreted that if a household faces erratic supply or other severe water shortage it will be less willing to pay or it will reveal a very small amount that it will be willing to pay even for improved water services. Other variables that have been tested have not shown significant influence in the household's decision on the amount they are willing to pay for current level of water services provision.

Discussion

In summary, the tested models have produce very mixed results. Generally the model results are not as impressive as would be expected. However, they bring forth very interesting insights on household behavior and their response to willingness to pay questions. Some factors - such as income - that have strong theoretical importance in influencing household's decision do not seem to have any particular significance in these results. The factors that seem to have significant influence are those that are related to water availability problems and household history in paying for water services.

For example **timefetch** seems to be significantly influencing household decisions to pay and the amount that a household is willing to pay for current level of water service provision. This can be interpreted that if a household is facing difficulties in getting water and spends plenty of time in collecting water, it is likely to be more willing to pay for water services controlling for income. In contrast, the variable **availpro** seems to be a significant disincentive for a household willingness to pay for water services.

It can then be said that Zanzibar Town households value efficient water service and that low income may be a limitation, but is generally not a disincentive, to paying for water services. The households are, thus --by implication-- asking to be taken out of their current

predicament of spending many hours fetching water or enduring inefficient and poor quality water services.

A household that has history of paying for water services (payforwa) also seems to be important factor influencing household decision to pay for water services. This makes sense, because it may mean that these households nostalgically remember the days of efficient water services and the fact that the efficiency came as they were paying for the services makes them more willing to pay than households that never had opportunity to compare the periods.

These mixed results - that in some areas are counterintuitive - may be due to methodological inadequacy such as small sample size, the choice of variables, and even weaknesses in the interview implementation. The use of open-ended questions could be another methodological weakness that has affected the results of this study. Whittington (2002) noted three major problems affecting the results of many of CV studies conducted in developing countries. These are Poor survey implementation, poorly crafted contingent valuation scenarios, and failure to test the effects of variation in survey designs on the result of CV studies. These problems might have affected this study. Nonetheless, these results may be reflecting the reality as opposed to theoretical expectations. The reality is that people are concerned more with the availability of efficient services and are willing to contribute financially so that those quality services are delivered.

Implication of the Valuation

Experience has shown that people are willing to pay for services and they will pay substantially more if the services are reliable (Briscoe, 1992). What people need is not charity but a choice of services at fair prices (Briscoe, 1992). Otherwise, the government will continue with the paternalistic policies that end up giving unfulfilled promises. This is true in Zanzibar as is true elsewhere in the developing countries. The water supply service in Zanzibar Town is getting worse while the government is maintaining its policy of free water for all domestic users.

This study was not intended to develop water tariffs for the town. Nonetheless, a discussion on revenue collection is being made on the basis of the revealed WTP. Thus, in the

discussion below the flat rate is used for the convenience of calculation and to simply show the potential amount of revenue that could be collected from domestic consumers who are currently not required to pay for the water services. No effort is made to structure water tariffs in relation to household volumetric water consumption, even though this should ideally be the case. This is not intended to suggest that the DWD use a flat rate in setting up tariff. If and when the DWD institutes any tariffs, the tariff structure should be linked to household water use. The households that consume more should pay more. This is necessary because apart from the need to raise revenue, there is a need to control water demand, conserve water resources, limit wasteful use of water, and reduce water loss. Positive price linked to the volume of consumption will help to achieve this demand control and water conservation.

According to this study, the mean value of improved water services to the people of Zanzibar Town is TSh. 1582.40 (approx. TSh. 1600.00) per month. Zanzibar's department of statistics records estimated that there are 32,000 households in Zanzibar town (Urban District). If the households were to pay the flat rate of TSh. 1600.00 per household per month for water services, then the water department would collect TSh. 51,200,000 per month, or 614,400,000 per year. However, since this study has established that only 79% are connected to a portable water supply system, then the number of potential paying consumers will be 25,280. Thus, the potential collectable monthly revenue based on flat rate will be TSh. 40,448,000.00, which means potential annual revenue of TSh. 485,376,000.00.

Nonetheless, this study shows that only 60% of the population are willing to pay for improved services. This means that there are 19,200 potential paying customers. If a flat rate of TSh 1600.00 is used, the 19,200 households will generate potential revenue of TSh. 30,720,000.00 per month, equivalent to TSh 368,640,000.00 per year. It is to be expected, however, that the monthly payment rate will not be one hundred percent. Let's arbitrarily suppose that only 60% of those 19,200 households will actually pay. This will mean that only 36 % of the Zanzibar Town households, equivalent to 11,520 households will pay for the services. If this will be the case, then the revenue of TSh 18,432,000.00 per month or TSh 221,184,000 per year is to be expected. This information is summarized in table 9.

The Overall (Urban and rural) budget of the Zanzibar Department of Water Development (DWD) for the year 2002/03 is TSh. 822,000,000.00. Out of these TSh. 440,000,000.00 is

capital budget for operations and maintenance. If we compare this DWD budget and the least amount of potential revenue collectable according to this study (TSh 221,184,000), we can see that this sum quoted above is 26.91 % of the overall DWD budget and 50.27 % of the DWD capital budget. This sum is potential revenue from Zanzibar Town (Urban district) only. It should be remembered that there are other districts and towns that could generate substantial amount of revenue the sum of which should be able to cover the DWD budget.

Table 14: Hypothetical Revenue Potential Projection

Percent of Paying Households (%)	No of Households	Monthly User fee (TSh)	Potential Monthly Revenue (TSh)	Potential Annual Revenue (TSh)
100	32,000	1,600.00	51,200,000.00	614,400,000.00
79	25,280	1,600.00	40,448,000.00	485,376,000.00
60	19,200	1,600.00	30,720,000.00	368,640,000.00
36	11,520	1,600.00	18,432,000.00	221,184,000.00

While the government continues to pursue the policy of not charging for water services and promising to subsidise the services, it is obvious that it can not meet the obligation. For example, the DWD budget of 2001/02 for urban water services improvement was TSh. 190,000,000.00; by March of 2002 the department had requested 142,500,000.00. Unfortunately the Zanzibar treasury could only disburse TSh.14,633,180.00, equivalent to only 8% of DWD total budget or 10.3% of DWD capital budget. In the meantime, it has clearly been shown in this study that there is a substantial amount of revenue that can be collected from the water users who are willing to pay for the services.

The existing policy is supposed to assist the people of Zanzibar to access water service at no cost and thus reduce their living cost. However, the situation in Zanzibar as is elsewhere in the world shows that this policy is not working. The cost of this policy to the very people that it attempts to assist is usually very high. For instance, Briscoe (1992) succinctly sums up this situation as follows: “In many cities of the developing world large number of poor people depend on water vendors, paying at least ten times what a middle-class person pays for a liter of water.”(pp. 1) In Zanzibar people buy water from vendors, forced to spend many hours searching for water, or have to invest in well digging and purchase of pumps.

Recommendation

This study as well as other similar studies before it in Zanzibar has shown that the populist policy of providing free water services for domestic consumers and religious institutions can and should be changed. The study results show that there is a potential to raise enough funds from water users to support operations and maintenance of an urban water supply system. The following recommendations are made in order to support the argument of policy change and improve the water services provision.

- It is important that the government should review and change this policy. It should adopt the policy where water users pay for supply services. The policy review should be conducted and implemented within the next five years. Without the change of the policy, the infrastructure deterioration will accelerate. The new policy should remove the prevailing thought that water is a public good that everyone should freely have access to whatever amount of water they want at any time. Moreover, the policy will enable collection of revenue that will significantly support the improvement of the quality of the water supply services provided.

- The policy change should be accompanied by setting up pricing policy framework that will include efficient and effective mechanisms for revenue collection and management of funds. Funds so collected should be invested back into service operations and maintenance.

- The immediate goal of charging for water services should be to achieve cost recovery. Zanzibar should aim at meeting recovering operation and maintenance costs to achieve and maintain improved quality of delivery of the services.

- Similarly, public awareness, education, and participation should accompany the policy implementation. Investment should be made to explain to consumers why they have to pay for water services and how can they manage and reduce their water bills.[5]

[5] Roth (2001) offer details of the pricing policy framework elements in a report titled "Water Pricing in the EU."

- Although this study is not concerned with tariff setting if and when tariffs are adopted, it is suggested that flat rate be used in early days of tariff reinstitution. This is suggested because currently there is no water metering system in Zanzibar. The goal, however, should be towards developing tariffs that are attached to household volumetric consumption. This goal is expected to allow the government to reach a fair balance between its commitment to social justice (equity), promoting water allocation efficiency, and raising funds for maintaining and operating the supply system.

- Given the current management problem, the government of Zanzibar may need to consider private sector participation in water resources management. Private sector participation will be expected to expand coverage, improve quality of service, and make gains in management and improved customer services. However, it may be necessary to start by strengthening the current public water department and reform the structural limitations in the services financing, regulations and water pricing. This is important because private sector participation can not compensate for the current institutional inefficiencies and failures.

- Nonetheless, if the reforms of the department will be a success, it may be necessary to strengthen the achievement of the reform and increase the autonomy of the publicly owned organization. When compared to privatization, this path will make it easier for the government to meet the dual purpose of social equity and cost recovery within public sector. In the autonomous organization the emphasis should be in managerial discipline in resource acquisition, allocation, and management. Once that is attained and retained, then efficient delivery of services is more likely to be achieved.

- Water vendors will continue to be an important part of the water supply system in the foreseeable future. This is because the town expands rapidly and more and more households are established in areas where there is no piped water connection. Thus, any future planning for water services provision should consider and accommodate the involvement of independent water vendors.

- In the effort to resuscitate the effectiveness of the water supply services in the town, it is thus recommended that the Zanzibar water department carefully consider the kind of costs to be used in calculating tariffs as part of the cost recovery strategy. This is

important so as to avoid raising the costs such that inefficiency of the service delivery will continue.

Conclusion

In spite of positive results of this study, that people are willing to pay for water services and by implication that they put monetary value to water services, there still is a room to improve and enhance this research. The study could benefit from methodological improvement as well as policy recommendations.

This study has confined itself to domestic piped water consumption. The reason was that though domestic water users are the major consumer group in Zanzibar town, they are the ones who are not charged for using the services. At the same time, this is the group that suffers most from the poor quality of services. This study has been an important contribution in understanding the potential of domestic consumers to finance the water services management in the town. However, any future study of this kind should aim at looking beyond domestic consumption and household water service reliability. For instance, the study should also look into the issue of water quality. It may also be necessary for the Zanzibar government to undertake a broader study that would look into all issues that concerns water management in Zanzibar. The study should look at long term sustainability of water use, domestic consumption for urban and rural domestic users, industrial users, water for agriculture, pricing and tariff structure.

On pricing and tariffs, future studies should concentrate on evaluating water demand management measures that will also take into account the economic social and environmental implication of any decision to be taken (OECD, 1989; Roth, 2001). That kind of study will generate information that would assist the government in water management including developing policies, rules and regulations on water use.

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Appendix 1: Questionnaire used in the Survey

Dodoso la kuangalia utayari wa watu Zanzibar mjini kulipia huduma ya maji

Nambari ya Kaya _____ Shehia _____

A. Taarifa za kaya

1. Ni nani mkuu wa kaya hii?

Mume	1	
Mke	2	

2. Kaya yako ina watu wangapi?

Idadi ya watu	Geresho	✓
01 - 05	1	
06 - 10	2	
11 – 15	3	
16 - 20	4	
> 20	5	

Nitajie majina yao

	Wanakaya Anaehojiwa = *	**Umri** M/Mzima (1) Mtoto (2)	Jinsia Mume (1) **Mke (2)**	Uhusiano Baba (1) Mama (2) Mtoto Mume (3) Mtoto Mke (4) Wengineo (5)*	**Ajira** Serikalini (1) Binafsi (2) Kujiajiri (3) Hana Ajira (4) Mstaafu (5) Mwanafunzi (6)	Kiwango cha Elimu Hajafikia (1) Hajasoma (2) Elimu WW (3) Msingi (4) Sekondari (5) Elimu ya Juu (6)
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						
19						
20						

***Wengineo – Awe ameishi na familia kwa zaidi ya miezi 6. Elezea Uhusiano**

3. Tafadahali tujulishe kipato cha kaya yako kwa mwezi (Siku)?

Kipato kwa Mwezi (TSh)	**Geresho**	✓
Haijaelezwa	1	
00 - 30,000	2	
30 – 60, 000	3	
60 – 120,000	4	
> 120,000	5	

4. Je unaweza kunielezea chanzo cha kipato chako?

Chanzo	**Geresho**	✓
Mshahara	1	
Biashara	2	
Vyote viwili	3	
Vyenginevyo	4	

Ikiwa (4) Elezea _____

B. Masuala ya Maji

I. Uunganishaji Maji

5. Kaya yako inapata maji kutoka wapi kwa matumizi tofauti?

Chanzo	Geresho	✓
Mfereji wa ndani	1	
Mfereji nje ya nyumba	2	
Mfereji wa Serikali	3	
Mfereji wa Jirani	4	
Kisima changu	5	
Kisima cha jirani	6	
Vyenginevyo (Elezea)	7	

Ikiwa (8) Elezea _____

6. Je nyumba yako imeunganishwa kwenye huduma ya idara ya maji?

	Geresho	✓
Ndio	1	
Hapana	2	
Sijui	3	

Ikiwa hapana au sijui nenda sula la 12

7. Nyumba yako iliunganishwa lini?

Mwaka				

Miaka	Geresho	✓
1 – 5	1	
6 – 10	2	
> 10	3	
Sijui	4	

8. Je ulilipia ili kuunganishwa?

Ndio	1	
Hapana	2	
Sijui/Sikumbuki	3	

Ikiwa hapana nenda suala la 11

9. Ikiwa ndio, Ulilipia kiasi gani?

Kima cha Malipo	Geresho	✓
0	1	
< 1000	2	
1001 – 3000	3	
3001 – 5000	4	
> 5000	5	
Sijui/Sikumbuki	6	

10. Je ulimlipa nani?

Taasisi ya Serikali	1	
Mtu Binafsi	2	
Sina hakika/Sikumbuki/Sijui	3	

11. Ikiwa hapana Je uliunganishaje?

_____
_____

II. Masuala ya Utumiaji

12. Kati ya matumizi yafuatayo ni lipi unalipa umuhimu sana?

Matumizi	Geresho	
Usafi wa mwili	1	
Kufua	2	
Usafi wa nyumba (Deki)	3	
Kupikia na Kunywa	4	
Mengineyo	5	

Ikiwa (6) Eleza:

_____

13. Kila siku unatumia kiasi gani cha maji?

Matumizi	**Geresho**	**Idadi Ndoo**
Usafi wa mwili	1	
Kufua	2	
Usafi wa nyumba (Deki)	3	
Kupikia na Kunywa	4	
Matumizi mengine	5	
Jumla	**6**	

Jumla Lita	**Geresho**	
< 100	1	
100 - 200	2	
201 - 300	3	
> 300	4	

IV. Masuali ya Kuhifadhi

14. Je kaya yako huwa inahifadhi maji?

Ndio	1	
Hapana	2	

Ikiwa hapana nenda suala la 26

15. Kwanini mnahifadhi maji?

Sababu	Geresho	✓
Hakuna jawabu	0	
Maji hayatoki kwenye mfereji	1	
Maji hayatoki kwa uhakika (yanatoka kwa vipindi	2	
Akiba kwa wakati wa upungufu	3	
Nyumbani hamna mfereji	4	
Sababu nyenginezo	5	

16. Je ni vipi unahifadhi maji?

Aina	**Geresho**	✓
Hodhi	1	
Tangi la juu	2	
Ndoo/Madumu	3	
Pipa	4	
Vyenginevyo	5	

17. Ujazo wa chombo/sehemu ya kuhifadhia maji?

Ujazo	**Geresho**	**Lita**
000 – 200 litres	1	
200 – 500 litres	2	
500 – 1000 litres	3	
1000 – 2000 litres	4	
2000 – 4000 litres	5	
> 4000 litres	6	

18. Je unajazaje chombo chako cha kuhifadhia maji?

Njia	**Geresho**	✓
Pampu	1	
Kwa mikono	2	
Nyenginezo	3	

Ikiwa (3) Elezea

_____
_____
_____

19. Ikiwa unatumia pampu. Ni mara ngapi kwa wiki unapandisha maji? (fikiri kwa kiasi cha mwezi mmoja uliopita)

Mara kwa wiki	**Geresho**	✓
Siku moja	1	
Siku mbili	2	
Siku tatu	3	
Tatu nne	4	
Siku tano	5	
Siku sita	6	
Siku saba	7	

20. Pampu uliinununua kwa kiasi gani?

Bei	**Geresho**	✓
< 10,000	1	
10,000 – 20,000	2	
21,000 – 30,000	3	
31,000 – 40,000	4	
> 40,000	5	

21. Je ilikugharimu kiasi gani kununua vifaa vyengine na kuifunga pampu?

Gharama	Geresho	✓
< 10,000	1	
10,000 – 40,000	2	
41,000 – 80,000	3	
81,000 – 120,000	4	
> 120,000	5	

22. Je maji unayopandisha yanatoka wapi?

Chanzo	Geresho	✓
Kisimani	1	
Kwenye Bomba	2	
Hodhi	3	
Kwengineko	4	

Kama (4) Elezea

_____

_____

_____

V. Upatikanaji wa Maji

23. Je kuna matatizo ya upatikanaji wa maji ambayo umekumbana nayo?

Tatizo	Geresho	✓
Maji hayatoki kabisa	1	
Maji yanatoka kwa vipindi	2	
Hakuna matatizo	3	
Mengineyo	4	

Ikiwa hayatoki kabisa au hakuna matatizo nenda suala la 30

24. Je maji yanatoka siku ngapi kwa wiki?

Siku kwa wiki	Geresho	✓
Siku 1	1	
Siku 2	2	
Siku 3	3	
Siku 4	4	
Siku 5	5	
Siku 6	6	
Siku 7	7	

25. Je yanapotoka huwa ni kwa saa ngapi kwa siku?

Saa kwa siku	Geresho	✓
0 – 5 hrs	1	
5 – 10 hrs	2	
10 – 15 hrs	3	
15 – 24 hrs	4	

26. Wakati maji hayatoki unapata wapi huduma ya maji?

Chanzo	Geresho	✓
Mfereji wa Serikali	1	

Mfereji wa Jirani	2	
Kisima changu	3	
Kisima cha jirani	4	
Vyenginevyo (Elezea)	5	

27. Je chanzo hiki kiko umbali gani?

Masafa	**Geresho**	✓
0 – 1 km	1	
1 – 2 km	2	
2 – 3 km	3	
> 3 km	4	

28. Unatumia muda gani kwa shuguli za kuchota maji kila siku?

	Geresho	**Muda (saa)**
Kwenda	1	
Kusubiri	2	
Kurudi	3	
Jumla		

Jumla	**Geresho**	✓
< 1 hrs	1	
1 – 2 hrs	2	
2 – 3 hrs	3	
> 3	4	

29. Yanapotokezea matatizo ya maji ni nani ambae kwa kawaida hufanya kazi ya kuchota maji?

Mchota Maji	**Geresho**	✓
Wanaume	1	
Wanawake	2	
Watoto	3	
Yeyote/Wote	4	
Muuza maji (Mzegazega)	5	

III. Malipo

30. Je unafikiri ni sawa kulipia huduma ya maji?

Ndio	1	
Hapana	2	

31. Je umewahi kulipia au kununua huduma ya maji katika maisha yako?

	Geresho	✓
Ndio kulipia	1	
Ndio Kununua	2	
Hapana	3	

32. Kama umewahi kulipia au kununua. Je ulimlipa nani?

	Geresho	✓
Taasisi ya serikali	1	
Wauza Maji (Mzegazega)	2	
Wengineo (Elezea)	3	

33. Ikiwa umewahi kulipia au kununua. Ulitumia kiasi gani cha fedha?

Kipimo	**Geresho**	**TSh**

Kwa Ndoo (20 lts)	1	
Kwa siku	2	
Kwa Mwezi	3	

34. Je kwa sasa hivi unalipia au unanunua huduma ya maji?

	Geresho	✓
Ndio kulipia	1	
Ndio Kununua	2	
Hapana	3	

35. Kama unalipia au unanunua. Je unamlipa nani?

	Geresho	✓
Taasisi ya serikali	1	
Wauza Maji (Mzegazega)	2	
Wengineo (Elezea)	3	

36. Ikiwa unalipia au unanunua. Unatumia kiasi gani cha fedha?

Kipimo	**TSh**	**Geresho**	✓
Kwa Ndoo (20 lts)	1 – 100	1	
	101 – 200	2	
	> 200	3	
Kwa siku	< 1000	1	
	1000 – 2000	2	
	2001 – 3000	3	
	3000 – 4000	4	
	4001 – 5000	5	
	> 5000	6	
Kwa Mwezi	< 1000	1	
	1000 – 2000	2	
	2001 – 3000	3	
	3000 – 4000	4	
	4001 – 5000	5	
	> 5000	6	

37. Katika hali ya sasa ya upatikanaji maji, Ukotayari kulipia huduma hii?

Ndio	1	
Hapana	2	

38. Ikiwa ndio. Uko tayari kulipa kiasi gani kwa mwezi (Kiwango cha juu)?

Kiwango	**Geresho**	✓
< 1000	1	
1000 - 2000	2	
2001 - 3000	3	
3001 - 4000	4	
4001 - 5000	5	
> 5000	6	

39. Je uko tayari kulipia huduma ya maji ikiwa huduma zitarekebishwa na maji yakawa yanatoka masaa 24?

Ndio	1	
Hapana	2	

Ikiwa hapana nenda sula la 38

40. Ikiwa ndio. Uko tayari kulipa kiasi gani kwa mwezi (Kiwango cha juu)?

Kiwango	Geresho	✓
< 1000	1	
1000 - 2000	2	
2001 - 3000	3	
3001 - 4000	4	
4001 - 5000	5	
> 5000	6	

41. Ikiwa hapana, Kwa nini huko tayari kulipia huduma ya maji?

Sababu	Geresho	✓
Ni jukumu la Serikali	1	
Masikini siwezi kumudu gharama	2	
Sababu nyenginezo	3	
Sina sababu	4	

Ikiwa (3) Elezea

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Maoni

Aliehoji ……..…….. Geresho……

Sahihi…….. Tarehe ……