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Citizens' Willingness to Pay for Improved Sustainable Water Supply in a Medium-Sized City in South Western Nigeria

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Abstract: Willingness to pay for urban services is often regarded as a means of ensuring the long term sustainability of such services. This paper examined some factors that explain citizens' willingness to pay for improved sustainable water supply in Ado-Ekiti, Nigeria. Such analysis is critical to the success of the government current drive on privatization and divestment on infrastructural financing. Empirical estimates show that factors that significantly affect willingness to pay for improved sustainable water supply include; main source of domestic water used by household, access to improved source of water, distance from main source to house, average time spent to fetch from main source, adequacy of supply from main source, quantity of water used per person per day, quantity of water purchased per day, attack by water borne diseases, performance of supply from designated water institution and average amount spent on water during the dry season. Some policy implications of findings are discussed.

Key words: Medium-sized city, water commercialization plan, willingness to pay

INTRODUCTION

Water is one of the most valuable natural resources vital to the existence of any form of life. An adequate supply of safe, clean water is the most important precondition for sustaining human life, for maintaining ecosystems that support all life and for achieving sustainable development (Topfer, 1998). Irrespective of its importance, a global paucity of safe drinking water had been established (UN, 2002; UNEP, 2002; WHO and UNICEF 2004). Specifically UN (2002) reports that 1.1 billion people representing 18% of the world's population lack access to safe drinking water. The consequence of the failure to provide safe water is that a large proportion of human beings have resorted into the use of potentially harmful sources of water. The implications of this collective failure are dimmed prospects for the billions of people locked in a cycle of poverty and disease. UNEP (2002) estimates that diarrhea kills about 2.2 million people a year. Brown (2003) contends that there are more people in the world hospitals today, suffering from water-borne diseases than any other ailment. Some two million children every year – about 6,000 a day – die from such infections. Out of this figure, 1.6 million are from the developing countries (UNICEF, 2003). Dowdeswell (1996) concludes that about 80% of all diseases and more than one-third of all deaths in developing countries are caused by contaminated water and sanitation. UN (2002) confirmed that with adequate supplies of safe drinking water, the incidence of some illnesses and death could drop by as much as 75%. Emphasizing the importance of water, Nielson (2004) contends that safe drinking water is not just a luxury. It often makes the difference between life and death.

One of the highly contentious issues on water supply is subsidy. Globally, the average effective sale price of water has been estimated to be about one-third of the marginal cost of producing the water (World Bank, 1990). In addition, of all the infrastructural sectors, water has the least cost recovery, making this sector more dependent on public budget transfer (World Bank, 1995a). This low cost recovery is largely explained by the fact that this utility is often highly subsidized. Franceys (1993) contends that the main justification for subsidizing the provision of an improved domestic water supply is the health benefit. Paradoxically, those that are connected to this highly subsidized system are generally more affluent people, while poor people not connected to the system rely on expensive private sellers or depend on unsafe sources. Most water vendors charge the poor up to twenty times more for water than the price paid by their wealthier neighbors whose supplies are subsidized (UN-HABITAT, 2006). UNDP (1998) calls for the cancellation of these subsidies since, all too often, they do not benefit those intended. Christmas and de Rooy (1990), contend that 70 – 80% of these funds go to serve 20 – 30% of the population, mostly the rich. For example, in a study carried out by the World Bank (1995b), it was observed that in Onitsha, Nigeria, the poor pay an estimated eighteen percent (18%) of their income on water during

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the dry season compared with upper-income households who pay 2-3 %. Globally, fewer than 4 in 10 of the poorest households use an improved water source, whereas 9 out of 10 of the richest households do (WHO and UNICEF, 2004).

The importance of willingness to pay for infrastructural facilities including maintenance and improvement has been variously amplified in literature (Fasakin, 2000; Pean, 1993; Arimah, 1995; World Bank, 1995b). In a study on the willingness to pay for the services of commercial motorcycles in Akure, Nigeria, Fasakin (2000) concludes that the long-term sustainability of commercial motorcycles can only be guaranteed, if the people are willing to pay for their services. Pean (1993) sees willingness to pay for urban services as the basis of effective demand, good infrastructural provision and maintenance and indeed responsible urban governance. Kalbermatten (1999) opines that the introduction of fees and charges for the use of freshwater can be an important stimulus to the efficient use of resources and a valuable source of revenue to ensure service to the absolute poor. He however, observed a classic dilemma under this arrangement. On the one hand, Kalbermatten (1999) observes that while additional charges are essential to provide adequate revenue for the sector and allow services to be extended and properly maintained, on the other hand, these charges are beyond the means of many people most needing the services. Fortunately, irrespective of this dilemma, the willingness of consumers to pay for water has been shown by the studies of vendors. One estimate suggests that vendors are now serving perhaps 20 – 30% of the urban population with total cost of water at 20% of household income; significantly above the official tariffs and also above the 3 – 5% of income often quoted as acceptable (Cairncross, 1990). A study from Nsukka district in Nigeria reveals that consumers are willing to pay for purchasing water from private vendors instead of paying flat rate user fees for potable water, reason being distrust in the quality and reliability of publicly supplied water. The bad quality and lack of reliable supply is due to poor maintenance, following an insufficient cost recovery (World Bank, 1995b). Another study from Onitsha, Nigeria showed that the willingness for households to pay for improved water services is rather high. 8,000 out of 100,000 households were connected to the piped water systems and the rest got water from vendors. The price paid to vendors was almost twice the operational and maintenance costs of potable water (World Bank, 1995c). It becomes therefore clearly obvious that even low-income consumers are willing to pay for the service they want. This aptly confirms that willingness to pay for any service is the foundation of the economic theory of value. Essentially, if something is worth having, then one can conveniently argue that it is worth paying for. The issue of subsidy could therefore be down–played if consumption is demand driven. This would enable customers' show their demand through their willingness to pay for different levels of service. Cairncross (1990) concludes that it is only when this change is achieved that the required substantial reduction in costs of services (through efficiency and the use of appropriate technology) and the equally necessary mobilization of additional funds from consumers could be made possible.

This research therefore endeavors to examine some of the factors that affect the willingness to pay for water services in Ado-Ekiti, Nigeria. It also aims at presenting empirical estimates (regression elasticities) to specify and explain the impacts of some factors on the willingness to pay for improved and sustainable water supply in Ado Ekiti, Nigeria.

MATERIALS AND METHODS

Research setting: Ado-Ekiti is a medium-sized city in the South-Western part of Nigeria (Fig. 1). This traditional headquarters of the homogenous people of Ekiti became a capital city following the creation of Ekiti state on October 1, 1996. Since then, the city has continuously witnessed influx of people. From a total population of 127,579 in 1991, the city's population was estimated at 209,866 for 2006. This rapid urban growth coupled with environmental factors especially the poor underground water resources and the peculiar nature of streams and rivers that often dry off during the dry season pose great challenges to the provision of domestic water in this city (Ebisemiju, 1993). In general, Ado-Ekiti is confronted with infrastructural inadequacies arising from the inability of the government to meet the demand of a rapidly urbanizing city. For example, most households rely on traditional sources of water supply such as springs, brooks and wells, which are largely unreliable and susceptible to infection. This is evident in the increasing rate of water borne diseases such as diarrhea, cholera and typhoid that are recorded in hospitals in the city (Adefolalu and Ibitoye, 1993).

Database description: As an addition to the main thrust of this research, the study was interested in the analysis of the spatial variation in water supply and demand systems in Ado Ekiti. To achieve this, three residential zones were identified in the city. They include the urban core, transitional zone and urban periphery (Fig. 2). The basic assumption made with respect to the populations of these zones was that fifty percent (50%) of the total population lives in the city core while thirty five percent (35%) and fifteen percent (15%) live in the peripheral neighborhood to the core and the suburb respectively.

The projected population figure for Ado-Ekiti in 2006 was put at 209,866 (op cit). Average family size in

Source: Peas Associates, 2007

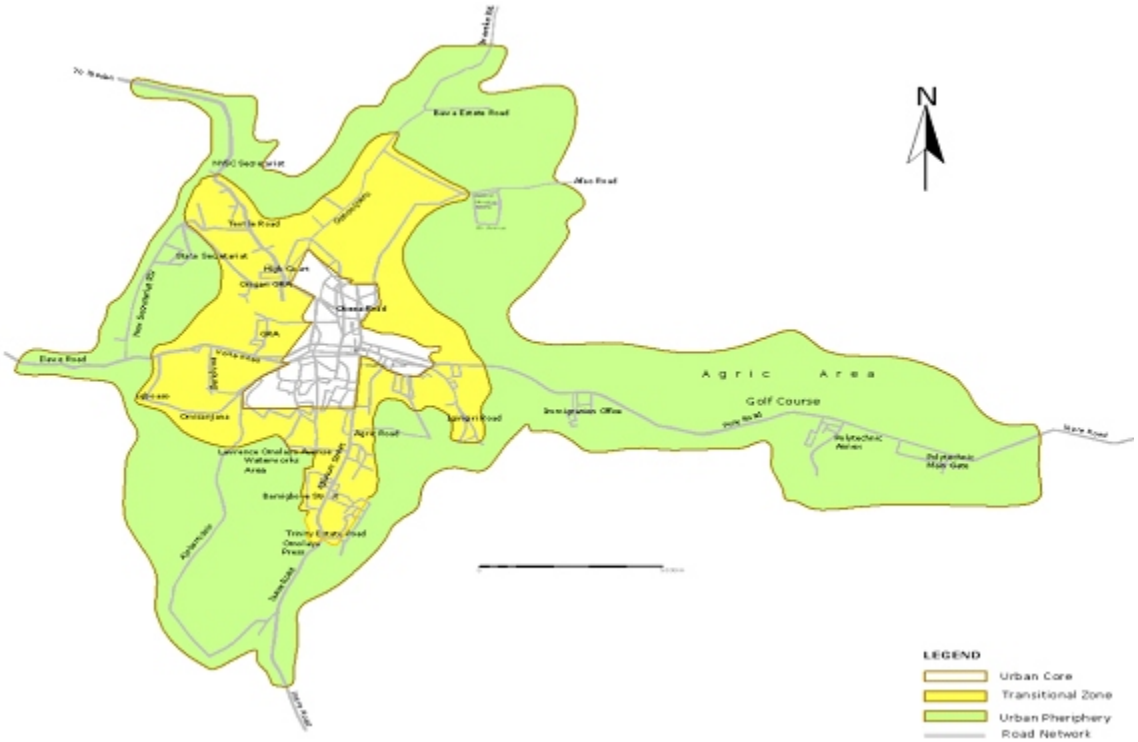
Fig. 1: Map of Nigeria showing the location of Ado-Ekiti

Nigeria has been estimated at 7 (Abumere, 1984; Fasakin, 2000). This implies that there were about 29,981 households in Ado-Ekiti. For this research, a sample size of 1,200 amounting to 4.0% of the total number of households in Ado-Ekiti was chosen. This appears plausible since there are traits of homogeneity in habitability in this study area.

Having stratified the city into three zones, specific areas that are convenient for data collection otherwise referred to in this study as Data Delineation Areas (DDAs) were identified in each zone. Based on the estimated population of each DDA, the number of households to be interviewed was estimated. In consonance with our earlier assumptions, 600 (50%) questionnaires were administered in the city core while 420 (35%) and 180 (15%) questionnaires were administered in the transitional zone and urban periphery respectively. Subsequently, systematic sampling procedure was adopted in the choice of households to be interviewed in each DDA. Fieldwork commenced in September 2007 and ended in December 2008. The survey utilized 51 variables out of which 10 were selected for multivariate analysis (Appendix A). Table 1 shows the variables used in the measurement of willingness to pay.

As a basis for empirical analysis, the specification, rationale and justification for the choice of variables are discussed. The variable of primary interest is M-WILL, which is regarded as a proxy measure for the people's willingness to pay.

M-Source: identifies the main source of domestic water that is adopted by each household in Ado-Ekiti. These sources include household connection, public standpipe, borehole, protected dug well, unprotected well, protected



Source: Fieldwork, 2007

Fig. 2: The three identified residential zones in Ado-Ekiti, Nigeria

Table 1: Definitions of research variables

S/N	Variable Code	Definition of variable
1	M-SOURCE	Main source of domestic water used by household
2	I-SOURCE	Access to improved source of water
3	D-SOURCE	Distance from main source to house
4	TI-SOURCE	Average time spent to fetch from main source
5	ADE-SOURCE	Adequacy of supply from main source
6	Q-PERDAY	Quantity of water used per person per day
7	Q-PURCHASE	Quantity of water purchased per day from vendor
8	DIS-ATTACK	Attack by water borne diseases
9	PERFORM	Performance of supply from Ekiti State Water Corporation
10	DRY-SPENT	Average amount spent on water during dry season
11	M-WILL	Willingness to contribute to maintenance/improvement of water supply

spring, unprotected spring rainwater collection, vendor provided water, bottled water and tanker truck water. However, WHO and UNICEF (2004) define access to safe drinking water as the percentage of the population using improved drinking water sources. Specifically, WHO and UNICEF (2004) identify improved drinking water sources to include: household connection, public standpipe, borehole, protected dug well, protected well, protected spring, and rainwater collection. On the other hand, unimproved drinking water sources were identified as including: unprotected spring, rivers or ponds, unprotected dug wells, vendor-provided water, bottled water and tanker truck water. Therefore, I-SOURCE is a variables measuring access to improved sources of water. Specifically, this variable measures the number of households that have access to the various sources in these categories.

The relationship between distance from main source to house (D-SOURCE), average time spent to fetch from water main source to house (TI-SOURCE) and average number of trips per person per day to main source has been well emphasized in literature (Cairncross, 1990; Cairncross and Feachem, 1993; Franceys, 1993; WHO and UNICEF, 2004). While time and number of trips made to fetch water are directly related to distance, distance and these other variables set limitation on the quantity of water that household could access. For this research, it is assumed that any source that is more than 1.0 kilometer from home shall be considered unimproved. This limit is in concurrence with the WHO and UNICEF (2004) monitoring indicator.

Again, fetching from a source that would require more than 30 minutes of walking is also considered unhealthy. WHO and UNICEF (2004) asserts that for people to satisfy their basic needs for water, the source must be reachable in a round trip of 30 minutes or less. When it takes more than 30 minutes to get to the water

source and back, people typically haul less water than they need to meet their basic requirements. In addition, such households were seen as wasting time that could otherwise be committed to a more productive venture.

From the household perception, ADE-SOURCE explains the adequacy or otherwise of the M-SOURCE. However, this perception does not indicate the adequacy of M-SOURCE from WHO guideline on the per capita per day requirements. Q-PERDAY measures this parameter. In accordance with the WHO guideline, if Q-PERDAY is less than 40 liters, it is concluded that such source cannot meet the expected health criteria of such household.

In general, household often supplement their M-SOURCE with other sources of water. In most cases, this practice arises from the inadequacy of the M-SOURCE to meet the full requirements of the household. More often than not, this supplement is met by vendor-provided water. Paradoxically, these sources are often expensive and considered unsafe for human consumption. Variable Q-PURCHASE endeavored to find out the quantity of water obtained from this source. Again, this variable could constitute a reasonable criterion for gauging the possible acceptability of price introduction into the water supply market by the consumers.

Water could be a source of diseases or even death. The prevalence of water-related diseases is an attestation to dearth of safe water in any given community. Therefore, DIS-ATTACK is an attribute that was designed to measure the number of households that were plagued by water-borne diseases in the recent past.

There is no doubt that it is the inadequacy arising from the failure of the public water systems at meeting the need of the populace that normally results to household seeking alternative water sources such as wells, boreholes, surface water, vendor-provided water, rain water among others. In most cases, these sources are often expensive or unsafe for human consumption (UNDP, 1998; World Bank, 1995a; UNEP, 2002; UN, 2002; Brown, 2003; Sullivan *et al.*, 2003). The institution that has the mandate for public potable water provision for Ado Ekiti is the Ekiti State Water Corporation. This research therefore endeavors to evaluate the performance of this Corporation in terms of service delivery. For quality appraisal, the research downplays information from the service provider; rather it relies mostly on user-based data. However, for clarity, where necessary, efforts were made to corroborate the claims of the consumers from this service provider. Essentially, this research relies on perception variables to measure the level of service delivery of the State Water Corporation. The significance of this measure should be considered with the background that the mandate of this Corporation is to access every dweller in the city to safe water supply. Variable PERFORM was therefore designed to measure performance level of this service provider. Essentially, the variable summarizes the failure or otherwise of this Corporation with respect to service delivery.

One measure of severity of water scarcity adopted in this study is the percentage of income spent on water. It was intended that the figures for wet season will be compared with those of dry season in an attempt to establish a pattern. This explains the adoption of variable DRY-SPENT to obtain the average amount spent by households on water during dry season in comparison with the amount spent during wet season.

M-WILL is an attribute of the willingness of water consumers to pay for water supply. Specifically, variables M-WILL measures the willingness of households to contribute towards water maintenance/ improvement of water supply. For this study, the response of this variable is considered as significant to the intervention of market forces and private sector participation in water production in Ado-Ekiti.

RESULTS AND DISCUSSION

The model used in the empirical estimation of parameters of analysis in this study is the logistic (double-log) linear regression function expressed below:

$$\ln(Y) = b_o + \sum_{i=1}^{n} b_1 \ln X_i \qquad (1)$$

Where ln is natural logarithm, b_0 is constant, b_1 …….. b_n are the parameter estimates or elasticity estimates or regression coefficients measured on a continuous scale and X1 …. Xn represent the predictor variables.

A number of reasons were considered critical in choosing double log version of the regression model over linear and semi-log models. First, the double log regression model enables the presentation of the regression coefficients directly as elasticity estimates (Fasakin, 2000; Canning, 1998; Arimah, 1994; Arimah and Ekeng, 1993). Second, it translates the skewness of the data frequency to a normal one thereby enabling much better estimates of the explanatory variable (Fasakin, 2000). Third, it reduces the occurrence of heteroscedasticity, that is, the variance of the distribution of the residual is uniform or constant for all values of the variables of research. Fourth, it ensures the stability of and significance of the implied relationship thereby enabling better explanatory power of the coefficient of multiple determination (R^2) (Fasakin, 2000; Arimah, 1995).

The following factors were considered as influencing willingness to pay for water supply in Ado-Ekiti: M-SOURCE, I-SOURCE, D-SOURCE, TI-SOURCE, ADE-SOURCE, Q-PERDAY, Q-PURCHASE, DIS-ATTACK, PERFORM and DRY-SPENT. One of the greatest

Table 2: Correlation matrix of willingness to contribute to maintenance/improvement of water supply (M-WILL) variables

Variables	M-SOURCE	I-SOURCE	D-SOURCE	TI-SOURCE	ADE-SOURCE	Q-PERDAY	Q-PURCHASE	DIS-ATTACK	PERFORM	DRY-SPENT
M-SOURCE	1.00	0.219	0.180	0.167	-0.030	0.020	0.107	0.085	0.215	0.083
I-SOURCE		1.000	0.007	0.045	0.000	0.043	-0.129	0.001	0.370	-0.052
D-SOURCE			1.000	0.523	0.126	0.056	0.202	0.151	0.028	0.199
TI-SOURCE				1.000	0.268	0.053	0.173	0.103	0.074	0.120
ADE-SOURCE					1.000	0.054	0.149	0.058	0.147	0.032
Q-PERDAY						1.000	0.207	0.029	0.056	0.122
Q-PURCHASE							1.000	0.140	0.084	0.306
DIS-ATTACK								1.000	0.013	0.021
PERFORM									1.000	0.006
DRY-SPENT										1.000

Table 3: Regression analysis result for willingness to contribute to improvement/maintenance of water supply variables

	Zone							
	City-Wide		City Core		Transitional Zone		Urban Periphery	
Variable	Reg. Coff.	Abs. t-Value	Reg. Coff.	Abs. t-value	Reg. Coff.	Abs. t-value	Reg. Coff.	Abs t-value
In M-SOURCE	0.126	0.640	0.984	1.726	0.000	0.000	0.161****	3.3E+07
In I-SOURCE	- 0.239	- 1.244	0.176**	- 2.069	1.467	0.000	0.000	0.000
In D-SOURCE	- 0.418***	3.351	- 0.350**	2.388	0.000	0.000	- 0.045****	1865891
In TI-SOURCE	- 0.316**	- 2.476	- 0.264	- 1.788	- 2.642	0.000	0.000	0.000
In ADE-SOURCE	0.411****	4.378	0.330**	2.916	1.479	0.000	0.217****	1.4E+07
In Q- PERDAY	0.230**	2.214	0.239	1.778	5.436	0.000	0.000	0000
In Q-PURCHASE	- 0.098	- 0.862	- 0.132	- 0.877	- 6.344	0.000	- 0.736****	- 3.5E+07
In DIS-ATTACK	- 0.090	- 1.029	- 0.060	- 0.611	8.324	0.000	0.000	0.000
In PERFORM	0.026	0.272	0.018	0.164	- 2.609	0.000	- 1.423	- 34E+07
In DRY-SPENT	- 0.216**	2.235	0.219	1.788	- 1.552	0.000	- 0.080****	4899983
Constant	- 5.71E-02*		- 0.576		- 3.219		7.959E-02****	
R	0.642		0.684		1.000		1.000	
R^2	0.513		0.568		1.000		1.000	
Adjusted R^2	0.389		0.377		1.000		1.000	
F-Ratio	5.624++++		5.111++++		6.0E+14++++		1.1E+15++++	
N	1,200		600		420		180	

ln: Natural logarithm

****: Significant at 0.000 alpha level (one-tail test); ***: Significant at 0.001 alpha level (one-tail test); **: Significant at 0.01 alpha level (one-tail test), *: Significant at 0.05 alpha level (one-tail test); ++++: F-ratio is significant at 0.000 level

problems confronting the use of regression models has been the issue of spatial autocorrelation and the problem of two or more variables aligning or having high correlation coefficients between or among themselves otherwise known as collinearity and multi-collinearity (Abumere, 1984; Fasakin, 2000). The need to eliminate such occurrence in a bid to validate the various estimates from this model is crucial. It therefore became imperative to first test for such inter-correlation among the variables used in the model for this research.

The results of this test are displayed in the correlation matrix in Table 2. Generally, collinearity or multi-collinearity seriously affects regression coefficients when pair-wise correlation coefficients among independent variables exceed 0.80. The results indicate that the regression will in no way be affected by either pair-wise collinearity or multi-collinearity since there is no pair-wise correlation in excess of 0.80 among the independent variables. In our own case the highest observed correlation coefficient is 0.573. This therefore confirms the true independence of and the reliability of the variables and parameter estimates, used in this analysis. Using these variables, the regression equation could be amplified and re-interpreted as follow:

$$\ln(\text{M-WILL}) = b_0 + b_1\ln(\text{M-SOURCE}) + b_2\ln(\text{I-SOURCE}) + b_3\ln(\text{D-SOURCE}) + b_4\ln(\text{TI-SOURCE}) + b_5\ln(\text{ADE-SOURCE}) + b_6(\text{Q-PERDAY}) + b_7\ln(\text{Q-PURCHASE}) + b_8\ln(\text{DIS-ATTACK}) + b_9\ln(\text{PERFORM} + b_{10}\ln(\text{DRY-SPENT}) \quad (2)$$

The two most important variables influencing willingness to contribute to improvement/maintenance of water supply are distance to main source (D-SOURCE) and adequacy of supply from main source (ADE-SOURCE) (Table 3). D-SOURCE exhibits parameter estimates of -0.418, -0.350 and -0.045 city-wide and at both the city core and urban periphery that are significant at 0.001, 0.01 and 0.000 alpha levels respectively. The implication of this is that, if an improvement/maintenance of a water source through a 100% reduction in the distance covered by household to fetch water from such source is effected, 41.8, 35 and 4.5% of the households city-wide, the city core and urban periphery would be willing to contribute towards such improvement/ maintenance. Examples of such improvement/ maintenance include increase in the number of public standing taps, repair of public standing taps, and

improvement of springs among others. The willingness to contribute to improvement/maintenance of such facilities is quite logical when one realizes the relationship between the D-SOURCE and TI-SOURCE, ADE-SOURCE, Q-PERDAY, DIS-ATTACK among others. It is rather unfortunate that over the years, no significant effort had been made to reduce the distance covered by households to fetch water from source in Ado-Ekiti. For example, it was confirmed that since the commissioning of the city's waterworks in 1961, no effort had been made for any system expansion. Therefore, water trunk network is largely restricted to the city core. Again, even though the city core appears to be favored in terms of provision of water trunk network, households still obtain improved water at a relatively longer distance. This paradox could be explained by the fact that the few functioning public standpipes are sparsely distributed in the city core thereby increasing distance covered by most households to fetch water. In addition, the State Water Corporation confirmed that water is only released to the city once or twice in a week on a diversionary basis. Subsequently, households have to divert their water search to this area of water release. A significant proportion of these households have to trek to the waterworks directly, a relatively long distance to most households, to meet their water need since they confirmed that it is the only assured water point.

Adequacy of supply from main source (ADE-SOURCE) also influences M-WILL positively citywide and at both the city-core and urban periphery with coefficient estimates of 0.411, 0.330 and 0.217. While this influence is significant at 0.01 alpha levels for the city core, it is absolute citywide and for the urban periphery. The inference from this findings is that if an improvement/maintenance of water supply system in Ado-Ekiti will double the present access of households to the system, such that households would consider supply from this source as adequate, then one is 100% confident that 41.1% of the households in Ado-Ekiti will be willing to contribute to the maintenance/improvement of such system. The proportion of such willingness stands at 33.0 and 21.7% for the city core and transitional zone respectively. The inability of the households to meet their water need in the required quantity must have been instrumental to this pattern of behavior. One obvious conclusion from this analysis is that the gradient of willingness decreases away from the city core. This is rather ambiguous since access to public water decreases away from the city core to the periphery. Ordinarily, households outside the city core are expected to express better willingness since they are edged out of the public water system. This implies that the seemingly better access by the city core is constrained. This scenario could be linked with institutional deficiencies earlier enumerated in this report, which include the obvious gap between water supply and demand, inadequate standpipes, regulated pumping among others. There is the tendency among these households to therefore regard the development of public water system as a "Greek gift". Therefore, one expects that any effort that would lead to the improvement of this awful situation would be embraced by the households.

Other significant factors influencing the willingness to contribute to improvement/maintenance of water supply are the quantity of water used per person per day (Q-PERDAY) and the quantity of water purchased from water vendors per person per day (Q-PURCHASE). The influence of Q-PERDAY is significant only at the city level. The regression estimate is 0.230 indicating that if improvement/maintenance of the water supply system would bring about 100% increment in access to the system, 23.0% of the households would be willing to contribute to such improvement/maintenance. Given the present low consumption per day (Adefolalu and Ibitoye, 1993), this finding could be considered reasonable.

However, the influence of Q-PURCHASE is only significant in the urban periphery with a regression coefficient of -0.736 at 0.000 alpha levels. The implication of this is that any improvement/maintenance of the water supply that would ensure 100% reduction in water procurement from the vendors will compel 73.6% of the households inhabiting this zone to be willing to contribute to such improvement/maintenance. This is quite plausible since it is expected that households would consider it more rational to subscribe to a more sustainable water provision rather than buying from vendors at relatively higher cost and possibly poor quality. The strength of this observation lies in the fact that, this zone which is the least spatially served in the city, is inhabited by the fairly well to do who could afford such payment.

Another relatively important factor affecting the willingness to contribute to improvement/maintenance of water supply is the average amount spent on water during dry season (DRY-SPENT). The influence of this variable is significant citywide and in the urban periphery with regression coefficients of -0.216 and -0.080 respectively. The implication of this is that if an improvement/ maintenance of a supply system would increase supply level such that less amount will be spent on water procurement during the dry season, 21.6 and 8.0% of the households city-wide and in the urban periphery will be willing to contribute to such project. Considering the stress that households go through during the dry season coupled with cost of procurement especially in the urban fringe that is totally devoid of supply from pubic water system, this result is expected.

The regression estimate for M-SOURCE which is significant only at the urban periphery is 0.161 indicating that if households are genuinely convinced that

improvement/maintenance of their main sources of domestic water would double the present level of supply, then 16.1% of these households would be willing to contribute to the project. In like manner, the I-SOURCE coefficient of 0.176 implies that doubling the quality of the present main source probably through better scientific treatment, protection of springs among others will increase the proportion of households willing to contribute to improvement/maintenance by 17.6%. The impact of TI-SOURCE is negative, having a regression coefficient of -0.316. The implication of this is that if the improvement/maintenance will involve restoring broken down water points and increased capacity thereby leading to a reduction in time spent to fetch water from source, 31.6% of the households in Ado Ekiti will be willing to contribute to such project.

Other factors such as DIS-ATTACK and PERFORM affect willingness to pay in a mixed manner, but none of these effects is significant.

The F-ratio indicates that that the combined impact of all the factors is significant. However, there is a wide disparity in the collective influence of the variables used in this regression model at the city level and in the urban periphery and among different residential zones. While the collective influence of these variables accounts wholly (100%) for the households' willingness to contribute to maintenance/improvement in the transitional zone and urban periphery, these factors could only explain about 50% of why households are willing to pay for improvement/maintenance city-wide and in the urban core (Table 3). The observed pattern indicates that most households citywide and especially at the city core felt that water maintenance and development must be government responsibility. This appears very curious in this age of privatization and government divestment on infrastructure financing.

CONCLUSION AND RECOMMENDATION

In this paper, the parameters of the willingness to pay for water services attributes have been estimated using data drawn from a medium-sized city in Nigeria. The results have shown that most important determinants of willingness to pay for water services in Ado-Ekiti are: distance from main source to house, adequacy of supply from main source, quantity of water used per person per day, quantity of water purchased per day from vendor, average amount spent on water during dry season, main source of domestic water used by household, access to improved source of water, attack by water-borne diseases and performance of supply from Ekiti State Water Corporation.

Previous studies have shown that low-income consumers are willing to pay for service they want including water supply (Cairncross, 1990; World Bank, 1995b; World Bank, 1995c). It has also been argued that if something is worth having, then it should be worth paying for. Considering the importance of water, the relatively weak values of R^2 recorded citywide and in the urban core are at variance with reality. This situation might not be unconnected with the low level of awareness among households on the global trend in infrastructure financing which promotes community participation in a bid to achieving sustainable infrastructural development. One also suspects that the relatively low level of income among households especially among the urban poor might be responsible for the relatively weak R^2 citywide and in the urban core. In a society ravaged with poverty, such seemingly additional responsibility might be resented by the people. Paradoxically, these non-willing households of the city center have greatest access to piped water.

Attempts must be made to improve willingness to pay for water services in the city. To achieve this, the government should build up the commercialization plan for water supply in Ado-Ekiti through community penetrating enlightenment campaigns in local dialects. The campaign must concentrate heavily on the non-willing households of the city center who paradoxically are supplied with piped water. This campaign can then dovetail sequentially to other zones. Government should realize that improvement to the existing inefficient network can only be improved through community involvement, part financing and partial monitoring.

In addition, government should as a matter of policy introduce water development charge in the state. As a prelude to this action, the State Water Corporation should urgently convene Water Stakeholders Forum where the details of the introduction could be discussed and agreed upon among stakeholders. The current minimum wage in Ekiti State is 64 USD per month. We therefore suggest that government should not charge less than 2 USD per household per month as water development charge independent of the routine water bill. This translates to 24 USD per household per year. This charge can be collected in the manner of tenement rate. However, a joint committee of the Stakeholders Forum should be set up to manage the fund on local water projects.

In a bid to stimulate people's willingness to maintain and improve water supply, government should allow communities to assume greater responsibilities in the area of policy articulation, project prioritization, design, execution, routine monitoring and management. The essence of such involvement is to indirectly confer ownership of projects on these communities. One expects that such approach that motivates the communities would challenge their desire to support project expansion and new project development. However, effective participation in the development process requires a certain minimum level of capacity. Government in collaboration with relevant local and international agencies such as

UNDP, UNICEF, USAID, DFID among others should organize management and capacity building programs for the communities in a bid to enhance their managerial and technical skills in project planning, design, execution, monitoring and management.

Appendix A:

Research Variables Used in the Evaluation of Domestic Water Needs for Ado-Ekiti, Nigeria

- Available Sources of Domestic Water for Household
- Main Source of Domestic Water used by Household
- Access to Improved Source of Domestic Water
- Access to Unimproved Source of Domestic Water
- Distance from Main Source of Domestic Water to House
- Distance from Improved Source of Domestic Water to House
- Distance from Unimproved Source of Domestic Water to House
- Average Time Spent to Fetch from the Main Source
- Average Number of Trips made per Person per Day to Fetch from Main Source
- Adequacy of Supply from the Main Source
- Household Preferred Domestic Water Source
- Reason for Preferred Source
- Problems associated with the Preferred Source
- Quantity of Water used per Person per Day
- Purchase from Water Vendor
- Quantity of Water Purchased from Water Vendor per Person per Day
- Amount Paid per 25-Liter Volume of Water Purchased
- Willingness to Contribute towards Maintenance/ Improvement of Water Supply
- Amount Willing to Contribute towards Maintenance/Improvement of Water Supply
- Willingness to Contribute towards the Development of Community Water Supply
- Amount Willing to Contribute towards the Development of Community Water Supply
- Water Usage
- Household Water Collectors
- Ages of Household Water Collectors
- Water Storage Methods
- Water-Borne Diseases
- Attack from/by Water-Borne Diseases
- Frequency of Attack by Water-Borne Diseases
- Supply from Ekiti State Water Corporation
- Service Delivery Rating of Ekiti State Water Corporation
- Payment for Service Delivery by Ekiti State Water Corporation
- Average Monthly Payment to Ekiti State Water Corporation
- Metering
- Meter Reading
- Billing
- Adequacy of Supply of Ekiti State Water Corporation
- Quality of Water from Ekiti State Water Corporation
- Frequency of Pumping of Water by Ekiti State Water Corporation
- Notices from Ekiti State Water Corporation
- Response to Leakages
- Adequacy of Public (Street) Standpipes
- Appropriate Location/Distribution of Public (Street) Standpipes
- Sex
- Age
- Education Level
- Occupation/Profession
- Marital Status
- Household Size
- Annual Income
- Percentage Income Spent on Water During Dry Season
- Percentage Income Spent on Water During Wet Season

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