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Examination of Water Pricing Policy Adopted by Borno State Water Corporation in Maiduguri and Household's Willingness to Pay for Water

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ABSTRACT: *This study examined two research questions, (1) the water pricing policy adopted by Borno State water Corporation in Maiduguri and (2) the household's willingness to pay for water. Two stage sampling procedures were employed in selecting respondents for collection of data through questionnaire, which was administered to respondents out of which 474 questionnaires were used for the study due to their completeness and consistency (181 for staff of Borno state water corporation and while 293 for Households willingness to pay for water). Descriptive statistics and Probit Regression were used to analyze the data. The result of the study revealed that domestic water flat rate was adopted as water pricing policy by Borno state water corporation in Maiduguri. This involves an equal charging water rate to households, and at a very low rate. The second research question result of the study revealed that some socio-economic characteristics of respondents captured in the probit regression influenced household willingness to pay for water which are age, education qualification, household size, income level, household awareness of water problems, time of water availability, perception of respondents on the amount paid for water supply and perception of respondent on the need to improve water supply. The value of R^2 indicates that 89% of variation in the willingness to pay for water is explained by the explanatory variables. The researchers recommend that water consumption should be metered so that household heads will pay for what they consumed instead of adopting water flat rate.*

KEYWORDS: Water board staff, household heads, socio-economic factors, water pricing policy, water tariff, willingness to pay

INTRODUCTION

Water is an important need of mankind because it's a natural resource that sustains life and the environments. Historically, domestic water use plays crucial role in people's daily life and it is directly related to social welfare and public health issues. Although domestic water use is not a major part of water consumption, but also used for irrigation in agriculture, for hydro-power electric generation, commercial use (water use in motels, hotels and restaurants) and for industrial use. Therefore, the efficient use of limited domestic water use is one of the central concerns of policy makers. Water supply has been on the

decrease, while the demand for water and the various end-users have been on the increased and this also has necessitated the thinking of water as an economic or social good. The general agreement in economics thinking is that, when the supply of a commodity is scarce relative to demand, the commodity is considered as an economic good. This therefore calls for the use of economic techniques for water demand management (Joseph, 2018).

Globally, water supply has been on the decrease, while the demand for water and the various end-users have been on the increase. This therefore, has created a gap between the demand and supply of water. This also has necessitated the thinking of conceptualizing water as an economic or social good for effective of water resources. The general agreement in economics thinking is that, when the supply of a commodity is scarce relative to demand, the commodity is considered as an economic good. This therefore calls for the use of economic techniques for water demand management. (Joseph, 2018).

According to Tamkinat and Wassif (2008) show that through pricing policies, existing demand patterns are modified to achieve various objectives such as cost recovery, conservation, and equitable allocation of water among different income groups. To implement this policy successfully, the value of water is reflected by the price elasticity of water demand such that if the demand is inelastic, the price has little or no effect on the quantity consumed. On the other hand, if elasticity is high, consumers indicate willingness to reduce/increase the use of water with changes in price. Clearly, this information is fundamental in deciding the way tariffs should be structured. Water pricing policy is seen as an effective mechanism to manage water use. Developing countries, which usually suffer from inadequate water supply facilities and comprehensive water pricing systems, need more practical and effective water pricing methods. In Nigeria, potable water supply is a public service, controlled by the government through states water boards, corporations or authorities and generally known as State Water Agency (SWA). As the services rendered by these SWAs are historically considered a social welfare service, their charges are usually at low rates which constitute only a fraction of the operational costs. This situation shown that the water produced in these utilities is not priced in accordance with the requirements of the law or edict establishing them. (Johnson, 2003).

Borno State Government subsidized water supply to the community by charging low water rate to maximize economic welfares of the people and installed boreholes in areas where treated or surface water supply cannot reach, without clear financial obligation and then bearing the annual losses. However, water demand was on the increase than the supply and technique or approach toward water charges called water pricing policies have being introduced due to obvious gap between urban demand and water supply as consequent on high population growth rate coupled with increasing urbanization and rising living condition. Hence, it is necessary to assess water pricing policies adopted in the study area in other to know how sustainable it is in address water deficiency. This study is vital because of the growing concern about water supply that does not match the demand of water. The study will pave way to research into water pricing policy and an appropriate tool for management of water supply in Maiduguri, Borno State.

Indeed, With the expansion of urban areas, infrastructural development and persistent need for water supply, many urban communities Maiduguri are still faced with the challenge of inadequate water supply. Water supplied for domestic and agricultural uses are generally inadequate. However, the supply of clean drinking water to meet the growing population is challenging in many societies. (Abdullah, *et al* 2019). Many households purchased water from private vendors, which was more expensively than from public supply. Thus, this calls for study focus on household's willingness to pay for water

LITERATURE REVIEW

Abdullah, *et al* (2019) studies Pattern of Residential Water Demand Analysis for Maiduguri Metropolis, North-Eastern Nigeria. The research presents the population projection and water demand of Maiduguri from 2006 to 2056. The studies explained that number of households having access to water has increased, yet the population has doubled over the year due to population expulsion in the city. Conversely, more than 57% of household water requirement in Maiduguri town is not met by the public water supply (PWS) due to poor funding, maintenance, and mismanagement of the available finances. It is noteworthy that most of the boreholes in the study area also operates below their design yields. The total average water demand was estimated to be 200000 L/day while only 84400 L/day was being supplied by 2016. Majority of the respondents are traders and civil servants whose earnings hardly sustain their family, because most of the respondents are low-income earners, they depend largely on water vendors for water supply. Besides, respondent's occupation is statistically significant ($p<0.05$) in determining water demand. The regression result also shows that income of households is positively and statistically significant in explaining water demand. A 1% increase in income increases water demand by 26.8%, and this is significant at 5% confidence interval. the living standard and income level of the people are directly related. People with higher income could satisfy their basic needs than low-income groups. It is clear that households with higher monthly income are more likely to obtain sufficient water at whatever cost.

Deborah (2012) studied the determinants of household water consumption in Jos Metropolis of Plateaus state, Nigeria. The results of the findings showed that 67% were the majority of the respondents whose sourced of water supply was public tap/borehole followed by 37% of whose sourced their water supply from private tap. Laudia el at. (2004) assessed the determinants of rural household willingness to pay for safe water in Kwara state of Nigeria. The results revealed that 41.7% were the majority respondents whose sourced their water supply from unprotected well. Coster and Otufale (2014) studied the households' water – use demand and willingness to pay for improved water services in Ijebu Ode of Ogun state. Results from the findings reported 59% were the majority of the respondent that preferred public piped.

Douglass North (1993) defined Institutions more broadly than simply government agencies and private organizations. According to him, institutions are "...sets of ordered relationships among people which

define their rights, exposure to rights of others, privileges and responsibilities". In this context, institutions set the "rules of the game" within which the economic system operates. For example, the property rights system is considered a water institution because it includes provisions which determine access to water and land. The property rights structure helps define the incentives, disincentives, rules, rights and duties (including informal customs and formal legal systems) that guide human activities and encourage conformist behavior. Thus, property rights are part of an institutional arrangement governing economic activities including water use (Whittington 2006).

Demand for Water

Essentially, the analysis of water demand aims at offering all the necessary information and knowledge for designing an effective water demand policy, and specifically a policy that pursues the efficient use of water resources. Accordingly, efficient use is defined as a pattern of use that maximizes the benefits arising from the exploitation of water resources (Bithas and Stoforos, 2006). A pure competitive water market would ensure efficient use by defining the optimum use of water and its optimum allocation among competitive users. Indeed, in a market that operates under competitive conditions, the price of water would be determined by the interaction of market demand and supply to reflect the actual costs of water usage. This price would induce users to purchase the optimum quantity of water. In this context, no exogenous administrative intervention would be necessary, as the “invisible hand” would, by itself, ensure the efficient level of use induced by an equilibrium price that reflects water costs. Furthermore, the “invisible hand” would lead to defining the appropriate investments in order to attain the efficient use of water in the future.

The economic characteristics of the water sector, in combination with the fundamental social perception that water is a socially sensitive good related to human existence and health, led to a strict administrative framework for the operation of the water supply sector and hence of the water market (Kaika, 2003). In effect, the fundamental decisions, like the determination of investments and prices, have been strongly influenced by administrative rationale. In such a framework of direct or indirect government interventions, the estimation of demand parameters and characteristics acquires a special significance, since the decision-makers require enough knowledge and information. The conditions for determining the efficient use of water and the relevance of demand analysis, which offers the necessary information, are traced in Figure 2.1.

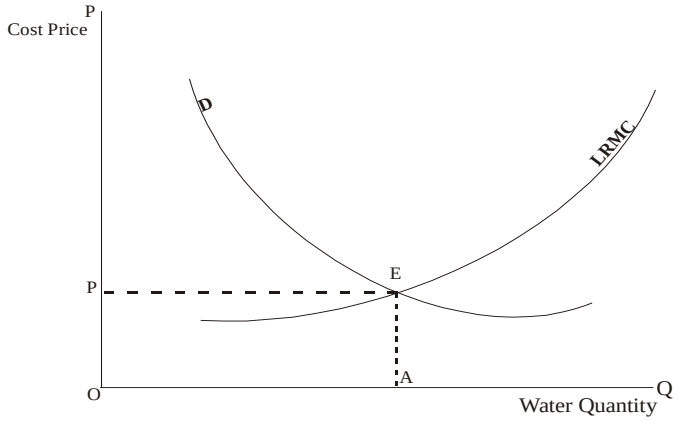

Figure 1. The Efficient Use of Water
Source: Bithas and Stoforos (2006)

The analysis of demand for water is an important step in economic analysis of water supply projects. From economic perspective, the price of water is an important determinant of the quantity of water demanded. The relationship between the quantity of water used and the price is illustrated by the demand for water in Figure 1. In the Figure, the LRMC curve represents the long run marginal cost of water supply. The data and the information for the estimation of the LRMC curve are to a significant level, available to the administrative agencies responsible for formulating water policy. However, the authorities are hardly aware of the functionality and operation ability of the long run marginal costs of water supply. Curve D represents the marginal benefits of water use. However, the information for defining curve D could be revealed in a free water market as well as through market surveys in the administratively supervised markets. If a competitive market exists, then the curve D defines the respective demand curve. The efficient use of water is determined by the intersection of the LRMC and curves D. OA represents the efficient quantity of water use (Bithas and Stoforos, 2006). In this light, the efficient optimum use of water would have prevailed in a competitive market.

In the administratively regulated markets, the achievement of effective use, OA in the Figure, can be ensured if the decision-makers define the appropriate price, OP, being equal to the marginal cost of OA water use. To define the appropriate price, decision-makers must have enough information on water demand. The analysis of demand can be an important tool in formulating the relevant investment policy. The key factor for making appropriate investment decisions is the expected (future) demand. Forecasting demand leads to the determination of the optimal future level of water use and hence to the design of the future capacity of the water supply system (delivery networks and processing plants). Water supply infrastructure is expensive, especially as far as urban uses are concerned. Therefore, the forecasting of water demand, and the definition of the level and the appropriate magnitude of investments, is of crucial importance for the decision- makers.

Another factor that affects demand for water is population growth. For example, all other factors remaining constant, annual population growth of two percent may result in doubling of both population and demand for water in future years. The opportunity cost of water (OCW) is therefore gone benefit of utilizing water for one water supply project compared to its next best alternative. Water can be utilized for several purposes like agriculture (irrigation and livestock), hydropower generation (electricity), and for domestic uses (cooking, drinking, etc.). The OCW is zero if water is abundant in supply, but if a choice has to be made between its alternative uses in order to provide domestic water supply then opportunity costs may be high. The income elasticity was seen to be very low in most of the previous studies (Shella, 2007; Briscoe, 1997; Renwick and Archibald, 1998).

Access to adequate water supply and sanitation facilities are usually described as basic needs. Among other things, this implies that lower-income households tend to spend a large proportion of their disposable income on water and sanitation. Moreover, their expenditures will be proportionately much greater than richer households.

Effects of Pricing Policy

The best tariff design is one that strikes the most desirable balance among the objectives that are important to the community. Peter, 2001 observed that consumers and suppliers have different expectation on water tariff. Consumers like high quality water at affordable and stable prices while suppliers like to cover all costs and generate a stable revenue from the supply. However, a good water fee rate is expected to generate revenue, improve welfare and equity (Peter, 2001). Thus, it is hypothesized that pricing policy would have the following effects: that an increased price would reduce demand for water; increase supply of water; facilitate re-allocation between sectors; improve managerial efficiency due to increased revenues; lead to sustainability; and reduce per unit cost of water to poor people.

Empirically, Montginoul (2007) carried out a study on diversity of water pricing structures, the case of France in conjunction with water resources management. The results of a 2003 national survey of urban water pricing structure implemented in 429 districts showed how each structure can be used to achieve different management objectives (water allocation efficiency, costs recovery, and equity). It then describes the structures adopted by French water utilities, showing that the flat rate was rarely adopted; declining blocks frequently used; and increasing blocks pricing which should be used to promote water use efficiency remain extremely rare. A statistical clustering is then conducted, and a typology of situations elaborated. The paper concluded with highlighting that current pricing structures are influenced by past practices and that the dominant objective of water utilities is to cover costs.

Lin (2015) presented a research work on Water Pricing in Australia: Unbundled Politics, Accounting, and Water Pricing. Price control and quantitative control are the two most commonly applied policy instruments for water demand management. This paper used a bio-economic model (BEM) to examine

the shadow price of water resources and to investigate farmers' response to water demand management policies in water scarce regions based on a study in the Heihe River Basin in northwest China. The results indicate that farmers are not very responsive to changes in water price, because it is currently far below the shadow price of water resources in most irrigation zones. A reduction of agricultural water demand could occur only with a large rise in the water price. In comparison, a quantitative control measure is more effective at reducing water use. Concerning the effects on farm income, a price control will cost much more suitable choice for the purpose of reducing agricultural water use, while minimizing farm income loss in the region of this case study.

Vasilis *et al* (2016) on determining a socially fair drinking water pricing policy: the case of Kozani, Greece. The Water Framework Directive (WFD) 2000/60/EC clearly indicates that all member states should develop and apply water pricing policies to recover the Full Water Cost (FWC) (including the direct cost, the environmental and the water resource costs). Drinking water pricing policies set by the water utilities today do not comply with the WFD basic principle. They are rather determined locally, without taking into consideration environmental (e.g. river basin water balance) or economic issues (e.g. socially fair allocation of the water cost).

REVIEW OF RELATED LITERATURE

Socio economic characteristic of Household Heads water demand

Gender

Ifabiyi (2011), in a study on willingness to pay for water (WTP) at the level of households in Ilorin, Nigeria, showed that majority of respondents 68%, were female, while 32% were males. Deborah (2012) studied the determinants of household water consumption in Jos metropolis of Plateaus state. According to the findings revealed that 60.1% of the respondents are male.

Age

Ifabiyi (2011) findings showed that majority of the respondents (66%) were within the age bracket of 31 – 50 years. Ubagida (2012) studied the effectiveness of pricing policy in households' water demand management in Kaduna state: A case study of Sobon Gari Local Government. The findings showed that majority (43.6%) of the respondents were within the age bracket of 31 - 43 years.

Marital status

Coster and Otufale (2014) studied the households' water use demand and willingness to pay for improved water services in Ijebu Ode, Ogun state of Nigeria. Results from the study indicated that majority of respondents (67%) were married. Aho, Akpan and Ivue (2016) studied the determinants of residential per capital water demand of Makurdi Metropolis. The findings showed that majority of respondents (59%) were single.

Educational level

Ubagida (2012) findings further revealed that majority (48.3%) owned higher institutions certificates. While Ifabiyi (2011) findings revealed that majority of the respondents (42%) have higher institutions certificates. Aho, Akpon and Ivue (2016) study show that majority of respondents (40.7%) owned tertiary undergraduate certificate.

Household size

From Ifabiyi (2011) study, the family size distribution of household water consumers showed that most of the respondents had family size of about 6 – 10 persons. This indicated that there were enough persons in each household consuming water. Aho, Akpen and Ivue (2016) found that 61.1% were the majority with highest household size of less than 5 persons; while Deborah (2012) found that 23.6% of respondents represent the majority, had two persons as household size.

Income level

Ifabiyi (2011) result on income in his study revealed that 48% of respondents emerged the majority which earned less than 50,000 naira. Ubagida (2012) findings revealed that majority of the respondents (40%) were persons of higher income level. While Deborah (2012) found that 24.5% were the majority earning income between 5,000 – 35,000 naira monthly.

Occupation

Coster and Otufale (2014) studied the households' water – use demand and willingness to pay for improved water services in Ijebu Ode of Ogun state. Results from the study indicated that majority of the respondents (60.6%) engaged in trading. Ubagida (2012) findings revealed that majority of respondents (49.6%) were civil/public servants. Deborah (2012) uncovered that majority of the respondents (45.2%) were student.

Households Willingness to Pay for Water

Choe et al. (1995) employed a Contingent Valuation Method (CVM) to examine household demand for surface water quality improvement. A total of 581 persons were interviewed a referendum kind of question about a citywide plan for an improvement in water quality. The result show that the support for the water quality improvement plan fell sharply as the monthly fee increases. From the estimation of WTP of different households from socio-economic characteristics, the result shows that household WTP for water quality improvement is low, both in absolute and percentage, and 15% of the respondents refused to pay. Several results from the research suggest that these low estimates of WTP for surface water quality improvement are likely to reflect respondents' true preferences.

MATERIAL, METHOD AND EMPIRICAL RESULT

This study addressed two research questions, (1) the water pricing policy adopted by Borno State water Corporation in Maiduguri and (2) the household's willingness to pay for water. Primary data were collected through administration of questionnaire, the questionnaire designed for collection of data was

adopted from Ayanshola *et al*. (2013) and Ubangida (2012). The questionnaires were structured using two response style questionnaires and five-point Likert scale, ranging from strongly agree having a score of 5, agree having a score of 4, undecided having a score of 3, disagree having a score of 2, strongly disagree having a score of 1 and open-ended questions which allow free responses from the respondents. Besides, water provider comprises of officials of the Borno State Water Corporation working in Maiduguri. The population was stratified into departments and sample size was drawn from each department's proportion to the size of its personnel. Data were collected through questionnaire which was administered to respondents and purposive sampling was then used to collect data from staff in each department. 181 questionnaires were used for the study due to their completeness and consistency. Households within Maiduguri metropolis was stratified into wards and respondents were selected from each ward in proportion to the size of its population. Systematic random sampling was then employed to select household heads in each ward based on the sample frame and 293 questionnaires from respondents were used for the study due to their completeness and consistency. For both the two research questions their sample size was obtained in accordance with the measuring table of determining sample size suggested by Krejcie and Mongan (1970).

Data collected were related to socio-economic characteristics of both sample staff of Borno State Water Agency in Maiduguri and also the households in Maiduguri Metropolis. Maiduguri was purposively chosen being the state capital, densely populated and has record of large volume of water demand and supply.

Descriptive statistics was used to analyze the data for research question (1) while Probit Regression was used to analyze the data gotten from research question (2). The result of the study revealed that domestic water flat rate was adopted as water pricing policy by Borno state water corporation in Maiduguri. This involves an equal charging water rate to households, and at a very low rate. The second research question result of the study revealed that some socio-economic characteristics of respondents captured in the probit regression influenced household willingness to pay for water which are age, education qualification, household size, income level, household awareness of water problems, time of water availability, perception of respondents on the amount paid for water supply and perception of respondent on the need to improve water supply.

The Table below shows the water pricing policy adopted in the study area. Domestic water flat rate is the only adopted pricing policy in Maiduguri Metropolitan Area by the Borno State water Corporation. This involves uniformly charging household a very low water rate or tariff of ₦300 monthly which is considered affordable.

Table1: Water Pricing Policies

	Frequency	Percent	Valid Percent	Cumulative Percent
Domestic Water Flat Rate	181	100	100	100
Water Fixed Rate	0	0	0	0
Water Metered Rate	0	0	0	0
Total	181	100	100	100

Table 5.1 buttressed water pricing policy adopted in the study area. Domestic Water Flat rate is the single and widely adopted pricing policy by the Borno State water institution revealed from the table above. This involves uniformly charging household a very low water rate or tariff that is affordable by all based on a single connection from the public water or State Water Board irrespective of the household size in a house unit.

According to Borno State Ministry of Water Resource (BSMWR) report (2015), it was revealed that the current water tariff was adapted to suit social and political situation of the study area. Borno State Water Board's (water provider) income comes from monthly recurrent subsidies and capital subventions from the state government, in addition to water rates and charges. The income derived from charges is relatively small compared to the cost of operating and maintaining the existing water systems. Objective of the tariff is to ensure that optimum portable water is supplied without compromising the cost of provision of the water utility (Laugeri, 1982).

In support to the above, Ayanshola (2013) affirmed that monthly flat rate of N200 charged by Kwara Water Corporation is much lower than the average monthly of N737.22 people are willing to pay for an improved and a reliable water supply to the city. Most Nigerian water supply connections are not metered. The metering ratio varies from 7% in Katsina to 16% in Kaduna and 24% in Lagos in 2007. Unmetered customers are charged a flat rate independent of consumption. For unmetered residential customers, the monthly flat rate was USD 3 in Lagos, USD 5 in Katsina and USD 11 in Kaduna. In Yobe state it was only Naira 100 (USD 0.60) per month, the lowest level in the country according to the Yobe State Water Corporation. The tariff revenues covered only 2% of the costs of supplying water.

Method

Probit Regression model was employed for data analysis. Probit analysis is designed to fit a regression model in which the dependent variable Y characterizes an event with only two possible outcomes. The probit model was used for the binary response (0, 1), that is, whether the household is willing to pay or not for the offered bid. Following Cameron and Pravin (2005), the probit model takes the following form below.

$$Y_i^* = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \cdots + \beta_k x_{ki} + \varepsilon_i \quad (1)$$

and that:

$$Y_i = 1 \text{ if } y_i^* > 0$$
$$Y_i = 0 \text{ otherwise.}$$

Where x_1, x_2, - - - - - -, x_k represent vectors of random variables, and ε_i represents a random disturbance term.
While the explicit function is,

$$WTP_i = \beta_0 + \beta_1 Agei + \beta_2 EDUCQ_i + \beta_3 HHS_i + \beta_4 HIL_i + \beta_5 HAW_i + \beta_6 TWA_i + \beta_7 PWS_i + \beta_8 PIWS_i + \varepsilon_i \quad (2)$$

where WTP (WTP for water tariff) is dependent variable, the probability of 1 (yes) if the households are willing to pay tariff for improved water and 0 (no) otherwise. X_i is a set of independent variables. β_0 is the intercept which is constant and β1 - β8 are coefficients of explanatory variables estimated by probit regression. ε_i is the error term. The explanatory variables are expressed as described by Raheem (2006) which were modified to suit this study. WTP has been defined in previous section; Age is age of household heads in years; EDUCQ defines as educational qualification of household heads: primary school = 1, secondary school = 2 and higher institution = 3; HHS is household size in numerical number; and HIL is measured as household heads' income level, measured in local currency (naira, N). While HAW is a dummy variable, determined as household awareness of shortage in water supply, ranged as 1 (yes) and 0 (no) otherwise. TWA is time of water availability daily, quarterly captured as: 1 – 6 hours = 1; 7 – 12 hours = 2; 13 – 18 hours = 3; and 19 – 24 hours = 4. PWS and PIWS are also dummy variables, the former expressed as perception on the amount pay for water supply, ranged as 1 (yes) and 0 (no) otherwise, while the latter is expressed as perception on the need to improve water supply, ranged as 1 (yes) and 0 (no) otherwise.

Empirical result

The empirical result of the research was vividly explained below.
The socio-economic characteristic of the respondents showed that about 81% of the household heads were male. Majority (81%) are between ages of 36 – 55 years and 30% of respondents have about 6 - 10 household members. Majority (57%) of the household heads have tertiary education. The household heads in the study area were mostly civil servants and earn above N50,000 monthly. Majority of the household heads (71%) had active water supply connection.

In Table 6.1 below, the coefficient of age (0.62) is statistically significant at 5% and positively related to willingness to pay water tariff. This implies that the likelihood of paying for water supply services rise as respondents' age increases and this agrees with the apriori expectation. This may be due to the fact that the old people who have adapted themselves to the water supply service have high preference and more willing to pay for water tariff as compared to their younger counterparts coupled with lack of physical strength to fetch water far from home. This agrees with Omonona *et al.* (2011) and Mamudu (2016), who

recognized that the older the respondent, the higher is the preference and willing to pay for the water service.

As indicated in the Table the coefficient of household heads level of education (1.95) is significant at 1% and positively influenced willingness to pay water tariff. This implies that the education level of respondents is an additional factor which is ought to influence willingness to pay for water supply services. The awareness of the source of water and the importance of good water hygiene ultimately influenced their decision on payment of water tariff. Similar result was obtained by Omonona *et al* (2011), Ifabiyi (2011), Mamudu (2016) in their study on estimating the willingness to pay for water services.

The coefficient of household size was also significant at 1% level and positively influenced willingness to pay water tariff. Increasing household size could exert more pressure on households need on portable water since this need tend to increase with the number of persons in the households. This implies that as households size increases, the probability of positive impact on households' willingness to pay for water tariff also increases. This is in line with the studies of Mamudu (2016), he found that when household size increases the probability of the household saying yes to willingness to pay for water tariff is also high.

Table 2 WTP Estimated Model n = 293

	Coefficient	SD Error	t-value	*p*-value
Constant	1.931116	0.709782	2.721**	0.0401
Age	0.622553	0.131159	4.747***	0.0102
EDUCQ	1.955758	0.265853	7.357***	0.0023
HHS	1.500696	0.277045	5.417***	0.0095
HIL	3.944736	0.416034	9.482***	0.0002
HAW	-0.479088	0.182727	-2.622**	0.0423
TWA	-1.247023	0.303417	-4.110***	0.0192
PWS	0.680963	0.307746	2.213**	0.0496
PWS	0.515091	0.201534	2.556**	0.0414

Log likelihood = 95.168696
LR chi^2 = 211.90
Prob>chi^2 = 0.0000
Pseudo R^2 = 0.895853

Note: SD = standard. ** = significant at 5%, *** = significant at 1%

The coefficient of income level, as presented in Table 6.1, is significant at 1% and this implies that for everyone naira increase in households' income level, willingness to pay for water tariff would also increase by 3.9. The income variable has a positive influence on willingness to pay. According to economic theory, the level of consumption of an individual depends largely on his level of current income

as propounded by John Maynard Keynes, the absolute income hypothesis. He stated that, the current real income is the most important determinant of consumption in the short run. This result also confirms with another economic theory, Income Effect Theory of Consumer Choice, which states that an individual/household demand for a commodity depends on his/her income, and that income is positively related, except in the case of inferior goods (Bayrou, 2002). Therefore, an increase in respondents' income will increase the likelihood of paying for water supply services. This agreed with Ayanshola et al. (2013), in a research in Ilorin that household income level have significant impact on WTP at 5% level of significance. Ifabiyi (2011) also reported that household income is the best predictor of willingness to pay in Ilorin with 83%.

Table 6.1 indicated that coefficient for households' awareness of water supply deficiency is statistically significant at 5% and negatively influenced household willingness to pay for water services. The result implies that the respondents are relatively less satisfied with the existing water services, but they are still willingness to pay for the service with the hope that the service will be improved. This is in support to the study conducted by Rananga *et al* (2015) which showed that respondents were dissatisfied with the unreliable water services (89.9%); but they are willing to pay for secured reliable water services (95.5%).

The coefficient of availability of water (in terms of the number of hours water is available per week received) is statistically significant at 1% level and showed a negative relationship with household's willingness to pay for water tariff. This implies that the household, though, willing to pay water tariff are relatively less satisfied with the existing time of water availability. This is in support to the research conducted by Omonona *et al* (2011).

The coefficient of the perception of household on the amount paid for water supply is statistically significant at 5% and it's showed a positive relationship. The result implies that households are satisfied with the amount paid for water supply and they are willing to pay for it. This is also in line with the finding by Omonona *et al* (2011), revealed that household public water consumers are satisfied with the water delivery service level and tariff at price that deem to be value for money.

The result also showed that the coefficient of perception of respondents on the need to improve water supply is statistically significant at 5%. The value indicates that respondents have positive perception on the need to improve water supply system in the study area. This implies that despite challenges in the delivery of adequate portable water, household are still willing to pay the water pricing or tariff. This is in line with Bayrou (2002) research work, the result revealed that the mean willingness to pay for improved water service is higher than the existing tariff. The affordability analyses result also indicated that consumers are willing to pay if they are provided the improved water service at a price equal to the average incremental cost of providing the improved water supply service.

CONCLUSION

The study examined water pricing policy adopted by Borno state water corporation in Maiduguri and household's willingness to pay for water. The study concluded that male dominated both staff/officials of Borno state water corporation and households, most of them were married, in their active ages and have tertiary education. Household relied on public water connection as their main source of water. This is because it is the most reliable, hygiene and cheapest to afford among other sources of water supply in the study area. Domestic water flat rate (₦300) is charged to suit social situation in the study area.

In the light of the above findings, the following recommendations are made. Water consumption should be metered so that household heads will only pay for what they consume instead of adopting flat rate. This can go a long way in changing consumers' attitude towards payment of water bills as well as encourage efficient water use and this can provide the Water Board enough revenue/funds that will ensure efficient and effective water supply. The variables and socio-economic characteristic identified influencing residential or household heads willingness to pay for water should be considered when planning water supply. Also, other studies on agricultural, industrial and commercial water demand should be done to estimate the total per capita water demand of Maiduguri. The wideness of the study area prolonged the administration and retrieval of questionnaires from respondents within the scope of the study. The researcher was able to overcome this challenge by employing two research assistants to administer the questionnaires to the respondents and quick retrieval of the questionnaires from the respondents.

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