

TOWARDS THE COMMERCIALISATION OF URBAN WATER SUPPLY IN NIGERIA – RESULTS OF A WILLINGNESS TO PAY SURVEY IN ZARIA

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Abstract

The National Policy for Water Supply and Sanitation of the Federal Government in Nigeria (NPWSS) strongly advocates the adoption of commercialisation and privatisation of piped urban water supply as a means of ensuring its sustainability through full cost recovery. This paper examines the economic feasibility and implications on access to water supply if this policy is eventually implemented using the case study of Zaria. A household survey was conducted to assess willingness to pay using contingent valuation procedures. Compared with present flat tariff of N 400 for single tap connections, it is shown from the data that 44% of households were willing to pay N 600 or more monthly under a commercialised regime. However, most households not presently connected indicate inability to pay for the initial cost of connection to the water supply system even under improved service conditions. The data was tested for differences among the 16 neighbourhoods using ANOVA, whence it is revealed that although there are no significant ($P = .05$) differences in the willingness to pay for monthly bills, there were significant differences (within and between groups) in the willingness to pay for connections. The implication drawn from this trend is that economically, there is a capacity to commercialise water supply as proposed in the NPWSS.

Introduction

There is an increasing trend towards pushing policies for urban water supply on cost recovery and commercialisation principles in Nigeria. In line with this, many state-owned water supply institutions have embarked on regular and progressive tariff reviews in a bid to recover costs and improve service delivery. Recent developments in the country, heralded by the institution of the National Policy for Water Supply and Sanitation (NPWSS) clearly spell out commercialisation and privatisation as the ultimate policy frame for urban water supply. This makes it imperative that investigations be undertaken on the feasibility and implications of implementing the policy. The study is motivated by the need for more empirical evidence in support of the tacit contentions on the feasibility of commercialisation and the necessity of its application to revive the urban water supply sector as implied in the NPWSS (Nigeria, 2000).

The main question that needs to be answered is whether households can pay commercial tariffs to secure access to water supply under the imminent commercialisation and privatisation policy. Findings of this survey in Zaria Urban Area revealed willingness of household heads to pay for connection to a postulated improved water supply system under a commercial regime that is based on full cost recovery for the provider.

Two parameters are applied in the survey: willingness to pay for tariffs in an improved supply situation as determined by the cost to the Water Board, and secondly, the willingness to pay for initial connections. This was done by employing contingent valuation method of assessing willingness to pay and was aimed to provide insight on a number of issues for discussion relating to the financial feasibility of the commercialisation and the

consequences on access to be expected should the policy be pursued as proposed in the NPWSS.

The Concept of Willingness to Pay

Willingness to Pay (WTP) is basically the maximum amount that individuals state they are willing to pay for a good or service. Most other conceptions revolve around the same idea applied in general terms or with reference to the assessment of the monetary value of public goods as used in Cost-Benefit Analyses. Conceptually, we can surmise that willingness to pay assessment is an attempt to arrive at a hypothetical value attached by people for a good or service which may or may not be presently supplied (Cummings, 1986; Mitchell et al, 1989; Wedgwood and Samson, 2003). The assessment amounts to predicting what people will be able and willing to pay for the good or service in the future. The concept therefore encapsulates both elements of ability and willingness. This is under an assumption that given a hypothetical scenario of the service or good in question at specified standard, people will indicate an amount of money they would pay for it, above which they would rather do without it. Practical utility is made of such estimates by comparing them with existing tariffs if any, and with the actual cost of providing the service.

The dearth of appropriate measures of the value of public or semi-public goods like water supply, for which a conventional demand-supply based pricing will not adequately capture, makes the use of this concept most appropriate and generally acceptable as a proxy (Majundar, 1990).

Estimating Willingness to Pay

Contingent Valuation (CV) is the most widely employed method in the assessment of Willingness to Pay especially in the urban water supply sector. The method involves the presentation of a scenario of an improved service in a questionnaire survey. Respondents are asked to indicate an amount they feel they can and will pay should the service be available at a specified standard. The individual, aggregate and mean values are used to compare with the cost estimates to determine the level of WTP, and hence, of access for the service to be expected should a particular price be charged. The procedure is widely employed in the evaluation of tariff policies, Cost-Benefit Analyses and implementation programs for water supply, sanitation and other services and facilities (Cummings, 1986; Mitchell et al, 1989; Whittington et al., 1989, 1990, 1993).

Methodology

Sampling Frame

The study covered the entire Zaria Urban Area as defined by the main administrative and social units forming its basic structure. Questionnaires were administered according to a two-stage cluster sampling design with those four districts, comprising the first stage clusters. Each of them was divided into another set of four clusters, roughly coinciding with the existing neighbourhood structure of the urban area, giving rise to a lattice of 16 sampling areas.

One block each from the 16 neighbourhoods was selected on the basis of centrality. After selecting the block and using systematic sampling procedures, 20 compounds were randomly selected in each from which one household head each was interviewed.

The sample size of 20 was found sufficient as it reflects the average number of compounds in a street block and is appropriate for the type of data analyses conducted. This gave a total of 320 households for the whole urban area. The sample size of 320 for the study area was considered adequate in view of the fair spatial representation that

cluster sampling used in the selection of street blocks for the administration of questionnaires in the household survey afforded.

Criteria Used for Assessing Willingness to Pay

The willingness to pay survey for different aspects of water supply by households was investigated using two sets of questionnaire – for households already connected to the public water supply system and those not connected respectively. The questionnaires enquired on the household's characteristics, water supply situation and willingness to pay commercial tariffs for an improved water supply. In eliciting information on willingness to pay, the questionnaires presented a hypothetical scenario of an improved system with water constantly available "24/24" to the respondents and enquired how much household heads would pay maximally for the services using open-ended question format.

Two components of willingness to pay were assessed – willingness to pay for connecting a residence to the system and for the payment of monthly bills. This is in view of the fact that the capacity to pay for the connection fee can be a strong barrier to decisions to connect, making it possibly more important than the ability to pay periodic consumption charges. This is the case considering the limited nature of the water supply network in the study area, which makes connections to a large part of it very costly. The study therefore attempted to capture this factor as well, and produce results reflecting a two-fold dimension. Findings on the willingness to pay for connection were used to draw important implications of commercialisation on access. For evaluating the result of the willingness to pay surveys, a comparison was made with estimates of actual costs in respect of both connections to the system and the cost of production.

Water Production Cost

The Kaduna State Water Board is the institution responsible for water supply in Zaria. Investigations show that it has no data on the actual production cost figure for water supply in the study area though it has issued an official estimate of ₦ 14 / M³ for the whole state which includes other towns. It is reasonable to assume that the Zaria water system operates at a similar level, considering that it is able to sustain current services without regular subventions for recurrent expenditure from the Government. It was assumed adequate therefore, to estimate that a 50% rise on the present tariff might be sufficient to cover the full cost of production. This is in line with the general trends in the cost of producing water among utilities globally (AWUP, 2000). The proposal on tariff was therefore N600 for single tap and N1000 for full connections. The estimate was an attempt to harmonise different accounts of existing official costs given by the Board for the whole State. A similar estimate was also made for the cost of connection, which came to a minimum of about N6, 000, assuming the use of least cost materials. The cost of connection assumes that service lines are available in the vicinity of each residence. Taking the cost component of the assessment as described above, the methodology adopted proceeded to use it as a benchmark and compared it with what households indicate they can pay maximally for water supply, given a scenario of improved services.

The benchmarking conceptually identifies the point at which the theoretical marginal cost curve (represented in this case by a fixed average cost curve) is bisected by the marginal WTP curve, thus defining an effective demand threshold for water supply as shown by Barker (1997). The procedure was applied to both the two types of access facilities (full connection and single tap connection) commonly used in the area in respect of the cost of having a private connection and the requisite tariff for monthly bills.

The study was able to establish important assessment criteria including the mean values of amounts households can pay and the proportion of households that can pay above and below the set benchmark, which served as the critical indices for the exercise.

In addition to the general depiction of the pattern using descriptive statistics, the analysis was anchored on comparisons reflecting the 16 neighbourhoods, each represented in a sample. Differences between the samples in the incidence of the key variables of connection status and willingness to pay tariff were assessed using Analysis of Variance (ANOVA).

RESULTS

Willingness to Connect to Proposed System

Households not presently connected were asked whether they were willing to connect to the public water supply system given the hypothetical picture of improved services with water available constantly and provided on commercial basis. A majority of the respondents (66%) expressed a willingness to connect, preferring in most cases, single tap connections as against full connections (Table 1). This cuts across all the neighbourhoods studied. However, a large proportion (44%) of households indicated non-willingness to connect and pay above the present tariffs or anything at all. The principal reason given is the need for Government to provide the service at subsidised rates.

Amount Willing To Pay For Connection

Given that some households not presently connected would want to connect if the system improves, the actual amounts they pledged as maximum they would pay was investigated (Table 1). The amounts indicated vary widely from N1, 000 to N20, 000 - the variation being accounted for within rather than between the samples. Thus, as the ANOVA shows, there are wide variations within and not between the samples, significant at 95% confidence level. While the former indicates general uniformity in the data across the urban area, the later indicates variations in individual household circumstances probably in income and access to alternative sources of water.

Table 1: Result of Willingness to Pay for Water Supply in Zaria

| Neighborhood | Willingness to Pay for Connection | | Willingness to Pay for Monthly Bill (Single Tap) | | Willingness to Pay for Monthly Bill (Full Connection) | |
|----------------------|---|-----------------------------|--|---------------------------|--|----------------------------|
| | Mean Willingness to Pay (₦) | Cases ≥ ₦ 6,000 Cut Off (%) | Mean | Cases ≥ ₦ 600 Cut Off (%) | Mean | Cases ≥ ₦ 1000 Cut Off (%) |
| Kwarbai | 3000 | 0 | 825 | 69 | 650 | 50 |
| Kaura | 5900 | 50 | 684.70 | 29 | 900 | 50 |
| Iya | 2833 | 0 | 664.28 | 43 | 1250 | 100 |
| Juma | 3116 | 17 | 642.81 | 50 | 750 | 50 |
| Gyallesu | 4727 | 36 | 483.33 | 8 | 760 | 40 |
| T/Wada | 5000 | 0 | 509.09 | 9 | No Full Connection | |
| T/Jukun | 4929 | 29 | 1200 | 22 | 1283.33 | 83 |
| Wusasa | 2000 | 0 | 649.16 | 42 | 691.66 | 17 |
| S/Gari | 5000 | 0 | 733.33 | 22 | 1500 | 100 |
| Muchia | 7200 | 50 | 726.92 | 31 | 1266.66 | 33 |
| GRA | - | - | 1000 | 100 | 1750 | 83 |
| Kwangila | 2000 | 0 | 958 | 60 | No Full Connection | |
| Palladan | 4000 | 0 | 600 | 4 | 1500 | 100 |
| Zango | 5000 | 50 | 781.25 | 0 | 1020 | 60 |
| Samaru | 5000 | 0 | 778.57 | 50 | 2350 | 100 |
| H/Dogo | 3179 | 7 | 713.33 | 57 | No Full Connection | |
| Zaria Average | 4316 | 23 | 772.19 | 44 | 1230.20 | 65 |
| Remarks | Survey addresses only households not presently connected and that are not renting | | Nearly half of the households are below the cut-off level. | | Only 10 % of presently unconnected households expressed desire for full connection | |

Source: Field Survey, 2005

Comparing the maximum amounts pledged for connection with the estimated cost of N6000 as cut off, the data shows that only 23% of the cases are at or above the cut off in the overall situation.

Amount Willing To Pay For Monthly Bill

Household heads were requested to indicate the maximum amount they would pay as monthly bill under the proposal. The data is presented separately for single tap connections, which is the dominant form of access to the delivery system and for full connection. For single tap connection tariff, a wide range of pledges were made (N200 – N3000) in all the neighbourhoods, although the ANOVA reveals that the differences between the neighbourhoods are not significant.

There is a relatively low willingness to pay among the few households having full connections. Thus, even in the exclusively high-income area of GRA, up to 17% have indicated values less than the cut-off level. The present poor level of services is perhaps the explanation for this, making the low values protest responses. However, generalisations will be difficult in view of the small number of households who have or desire to have full connection. This is the only incidence of willingness to pay being substantially less than the cut-off benchmark. In the group comparisons, the data reveals significant differences both within and between the neighbourhoods (Table 2).

| Source of Variation | SS | df | MS | F | P-value | F crit |
|-----------------------------------|--|----|----------|----------|----------|----------|
| Between Groups | 11441615 | 12 | 953467.9 | 2.083486 | 0.045331 | 2.041112 |
| Within Groups | 16017083 | 35 | 457631 | | | |
| Total | 27458698 | 47 | | | | |
| Source: Field Survey, 2005 | Remarks Significant differences exist between and within the neighbourhoods in the amounts households would pay to have full connection at 95% confidence level. | | | | | |

| Source of Variation | SS | df | MS | F | P-value | F crit |
|-----------------------------------|---|----|----------|---------|----------|----------|
| Between Groups | 200442885 | 14 | 14317349 | .575726 | 0.109421 | 1.842263 |
| Within Groups | 608774675 | 67 | 9086189 | | | |
| Total | 809217561 | 81 | | | | |
| Source: Field Survey, 2005 | Remarks Between-group differences among the neighbourhoods in the amounts households are willing to pay for connection are not significant at 95% confidence level. | | | | | |

Table 4: ANOVA Single Factor Analysis: Amount Willing to Pay for Monthly Bills – Single Tap

| Source of Variation | SS | df | MS | F | P-value | F crit |
|----------------------------|---|-----|----------|----------|----------|----------|
| Between Groups | 5095978 | 15 | 339731.9 | 1.493854 | 0.112089 | 1.725581 |
| Within Groups | 38661362 | 170 | 227419.8 | | | |
| Total | 43757340 | 185 | | | | |
| Source: Field Survey, 2005 | Remarks No significant difference between the neighbourhoods in the amounts households are willing to pay for monthly tariff at 95% confidence level. | | | | | |

DISCUSSION

The Feasibility of Commercialising Water Supply

While willingness to pay monthly bills has been shown to be high across the board, the willingness to pay for connections is in contrast, considerably less. It would appear therefore, that direct access by most households in the low-income group might only be achieved if connection fees are waived or subsidized. The alternative is to promote access for this group through shared facilities.

This strengthens the argument for willingness to pay level in support of the commercialization drive, although as shown in most willingness to pay surveys, this need to be taken cautiously. This is because of the likelihood of over estimation of the actual situation due to the tendency of respondents under condition of poor supplies to strategically exaggerate their WTP bids (Mitchell et al, 1989; Lee and Anas, 1992; Wedgwood and Samson, 2003)

Implications

Relevant issues to address in implementing reforms towards commercialisation with particular reference to safeguarding the low income include mode of access, tariff policy and choice of an appropriate institutional framework. However, it should be pointed out that operations of the urban water supply sector are such that local circumstances require tailor-made strategies to address the problem. In addition, for any given situation, detailed studies are needed to determine particular courses of action at all levels both on the design of projects to address the water supply problem in general and strategies focussed on access by the low-income.

Since securing direct access to the supply system may not be feasible for a large proportion of households as the data suggests, this may be secured satisfactorily from suitable low-cost options especially point sources - Public Stand Pipes (free access) and Distribution Kiosks which are commercial. These have proved suitable and convenient in several low income situations globally in view of the lower cost of distribution that point distribution water supply generally entails. Point networks are also more appropriate from the perspective of resource conservation and environmental protection since they generally entail lower per capita consumption and generate less wastages and leakages. They are also appropriate in meeting the basic water requirements for sanitation (usually on-plot and based on pit latrines in most Nigerian cities) and the actual water requirements of households.

Conclusion

As shown in the survey, the population may in aggregate terms be able to support a commercially based water supply system as indicated by the mean willingness to pay. However, a substantial number of households will not be able to have direct access, largely due to the inability to finance initial connection costs. The occurrence of such households points to the potential of alienating substantial parts of the urban population from direct access should privatisation as envisioned in the NPWSS proceed without addressing this issue. The capacity of households to pay for initial connections needs to be addressed as it has generally not been a subject of reference in the articulation of the NPWSS.

Whether water supply services and infrastructure in general should be charged for, and at what rate and manner continue to be a major issue in urban development policy in both developed and developing countries. While there is little debate on the matter concerning most infrastructure and facilities in the urban milieu, the question is significant for services like water supply, sanitation, electricity and solid waste management, whose private benefit component is strong and whose consumption may be more readily made exclusive.

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