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Cost Analysis of Domestic Water Consumption in Calabar Metropolis, Cross River State, Nigeria

Samuel U. Ukata, Egbai O. Ohon, Eric J. Ndik*, Ewa E. Eze and Uquetan U. Ibor

Department of Geography and Regional Planning, University of Calabar, Calabar, Cross River State, Nigeria
*E-mail: *<jemikeric@yahoo.com>*

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ABSTRACT This paper studied the cost implication of domestic water consumption in connected and unconnected households to public water supply within Calabar Metropolis. Based on their political units, ten residential areas of Ikot Ansa, Essien Town, State Housing, Big Qua, Akim Qua, Henshaw Town, Goldie, Atamunu, Mbukpa and Anantigha were randomly selected for the study as representative of the entire Calabar Urban. About 230 copies of questionnaire were administered to different heads of households and staff of the agency for public water supply. Out of this number, 200 copies were retrieved from respondents. Data were analyzed and presented in tables. From the result, it was discovered that, the unconnected households spend monthly average of between 9.3 dollars and use 564 litres of water as against 4.5 dollars and 741 litres consumed by connected residents. The unconnected households also cover distances between 250 and 500 metres far above threshold level of 100 metres to obtain the commodity for their usage. The uneven distribution of water supply mains, and low level of income of residents in some parts of the metropolis, restricts the supply of water in desired quantity to most urban dwellers. This is responsible for the low per capita consumption of 20 to 22 litres recorded. The study recommends increase in water pipeline densification across the city; the reduction of tariff charged consumers and the provision of additional standpipes at strategic locations to make the service rendered by municipal water board more sustainable.

INTRODUCTION

Africa may be facing water crisis in the next decade if urgent and deliberate steps are not taken to address the current water problems already manifesting. Studies by Shiklomanov (2002), Alayande (2005) and Emaobina (2006) revealed that water supply in Nigeria like other developing countries is facing serious challenges many of which are economic, and socio-political in nature. Water is essential for the life of our planet and its availability in the required proportion and quality for human consumption has assumed a crisis dimension across the globe (Green 2002). The commodity once viewed as infinitely renewable and bountiful resource is today under pressure as never before (Siegnor 2005).

In the words of Ghali (2005), the next war among countries will not be for oil or territorial boundary but only for the problem of water as access to fresh water resources today defines and confines human, social and economic development aspirations in many parts of the world. The demand and supply of water in relation to per capita income is a thing of concern in developing countries, especially where demand does not correspond with generating capacity of the people. Domestically, water is used for drinking, cooking, laundry, dish washing, house-cleaning, personal washing, car washing, watering of lawns and for other activities.

It is also important in the area of agriculture and industrial production including the processing of raw materials for export (Howard 2003). But the gap between water demand and actual supply has widened in Nigeria's urban centers which may include Calabar despite the continual efforts made to develop the nation's vast resource. Oyebande (1975) estimated that less than 0.5 percent of the total available water use and the per capita water supply for all uses stood at 6 litres per day. The United Nations per capita demand standard of 120 litres and 60 litres per capita per day for urban and peri-urban areas respectively by 2020 seem to be unrealisable among developing economies amidst competing demand for other infrastructural needs of their teeming population.

Consequently, this paper examines the cost implication of public water consumption by households in Calabar metropolis given the fact that facilities improvement by the agency concerned has been on-going for a period of five years (2005-2010)

Study Area

The area is Calabar Metropolis is located at the south- eastern end of Nigeria, between lon-

gitude $8^0 17'$ E and latitude $4^0 58'$ N. The town is flanked by Great Kwa river. The geology of the area comprises the tertiary sandy deposits of fluvo marine origin which are overlaid by quaternary silty and clayey alluvian, eroded from Oban hills in the outskirts. This characteristic poorly consolidated, non-cohesive and porous rock formation permits large accumulation of ground water with slight variation at different rainfall regimes (Fig.1).

The annual average rainfall is about 2000mm (Ayoade 2004). Temperature rarely falls below 19^0C with an average of 27^0C all over the year. The relative humidity is usually between 80-100 percent and a vapour pressure in the air averaging 29 millibar throughout the year. These climatic variables typical of this zone encourage ground water recharge which if properly harnessed could make the commodity readily available at affordable rate / quantity to urban dwellers.

MATERIALS AND METHODS

The entire Calabar was delineated into different sample sites. These sites were randomly selected in line with the political division of the metropolis into Calabar municipality and south. On the whole, ten sampling points, five each from either units fitted into the research criteria. Hence, such residential areas as Big Qua, Akim Qua, Henshaw Town, Goldie, Atamunu, Mbukpa and Anantigha were studied as representative of the entire city.

The Data

The major instrument for data collection was questionnaire designed to elicit information from domestic water consumers or households, both connected and unconnected. It also covered staff of the supply agency for clearer understanding of their activities in an attempt to serve members of the public better. All together, 230 copies of questionnaires were administered to residential areas shown in the map. Cognizance was taken of the population of residence in each case to ensure proportionality in copies administered during the exercise. For connected residents, basic questions on cost of water subscription or installation, amount paid as monthly bills and the regularity in supply as well as water quality were asked. Similarly, questionnaires for unconnected households sought information on major source of domestic water supply, its reliability, distance from the supply source, number of trips covered, sizes of containers and their various prices, changes in price of containers over the years and health problem associated with water consumption. Data were also got from journals and documented facts necessary for the study.

RESULTS AND DISCUSSION

The national water supply policy prescribes water for all with 120 liters and 60 liters per capita per day for urban and peri-urban / rural areas respectively by 2020 (National Bureau of statistics 2005). From the data on quantity of water produced by municipal water board as seen in Table 1, it was observed that the agency had a storage capacity of 105, 000 m^3 of the commodity meant to serve a projected population of 2,432,282 persons by 2015. This implies that the quantity available to end-users in the metropolis far exceeds the prescribed 120 liters for Nigerian urban dwellers in 2020. The factors of disparity in income level, inadequate densification of water means combine to pose a common problem of accessibility to consumers.

Table 1: Quantity of water produced by municipal water board (in liters)

Location of storage tank	*Quantity stored*	*Intake point or source*
Ground level reservoir opposite University of Calabar gate	1073 m^3	Groundwater
Elevated reservoir at Etta-Agbor	1700 m^3	Great Kwa river
Diamond hill	1700 m^3	Ground water
Ikot Effanga	500 m^3	Great Kwa river
Henshaw Town	830 m^3	Ground water
Total	105,000 m^3	

Source: Municipal Water Board 2010

The study revealed that on an average, a person in unpiped home consumes 21 liters of water which is even far below the quantity estimated by Ayoade and Oyebande (1987) of 46 liters to 115 liters for Nigeria and temperate countries. Also, a survey on water supply situation in Calabar Metropolis showed an increase in the volume of water abstracted by the agency concerned. Against the production quota of 32 litres per capita per day recorded in 1983, the per capita consumption rate rose to 190 litres in 2010. The total storage capacity of the various overhead

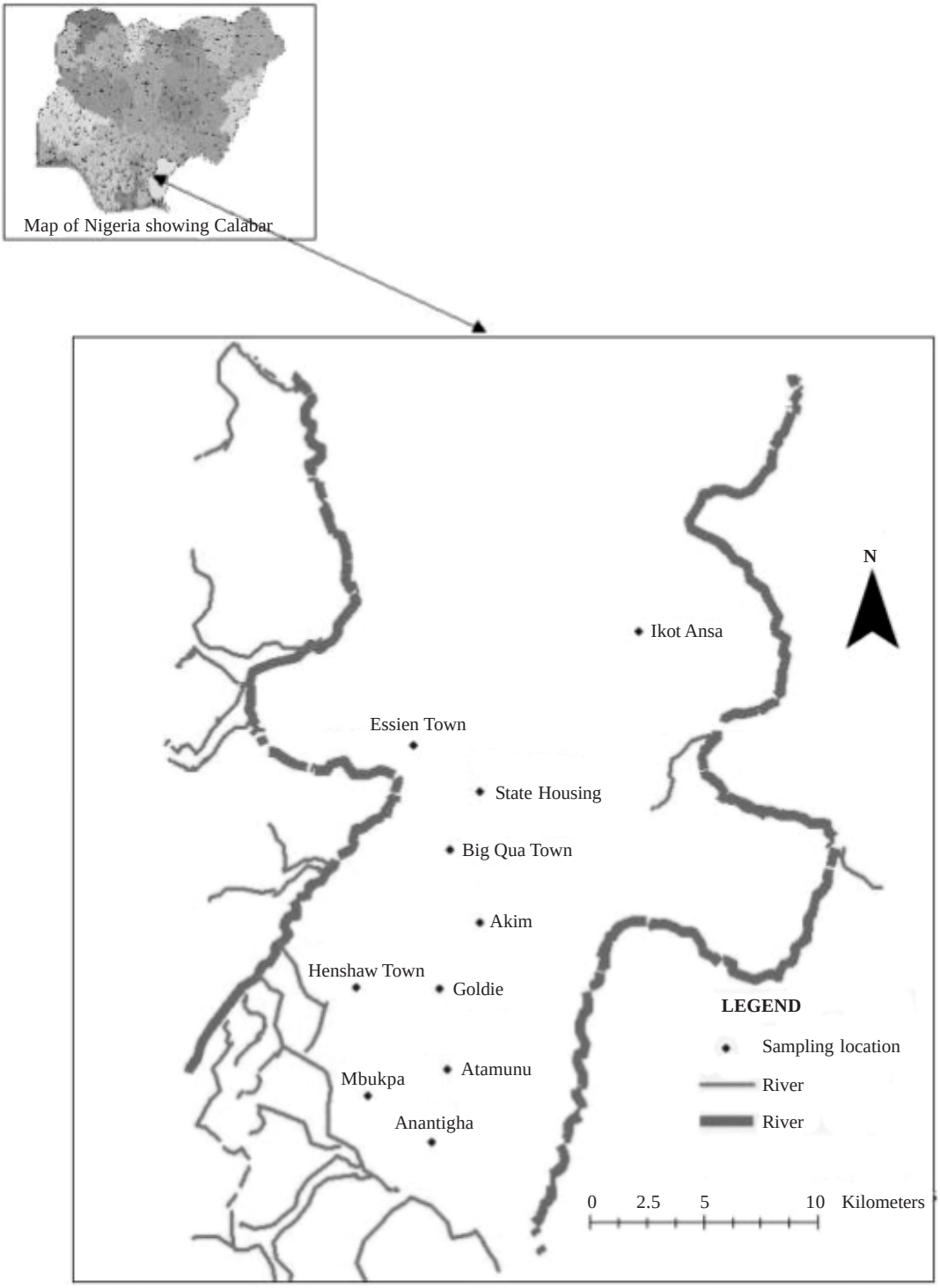

Fig. 1. Domestic water consumption sampled points in Calabar Metropolis

Table 2: Sample population of connected and unconnected residents to public water supply

Location	*Population*	*Connected residents*	*Unconnected residents*	*Percentage of connected residents*	*Percentage of unconnected residents*
Ikot Ansa	21,006	18,050	2956	85.9	14.1
Essien Town	10,041	8,223	1818	82.1	17.9
state Housing	14,429	14,011	418	97.1	3.9
Big Qua	15,205	14,899	306	98.0	2.0
Henshaw Town	7,576	4,388	3188	58.0	32.0
Akim Qua	20,288	13,521	6767	66.6	33.4
Mbukpa	32,421	18,202	14,219	56.1	43.9
Goldie	9,388	6,462	2926	68.8	31.2
Atamunu	7,658	5,745	1913	75.0	25.0
Anantigha	12,655	8,672	3983	68.5	31.5

Source: Authors Fieldwork 2010

tanks located at strategic places amounted to 105,000 m^3 to serve a projected population of 2,432,282 persons (see Table 2).

In order to minimize cost of production, it was discovered that the agency relied on surface and ground water instead of sea water desalination and the storage tanks or reservoir used are elevated concrete walls. The design rule is the gravity system meant to ensure efficient water supply independent of electricity. Available data showed that residential areas of Big Qua, State housing Estate and Ikot Ansa top the list of connected households. Other residential areas as Goldie, Henshaw Town, Atamunu, Akim Qua and Anantigha are yet to be massively, connected to public water supply system. The factors of income level and inadequate densification of water mains by municipal water board account for the short fall in the affected areas this reflected in Table 3.

Table 3: Quantity of per capita water consumed in liters and cost involved on mean basis

Location	*Mean household size*	*Monthly quantity of water used*	*Mean daily cost of consumption in US $*	*Mean per capita liter consumption*
Ikot Ansa	5	105	0.18	21
Essien Town	6	110	0.19	18.3
State Housing	4	85	0.14	21.25
Big Qua	6	124	0.20	20.7
Henshaw Town	4	78	0.13	19.5
Akim qua	5	105	0.17	21.0
Mbukpa	5	105	0.17	21.00
Goldie	4	79	0.17	20.00
Atamunu	5	105	0.17	21.00
Anantigha	6	115	0.17	19.2

Source: Fieldwork 2010

The study also revealed that on an average a person in un-piped home consumes 21 litres of water which is far below the quantity estimated by Ayoade and Oyebande (1987) of 46 to 115 litres respectively for Nigeria and temperate countries.

A comparison of per capita cost of consumption between connected and unconnected households in Table 4 also revealed that the later pay two or three times more than the former and consume less quantity of water. For instance, Ikot Ansa with a household size of five spends 0.59 dollars and consumes 884 liters while unconnected household of same size spends 1.05 dollars and consume 630 liters, the same is applicable to residential districts studied. According to World Commission on Water for the 21st Century report (1999), the poor in developing countries pay more on the average per liter of water than fellow citizens connected to municipal supply system (Shoklomanov 2002). It was noted that, this problem is further compounded by the uneven distribution of standpipes to cater for the unconnected households.

Responses from questionnaires on distances covered to public water sources in Table 5 revealed that 8 per cent of water drawers cover distances below 100 metres, 24 percent go up to 250 metres to supply source, 38 percent go as far as 350 metres while 30 percent cover 500 meters and above. Sule (2003) emphasized the distribution of urban amenities within the threshold of 100 metres. Anything short of this, as observed in this study is tantamount to planning parody: a common feature of most cities in developing countries including Calabar in Nigeria.

CONCLUSION

There is no gain saying the fact that water remains one of the basic necessities of life. But

Table 4: Comparison of per capita cost of water consumption in connected and unconnected households

Location	*Mean household size*	*Connected household mean monthly per capita cost $*	*Quantity used*	*Unconnected household mean monthly per capita cost $*	*Quantity used (liters)*
Ikot Ansa	5	0.59	884	1.05	630
Essien Town	6	0.45	674	0.93	549
State Housing	4	0.50	758	1.06	638
Big Qua	6	0.45	685	1.03	621
Henshaw Town	4	0.51	773	1.03	630
Akim Qua	5	0.43	642	1.05	630
Mbukpa	5	0.49	741	1.05	630
Goldie	4	0.56	841	0.98	630
Atamunu	5	0.48	724	1.05	630
Anantigha	6	0.46	692	0.93	576

Source: Authors Fieldwork. 2010

Table 5: Distance covered to public source of water supply

Response	*Frequency*	*Percentage*
Below 100 meters	16	8
250 meters	48	24
350 meters	72	38
500 meters and above	60	30
Total	200	100

Source: Authors Fieldwork 2010

evidence from this study proved differential access to the utility among classes of residents in Calabar metropolis. The cost of consumption and quantity used adversely affect unconnected households more than their counterparts with internal facilities of water supply. To redress this situation, planners must ensure an efficient distribution system that will incorporate a mechanism for monitoring water supply and demand, flexible enough for periodic adjustment both in quantity and price to end users.

REFERENCES

Ayoade JO 2004. *Introduction to Climatology for the Tropics*. Ibadan: Spectrum books Limited.

Ayoade JO, Oyebande BL 1987. Water Resources. In: O Oguntoyinbo, S Ogundiran, P Salau (Eds.): *Geography of Nigeria Development*. Ibadan: Spectrum Books Limited, pp. 71-88.

Alayande AW 2005. Water Demand Management. *Paper Presented at a Workshop Titled: Urban Water Supply Facilities Maintenance* held at National Water Resources Institute, Kaduna, Nigeria. November 7th-18th 2005.

Emoabino IU 2006. Water Demand Management: Prospects and Perspectives of Implementation in Nigeria. *Proceedings of International Congress on River Basin Management.* Ibadan. October 23 to 26, 2006. 88: 154-159.

Ghali BB 2005. *Water Supplies for Low Income Communities*. London: Oxford University Press.

Green J 2002. *World Thirst for Clean Water.* Ontario: Mcraw Hill Publishers.

Howard G 2003. Arsenic, drinking water and health risk. *Journal of Water and Human Health*, 41: 15-23.

National Bureau of Statistics 2005. *Poverty Profile for Nigeria.* Federal Republic of Nigeria: National Bureau of Statistics.

Oyebande L 1975. *Water Resource Problems in Africa: In Problems and Perspectives*. African Environment Special Report. London: International African Institute.

Siegnor RB 2005. Demand management factors in residential water use: The southern Arizona experience. *Journal of the American Water Works Association*, 3: 58-64.

Sule RO 2003. *Fundamentals of Urban Planning Theory and Practice in Nigeria.* Calabar: International Press.

Shiklomanov IA 2002. Appraisal and assessment of world water resources. *Water International*, 25(1): 11-32.

WHO 1999. *World Health Organisation Report: The Poor Pay Much More For Water, Use Less, Often Contaminated.* World Commission on Water for the 21st Century, Geneva: WHO.