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The Household Characteristics of Water Resources in Awka Metropolis, Anambra State, Nigeria

Dr. Prince Ugochukwu Ofoezie[1], Dr. Obinna Ubani[2] & Dr. Lucy N. Ugwu[3]

[1]Eaglewin Shelter Consult,
Uwani, Enugu State, Nigeria

[2]Department of Urban & Regional Planning, University Of Nigeria, Enugu Campus, Enugu, Enugu State, Nigeria

[3]Department of Urban & Regional Planning, Enugu State University of Science &Technology,
Agbani, Enugu State, Nigeria

Abstract

The supply of adequate and safe water is one of the basic needs, which influences the economic progress of human settlements and the health of dwellers. In Awka, water demand outweighs supply without a corresponding increase in water supply infrastructure. This is due to the increase in population. Both primary and secondary data were obtained from 1148 households using opened ended questionnaire and an in-house observation across the residential densities of Awka metropolis, Anambra State, South East, Nigeria. The obtained data were statistically analyzed using descriptive statistics, Analysis of Variance (ANOVA), and Multiple Linear Regression (MLR). The result rejects that household water demand differs significantly across the various residential densities ($F= 55.404$, P sig = 0.000 $P<0.05$). The findings indicate that water is not used efficiently in the metropolis. The findings revealed the need for stringent measures to attain sustainable urban household water demand management. The study recommends the policy of using modern devices and tools to enable the rationalization of domestic water consumption.

Keywords: *Water Demand, Water Supply, Households and Residential Densities*

1. Introduction

The supply of adequate and safe water is one of the basic needs, which influences the economic progress of human settlements and the health of dwellers. In Awka, water demand outweighs supply without a corresponding increase in water supply infrastructure. This is as a result of the increase in population. WHO and UNICEF (World Health Organization/United Nations International Education Fund), 2008 revealed in their study on the Joint Monitoring Programme for Progress on Drinking Water Supply and Sanitation in Nigeria that access to the water supply was 67% as of 2013.

Millions of Nigerians that lives in urban area lacks access to improved water supply house connections (World Bank, 2004). A lot of pressure are been mounted on the available water infrastructure are the functions of increase in urban population. In Nigeria, the most concern are the demand and supply of water with per capita income, especially where demand does not correspond with generating capacity of the supply infrastructures. This is with the obvious reasons that despite all efforts been made to develop the nation's vast resources, the gap between water demand and actual supply has widened in Nigeria's urban centers.

According to the National Bureau of Statistics (NBS), Annual Abstract of Statistics report published in 2012, only about 3.1% of households in Anambra State source their drinking and cooking water from treated pipe-borne water while some of the households source their drinking and cooking water from untreated pipe-borne water supply in 2007. The extent to which these factors relate to household water demand has not been empirically established in Awka.

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To enable proper water planning and management, it is important to know the level of water consumption, the degree of relationship between household size, income, and other demographic characteristics with household water demand, and the generating capacity of the supply. With an urban population that is increasing by more than 3 percent per annum, proper water management through adequate water provision and affordable to all residents is very vital. This study, therefore, seeks to ascertain the relationship between these factors and urban water supply.

2. Review of Literature

2.1 Household Access To Water Supply

Studies have been conducted on household access to water supply likeOyebande (1978) who examined urban water supply planning and management in Nigeria and deduced that there is anmajor water shortage, with the majority of the available water supplies unmetered. Where metered, ridiculous rates are charged. He stated the need for a management policy that will enhance financial viability and economic efficiency to meet increasing production and distribution costs. Michael (1985) studied the challenges in urban water management in the United States and infers that the rise in the intensity of water usage in the urban environment of the United States is one of the major challenges to the supply, utilization, and protection of water sources. An integrated management approach was proffered to address the water problems in the urban environment of the United States. The result revealed that about 30—60% of the urban population in low-income countries lack adequate housing with sanitary facilities, drainage systems, and piping for clean water (UNCHS, 1996).

Sharma, Dambaug, Gilbert-Hunt, Grey, Okaru, and Robberg, (1996) observed that lack of knowledge about the finite nature of water, its scarcity, and cost; the impact of deforestation and land degradation on the quantity and quality of water; inadequate capacity building; neglect of traditional knowledge bases; gender issues; fragmentation of water resources management; and weak institutional frameworks are the major challenges confronting sub-Saharan Africa.Beukman (2002) revealed that in the urban area of southern Africa, water supply services are provided through tankers, public standpipes, and yard and private house connections through reticulation networks. He also revealed that the services are characterized by an aging infrastructure and interrupted flows. Operation and Maintenance of Urban Water Supply and Sanitation Systems, (O&M, 2002) identified the inefficient organisation as a key factor contributing to poor performance of water supply facilities in many metropolitan cities in sub-Saharan Africa.

2.2 Population Growth and Water Demand

The issue of water stress due to population growth and other factors is not new and has been at the forefront of academic discussion. Migration to urban areas is placing increasing pressure on the local government's ability to respond to the social service needs of urban populations. UNFPA, (2007) observed this as a worldwide problem. Projecting that in 2008, more than the half of the population in the world will be urban. More so, urban population will be geared to double between 2000 and 2030 in Africa. UNPD (2006) also analysed population change from A.D. 1 to 2050. The study observed that the trend of the world's population grew from 300 million in A.D. 1 to 760 million in 1750, and came to 1 billion as of 1800. Then, in 1980 the world population became about 2.5 billion. In 2005, It rose to 6.5 billion, and proposing that by 2050, the population will be above 9 billion.

Therefore, it is estimated that water consumption doubles the rate of population growth (Population Institute, 2010). The study carried out by Ubugha, Okpiliya, Njoku, Itu, Ojoko, and Erhabor, (2017) revealed that there is a significant relationship between population growth and volume of pipe-borne water supplied as well as consumed. It was recommended that the need for new policies in water and population management will ensure sustainable water provision in the Municipality. In order words, if there is an increase in population growth and water use trends persist, it is expected that the water demand will exceed its supply and availability and many will be living in water stress/scarce regions soon.

The association between the populace and water is rather less emphasized. Annually, the expansion of the number of people on earth is 80 million people, increasing the water demand by as much as 64 billion m3 a year (Population Institute, 2010). Population growth implies increasing demand for water for all known uses (Population Action International, 2011). Rapid population growth and the resultant urbanization can expose more people to water scarcity, with adverse repercussions for general well-being and security. These demographic developments, in addition to increasing water consumption, will be an huge developmental challenge (Bates, Kundzewicz, Wu, and Palutikof, 2008). At the household level, the water demand is determined by demographic factors including household size, age structure, and income composition (Ubugha, Okpiliya, Njoku, Itu, Ojoko, Erhabor, 2017).

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3. Materials and Methods

For this study, both Primary and Secondary data were collected. The primary data were collected through observations which were made on the sources of domestic water supply like Agulu Lake and treatment plant, Ngene River water scheme, Nri Lake, Obibia River water scheme and Mamu River water scheme, Aj al ii River and treatment plant, locations of various water reservoirs in the study area.

More so, a total of 1148 households were sampled with a questionnaire containing 42 questions. To obtain précised data from the respondents, three sampling techniques namely stratified sampling, systematic sampling, and simple random sampling were employed. First, the study area was stratified into three strata (high, medium, and low). Then, applying systematic sampling, three neighborhoods each were selected without replacement from each of the three residential densities. These are high-density (Inezu Housing Estate, Uzu Awka Pocket, and Awka Industrial Extension), medium-density (Express Road, Udoka Housing Estate, and Isiagu-Amikwo New Development Scheme) and low-density (Agu Awka GRA, Ikenga Hotels Extension, and Iyiagu Housing Estate).

Simple random sampling was employed to select the residential compounds for sampling. Only one household was sampled in each selected compound. 'the questionnaire contained eighteen questions, divided into two sections: Section A and B. Section A deals with the socio-economic characteristics of the respondent, and Section B deals with the assessment of water demand and supply in Awka metropolis like underwater supply: sources of water demand, the distance of the source, the duration or time taken to collect water demand for household usage and water demand: quantity of water used daily, the amount spent on water monthly, etc.

Finally, the secondary data were reports from the combination of data from the National PopulationCensus (NPC), National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN) and NigerianCommunication Centre (NCC) published by the National Bureau of Statistics (NBS) in 2012.

4. Results and Discussion

The secondary data revealed the household demographic characteristics of the Awka metropolis. The report was a combination of data from the National Population Census (NPC), National Bureau of Statistics (NBS), Central Bank of Nigeria (CBN), and Nigerian Communication Centre (NCC) published by the National Bureau of Statistics (NBS) in 2012.

According to the National Bureau of Statistics, (Annual Abstract of Statistics Report, 2012) the gender percentage of households in the Awka metropolis is 49.5% and 50.1% male and female respectively compare to the State sex ratio of 87.90. Marital status indicates that 48.2%, 0.8%, 0.8%, 12.0%, and 38.2% were married, divorced, separated, widowed, and never married respectively as of 2007. More so, educational attainment was given as 50.4%, 71.1%, 58.7%, and 74.6% for non-poor educated households more compared to poor households whilst 69.9% and zero percent are households that are not educated and acquired vocational training respectively 2009-10. Furthermore, the survey revealed that 1.5% is among the households that had household expenditure less or equal to Nigerian Naira (#) 1,000 whilst 3.1%, 18.6%, and 40.9% are among households had household expenditure that is concentrated between Nigerian Naira (#) 1,999 to 4,999, 5000 to 9999 and 10000 to 19999 respectively. More so, 32.7%, 2.4%, and 0.9% are among households had household expenditure that is concentrated between Nigerian Naira (#) 20000 to 49999, 50000 to 80000 and above 80000 respectively in 2007. Age of respondents revealed that in Awka metropolis over 77.3 %, 6%, and 83.3% of household heads age dependency ratio fell among the young, old, and overall households respectively as of 2006. It was further indicated that the average number of persons per household in the Awka metropolis was 4.3, 4.4, 4.5, 4.2, and 3.9 for 2006, 2007, 2008, 2009, and 2010 respectively.

According to Arbues (2003), it was identified the factors influencing the amount of household and daily per capita water consumption, although, the most frequent variables in all studies are household size, income, education, expenditure of a household, age, and sex of the respondents, and distance of water source. Analysis and evaluation of these factors will help to identify factors, which either positively or negatively associated with the rate of per capita household water consumption. When this is compared to the present rate of water consumption in the study area, which is still very low (due to irregular supply) the use of a flat rate will yield more revenue for the corporation in the short run. Once consumption levels get to an average of 1000 liters in low-density areas, the use of meters must be encouraged. This is necessary for physical planners and ASWC water resource planners as it will be of good help during water projects and policy forecasting for the Awka metropolis. This has also been evident in the work done by Nauges and Thomas (2000) when he was determining the price of water for the local authority (municipality), they first of all determine the socio-demographic characteristics of the community in order the help have a better and a future policy and affordable price of water.

Secondly, Ibrahim, et al (2012) indicated that socio-demographic factors are equally important for water

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demand. Dessalegn (2012) found that proper planning of water supply utilities increases income emphasis on the employment of the residents' mechanisms.

5. Conclusions

The research revealed that the factors influencing the amount of household and daily per capita water consumption are household size, income, education, age, number of households in the compound, marital, occupation, and sex. When these are compared to the present rate of water consumption in the study area, which is still very low (due to irregular supply) the use of a flat rate will yield more revenue for the corporation in the short run. Once consumption levels get to an average of 1000 liters in low-density areas, the use of meters must be encouraged. This is necessary for physical planners and ASWC water resource planners as it will be of good help during water projects and policy forecasting for the Awka metropolis.

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