

WATER DEMAND AND SUPPLY IN UMUAHIA URBAN-ABIA STATE: CRITICAL STUDY

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Abstract

This research examines Urban water demand- supply relationship in Umuahia. The problem of inadequate and unsteady accessibility to water supply for domestic purpose has been an age-long problem to the dwellers of Umuahia Urban. This problem, which has persisted over the years, has become more severe in recent years, most especially during the dry season. This research is therefore, aimed at ascertaining why water supply shortages have remained a perennial problem. The findings show the margin of water deficiency from 1998-2007 to be 225175882 liters; average household size is 7, while the amount of water used per person per day is put at 65 liters as against 115 liters per head per day by the world Health Organization (WHO). The negative value of the correlation coefficient indicates that there is an inverse relationship between population and water supply in Umuahia Urban. Therefore, the capacity and efficiency of the water Board has to be increased.

Introduction

Water is an essential resource to mankind. It is both the most common and the most precious substance on earth. Without water, there can be no life. No wonder some scholars have argued that water and life are inseparable. It is in recognition of the vital role water plays in the life of man that has prompted successive governments in Nigeria to allocate considerable sum of money for water resources development.

Air, water and food, strictly in that order are the basic essentials of life (NEST, 1991). Human beings can live for more than sixty days without food. They can rarely survive for more than three days without water (Oyebande, 1986, 1978; NEST, 1991, 1992). They will die within a few minutes if deprived of air. About 70% of the human body, by weight, consists of water and this performs three roles of regulating the body temperature, transporting body nutrients to other vital organs, and carrying waste out of our internal body organs (Ayaode, 1975).

Ekpo (1994), emphasize the importance of water in the socio-economic development of any area and stresses that negative aspects of water signify adversity and its total absence, inadequacy or poor quality has a direct effect on the health of the people and the environment. Water is indeed a unique resource and has no substitute. Ayaode (1975), observe that, although a gift of nature and absolutely free when falling as rainwater, it is indeed a unique resource that has no substitute. Given this high status of water, there exists a strong need to re-assess man's attitude of wasting water when found abundant supply and the problems faced in getting the least quantity when found in short supply.

Insufficient water supply is a historic human problems of concern and this has led the desire of a well-planned and viable water system by most government and planners across the world. As the population growth increases, it is accompanied by a rapid increase in per capita water consumption, however, the margins of urban centers now exceed the rate at which the improvement in water supply is made. An urban area in which consumption exceeds more than 20% of the available renewable supply is considered vulnerable to water stress (Awake, 1997),

In Nigeria, different attempts have been made to arrest the problems of water supply. It should however be noted that those attempts cut across the three tiers of government. This is because there is an increasing awareness of the problems of water supply and also the possible dangers, if a good and viable water supply system is not developed to meet the ever increasing and growing demand for water by the rapidly growing population.

In Abia State, the responsibility of providing potable water supply services to the people is solely assigned to the Abia State Water "Board. In its effort to ensure adequate water supply, the government released funds to various Water Boards across the state for the rehabilitation and development of domestic water supply in the 2006 fiscal year (Abia State Water Board, 2006).

Beneficiaries included the Old Umuahia Water Scheme, Umuahia Regional Water Scheme, Ubakala Water Scheme, Olokoro Water Scheme and Afugiri Water Scheme, but there is neither the workability nor efficiency of water flow in Umuahia Urban. This has led to an acute water shortage coupled with the ever-increasing population of the area.

Water in umuahia Urban, like any other part of the world is used for a wide array of purposes as noted earlier. It thus follows that Umuahia and its environ should be supplied with water not only for human consumption but also as a take-off ladder for economic development and will help to alleviate the problem and bridge the gap between that water supply and the rapid increase in population.

Water Demand Pattern

Urban water demand refers to the quantity of water needed daily per household in the area. Total water requirements in the study area may be divided into the following categories, residential or domestic use, public and commercial water demand and industrial water demand.

In the study area, the residential or domestic use includes water requirements for drinking cooking, bathing, washing of clothes, utensils, and flushing of water closets. Provision is made sometimes for domestic animals. Public and commercial water demand is consumed by public establishments like schools, churches, hotels, hospitals, public offices, etc. while the industrial water demand is consumed by agro, manufacturing and processing activities in the industrial sector. However, because of the predominance of civil servants in the study area as against industrial and commercial activities, the household and domestic water demand accounts for about 60 percent of the total amount of water supplied while commercial and industrial use accounts for the remaining 40 percent (Oyebande, 1978).

Water Demand Estimation

Water demand is based on per capita water consumption of 115 liters per person per day as recommended by the World Health Organization (WHO). That is, 115 liters per head per day X the population for the year. Using the projected population, water demand for 1998, 2001, 2003 and 2006 was supposed to be as presented in Table 1.

Table 1 Water Demand in Umuahia Urban From 1998 - 2006

Year	Demand	Total
1998	115x1 80288 m ³ /day	207331 20 m ³ /day
2001	115x20900 ³ M ³ /day	22655375 m ³ /day
2003	115x228382m ³ /day	24,035345 m ³ /day
2006	115x20900 ³ m ³ /day	26263930 m ³ /day

Water Supply Pattern

Water supply sources vary from locality to locality. It depends on the local conditions of the community, namely: the geographical location and the available technology for water production. Water works run by state organs meet water demand in the urban areas. This source may be supplemented or complemented by private supplies from boreholes or water vendors. Umuahia urban obtains its water supplies from the following sources: water works operated by Abia State water board private boreholes, streams, rain catch, commercial and from water vendors as shown on table 2

Table 2: Respondents Major Sources of Water Supply in Percentages)

UNIT/ CLUSTER	R/S	Public Top	Streams	Vendors	boreholes						Total
A	96	-	32	28	33	28	80	97	89	130	613
B	92	-	43	33	52	30	61	79	118	154	662
C	95	-	54	26	31	15	58	81	75	105	540
TOTAL	283		129	87	166	73	199	257	282	389	1515
%	15.59	-	7.11	4.79	6.39	4.02	10.96	14.16	15.54	21.43	100.00

R/S = rainy Season while D/ S -Dry Season.

Source: fieldwork by Researchers, 2007

The result from Table 2, shows that rainwater constitutes a major source of water source of water during the rainy season with 15.59%, while the dry season has a value of zero (0) as a result of absence of rainfall. During the rainy season 6.39% of the people rely on rivers and streams while the value reduces to 4.02% during the dry season. 7.11% of the respondents rely on waterworks during the rainy season while it reduces to 4.79% during the dry season, Water vendors supplied 10.96% and 14.16% during the rainy and dry seasons respectively. Finally, boreholes have the highest percentage of water supply in the study area with 15.54% and 21.43% of the people depending on the source-during the rainy and dry seasons respectively. This gives a total percentage of 36.97%. this high percentage value reflects the increasing rate of boreholes in the area, which predominantly sell water to the people.

From Table2, it is further observed that boreholes account for the highest supply of water in the study area. Water vendors came second in terms of water supply while rainwater harvesting came third. The implication of this is that the water board should improve on their services while people should be discouraged from impairing the water quality of rivers and streams.

Table 3: Margin of Deficiency in Water Supply to Umuahia Urban

Period	Estimated water supply (m ³ /day)	Estimated water demand (m ³ /day)	Estimated population served	Deficiency in supply (m ³ /day)
1998	54713	20733120	180288	20678407
1999	90276	21355155	185697	21264897
2000	148956	21995705	191267	21846749
2001	245778	22655575	197005	22409797
2002	405533	23335225	202915	22929692
2003	669129	24035345	209003	23366216
2004	1104064	24756395	215273	23652331
2005	1821705	25499065	221731	23677360
2006	3005814	26263930	228382	23258116
2007	4959593	27051910	235234	22092317
Total	12505561	237681425	2066795	225175882

Source: fieldwork by Researchers, 2007.

The extent of water deficiency in Umuahia cannot be over looked. Obviously, without this quantitative research, the alarming nature of the problem of water deficiency in the supply of water cannot be appreciated as shown on Table 3.

Hence, a layman who gets water most of the time he needs it, may not be able to acknowledge the deficiency in water supply. Ayaode (1975), observes that, although a gift of nature and absolutely free when falling as rainwater, it is indeed a unique resource that has no substitute. Given this high status of water, there exist a strong need to re-assess man's attitude of wasting water when found and the problems faced in getting the least quantity when found in short supply.

In order to substantiate the researcher's arguments for inadequate or deficiency of water supply in the study area, a look is taken at Table 3. It is observed that only about 12505561 m³ /litres of water were supplied from 1998-2007 to the urban population whereas about 237681425 m³ /liters were

demanded. Therefore, during the forecasting period of 1998-2007, the deficiency in water supply in the study area stood at about 225175882 liters (table 3).

Test of Hypothesis

The following hypothesis guided the study: Ho: there is no significant relationship between water demand and the quantity of water supplied in Umuahia urban. Ho: There is a significant relationship between water demand and the quantity of water supplied in Umuahia urban

Table 4: Correlation Coefficient

Correlation	Projected population	Annual water supply
Projected population Pearson Correlation Sig. (2-tailed) N	1	-407 -278 9
Annual Water Supply Pearson Correlation Sig (2- tailed) N	-407 -278 9	

Using the Pearson product Moment Correlation Co-efficient Iroegbu (2005),

$$r = \frac{N(XY - (\bar{x})(\bar{Y}))}{\sqrt{(N(X^2 - (\bar{X})^2) (N(Y^2 - (\bar{Y})^2))} \dots \dots \dots 1$$

From Table 4, the negative value of the correlation coefficient (r - -0.407) indicates that there is an inverse relationship between population (water demand) and the quantity of water supplied in Umuahia Urban. This implies that as the populations increases, there is no corresponding increase in the quantity of water supplied. Other factors which are responsible for water supply shortages (seen Table 5) account for the remaining 6% of the water supply deficiency in Umuahia Urban.

Factors Responsible for Water Supply Shortages

One of the main attributes of any geographical investigation is its ability to answer "why" questions. In this case, why has the water deficiency persisted over time despite many attempts by the people to remedy the situation? To answer this question it is necessary to find out the root factors responsible for water deficiency in the area. This is necessary since the solution to any geographical problem requires the elucidation of its root causes/factors.

Tables 5: Factors Responsible for Water Supply Shortages

FACTORS RESPONSIBLE										
Sampled Units	FPF	LOE	EQP	MGP	LIW	IFE	10	WO	ISF	
A	77	54	63	67	45	64	40	32	21	463
B	71	56	58	53	63	70	48	40	32	491
C	63	59	51	52	63	34	28	19	19	427
Tota!	211	169	172	176	160	199	122	100	72	138
Percentage	15.28	12.24	12.45	12.74	H.59	14.41	8.83	7.24	5.21	100

Source: Fieldwork by Researchers, 2007 .

Key for Interpretation of the Variables

- FPF - Frequent Power Failure
- LOE - lack of expansion
- EQP - equipment problem
- MGP - management problems
- LIW - Low incentive to workers
- IFE - inadequate funding/embezzlement
- LOD - lack of data

WOW - Wastages of water
ISF - Inadequate storage facilities

Table 5, shows the factors responsible for water supply shortages in the study area. Frequent power failure has the greatest value of 15.28%. The scheme management identified power failure as the greatest problem that hinders the operation of the scheme. Inadequate funding/embezzlement ranked second with 14.41%. This largely limits the extent to which the state water scheme operates to supply water. Also, there is widespread embezzlement of funds meant for rehabilitation projects for the workers' selfish interest. Management problems have 12.74% from the respondents' perception. Management positions are often given to people who are not competent for the job. The result of this is low productivity.

Equipment problem and lack of expansion have values of 12.45% and 12.24% respectively. Some of the equipments have been abandoned, and need refurbishment while others have become obsolete and in a state of total disrepair. The capacity of the reservoir does not literally cope with the ever-increasing population of the area. Low incentives to workers and lack of data have 11.59% and 8.83% respectively.

It was discovered that there is no regular promotion of the workers like their counterparts in the other ministries. Also, allowances and other fringe benefits are not paid in accordance with the stipulated procedures and promptness. The consequence of these are brain drain, resorting to private practices, mechanical approach to human problems, strained relationship and apathy in work places. Wastages of water and insufficient storage facilities have values of 7.24% and 5.21% respectively. Non availability of facts and figures is a problem at the water scheme. There is no statistics on its daily water supplied to the urban area, and water demands by individuals in the area. Thus, efficient and effective planning to improve water supply is hampered.

Effects of Deficiency in Water Supply

The implications of this deficiency are enormous. Such effects manifest in poor social life of the people as well as the various health problems accompanying it. The people have to pay lots of money to get water vendors. Those who cannot afford to pay patronize other unwholesome sources. In some places, lack of adequate water supply has resulted to poor sanitation.

During periods of acute shortage of water, students and civil servants have been found to be either late or absent from school and work places respectively. And on such occasions of lateness and absenteeism, the affected people have usually blamed their shortcomings on water deficiency. Other effects of this deficiency in water supply include poor services, making service oriented corporations inefficient, poverty, pollution, low productivity, increased crime rate, etc.

Recommendations

In the light of the findings, it is hereby recommended that:

1. the water board should improve on its services.
2. the public (individuals) should be discouraged from impairing the water quality of rivers and streams.

Conclusion

Affordable, abundant and clean water is essential for human well-being. If adequately provided in the right place at the right time in the right form, it would help to achieve the aim of every nation which is to develop its population into an economically active one that would enhance development.

The researchers therefore believe that, the main problems of water supply, particularly in Umuahia Urban and the world all over lies between the Public Utilities Services (Water Corporation) and members of the public (consumers). Therefore, for this to be redressed it ought to be addressed in a team-tag manner. Thus, the new era of adequate water supply to all with regards to quantity and quality is sure to be achieved, and the wars of the new era will be averted, and Umuahia Urban have the cause to smile.

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