
An Appraisal of Urban Water Supply System in Nigeria

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ABSTRACT

The effects of inadequate water supply are more visible and prevalent in sub-Saharan Africa even though is a global crisis. Nigeria is face with a lot of inadequacies in terms of water provision in its urban centers due to one reason or the other; it is faced with the problem of overcrowding resulting from massive urban influx. Hence, the low income earners of the city feel the severity of the shortage most. This paper discusses urban water supply system and a range of issues that cause water crisis in the Nigerian urban centers; which urbanization and rapid population growth led to the unplanned expansion of the periphery and congesting the core centers of our urban areas, thus, making provision of portable water a great challenge. An analysis was made on the causes of urban water crisis and possible recommendations were made on how to curtail the menace of water shortage in the urban centers.

Key words: Urban, Water Supply System, Nigeria

INTRODUCTION

The pre-colonial Nigeria setting was characterized by unimproved sources of water such as rivers, brooks, streams, wells, and rainfall. While the post-colonial Nigeria, which brought a departure from this situation, is endowed with improved source although with problem due to the absence of proper maintenance culture which has denied the country total enjoyment of this improvement, often leave most women and children (who are the vulnerable) on queue for several hours and those that cannot endure are forced to travel long miles in search for alternative source of water, which may not fit for drinking. In light of this, mothers are prevented from domestic work and most children are kept away from school, while provision of potable water is on the concurrent list of the Nigerian constitution to be the responsibility of

the three tiers of government, i.e the Federal, State and Local Governments.

The National Water Policy however puts the responsibility of urban and semi-urban water supply delivery to the State Governments. The Federal Government through the Federal Ministry of water resources and Rural Development provides the overall policy framework, coordination and regulation necessary for sound management of the sector. The Federal Government also provides assistance through Federal Ministry of Water Resources and Rural Development (FMWRRD) and other agencies to the States and Local Governments. Each State of the federation and Federal Capital Territory (FCT) has established through an edict, a state agency responsible for water supply in that state (Sani, 2006). According to Bamiji *et al* (2014), a national water supply and sanitation policy recently adopted (January 2000), it has many positive points, but some weakness and inconsistencies. In particular, this policy makes the supply of adequate water supply and sanitation a right to all Nigerians, and give responsibility to three tiers of government, the private sector and the beneficiary. It recognize water as an economic good and the need to run water supply as business, identifies the need for reform and for private sector participation, recognize the special needs of women and the poor, and the need to link improved sanitation with water supply. At the same time, it promotes unachievable targets for coverage, and recommends free water for poor.

Besides, urban water supply is generally undertaken by Water Boards/Corporation. They are semi-autonomous government parastatals owned by the state government throughout Nigeria. Thus, each of the states has one Water Board/Corporation, which manages urban water supply through different schemes for each city and its peripheral settlements. The management of the water Board is under a parent ministry, usually the Ministry of Water Resources. The Board

enjoys limited autonomy with respect to the generation of revenue and daily operations (Sani, 2006).

The Boards typically consist of a Chairman and Directors appointed by the state governments. Management of operation is by a General Manager under who are various sub-managers in the areas of administration, finance and production. In decision making, Water Boards are generally responsible only for operations and maintenance of existing facilities for the production and distribution of water and only partially response for tariff policies and new investment facilities.

Water Resources in Nigeria

Nigeria, with a land area of about 924,000 sq.km is located within the tropics and is drain mainly by the River Niger and its main tributary, the River Benue and their numerous minor tributaries as well as the Lake Chad basin and the rivers discharge into it. Total surface runoff is large; annual runoff at the Lokoja gauging station on River Niger has been recorded as up to 165.80 billion cubic meters. Volume of available groundwater is also considerable in large sedimentary basins (Sokoto and Chad basins). The surface water resources potential of the country is estimated at 267.3 billion cubic meter while the groundwater potentials is 51.9 billion cubic meter.

Nigeria is considered to be abundantly blessed with water resources. However, there are temporal and spatial variation in water availability across the country. The north with low precipitation of only about 500mm in the northeastern corner, and the south with precipitation of over 4,000mm in the southeast. This high variability in precipitation in time and space is a significant characteristics of the tropical climate belt, especially the Sahelian part of the country. The Sahelian belt is at the southern border of the Sahara desert and it is here that the country faces the challenges of high variability in precipitation which has been manifested in the form of persistent drought in the past three decades

with it attendant impact on reduction in the extent of wetlands in the Hadejia-Nguru area and the almost complete loss of the Lake Chad.

For the water resource assessment in Nigeria, 163 automated hydrometric stations were established in 8 hydrological areas of the country while 26 existing primary stations were existing, the primary stations were upgraded to meet WMO (standards).

History of Water Supply in Nigeria

Supply of piped portable water for human consumption were first introduced in Nigeria by the colonial administration in the beginning of last century. This was in response to the need of the rapid growing urban areas and the public health concern for the rising incidence of water borne disease. The first system came into being at Lagos in (1981) with a capacity of 2.95 million liters of treated water daily. Amongst the early beneficiaries of these facilities were Lagos, Calabar, Kano, Ibadan, Abeokuta, Ijebu Ode and Enugu. The schemes were maintained with revenue from water rate collection with virtually no operational subvention from government.

With the creation of Regional Governments in the early 1950s, the water supply undertakings continued to maintain the schemes but the financial and technical responsibilities for developing new water schemes were taken over by the Regional Government who also assigned supervisory high level manpower (Water Engineers and Superintendents) to the water undertakings. For the period of the assignment, all the allowances and the salaries of these officers were paid from revenue generated from their water rate, while these officers still retained their employment and seniority in the regional Service. However, with growing demand and increasing cost, it became necessary for the Regional Governments to secure loans. The Regions were requested to set up independent bodies i.e. Water Corporations/Boards to develop, operate and manage the water supply

undertakings. Hence, the first water corporation was formed in 1966 by the then Western Region. All the public water supply undertakings in the Region, including their staff, assets and liabilities were taken over by the corporation. The staff of the water division of the ministry of works were also transferred to the new corporation. Today, all the thirty-six (36) state of the federation and the federal capital Territory have Water Board/Corporations or Public Utilities Boards, managing their public water supply undertakings. Their efforts are supplemented in many cases by Local Governments who supply water to small villages in their areas of jurisdiction.

The Federal Government got involved in water supply (in 1976) when the Federal Ministry of Water Resources and the eleven (11) River Basin Development Authorities (RBDAs) were created to manage the water resources of the country and to provide bulk water primarily for irrigation and water supply. The Federal Ministry also undertakes basic Hydrological Data Collection and Storage for National Planning purposes. Other agencies involved in public water supply as aid and loan programmes are the United Nations Children’s Fund (UNICEF), United Nation Development Program (UNDP), and a number of other bilateral, multilateral and External Support Agencies.

Table 1: Early Urban Water Supply in Nigeria

City	Source of Raw Water	Date Commission	Population	Daily OutPut(m l/d)	Daily Use (litres)	% of Need Met
1. Lagos	Surface	1915	2,240,000	219.80	89.10	85.33
2. Enugu	Surface	1924	300,000	19.50	65.00	56.42
3. Zaria***	Surface	1932	300,000	35.00	90.00	25.40
4. Kano	Surface	1934	447,000	68.00	152.10	132.27
5. Maiduguri	Borehol	1934	153,691	19.52	127.00	110.47

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6.Ibadan	Surface	1942	885,860	40.00	45.20	39.27
7.Sokoto	Surface	1947	132,000	20.45	154.80	134.72
8.Benin	Boreholes	1950	148,000	33.6	227.0	197.41
9.Bauchi	Boreholes	1951	100,000	2.70	27.0	23.43
10.Kaduna	Surface	1954	400,000	63.5	158.8	138.04
11.P/Harcourt	Boreholes	1954	250,000	53.70	214.80	186.76
12.Owerri	Borehole	1957	60,000	13.62	227.00	197.39
13.Minna	Surface	1958	88,182	30.50	345.80	33.79
14.Calabar	Surface/B	1960	17,000	13.4	114.68	99.55
15.Abeokuta	Surface	1962	249,000	8	32.13	27.93
16.Makurdi	Surface	1963	74,422	227	30.68	26.52
17.Jos	Surface	1967	150,000	18.2	121.30	105.51
18.Akure	Surface	1965	415,000	7.25	17.5	15.19
19.Ilorin	Surface	?				
20.Yola	Surface	?				

Source: Adopted From Sani, (2004)

Table2: Urban Water Supply in Nigeria by State (1981)

City	Total Supply (Million/l/d)	Population Served(Million)	Needs (Million l/d)	Proportion of need served (%)
Anambara	44.45	1.06	22.08	36.73
Bauchi	5.08	0.247	28.41	17.88
Bendel	81.29	0.823	94.71	85.83
Beneu	10.16	0.222	25.60	39.69
Borno	28.72	0.372	42.85	67.02
Cross River	30.90	0.954	109.79	28.14

Gongola	15.69	0.218	25.08	62.56
Imo	55.48	0.676	77.76	71.32
Kaduna	127.38	0.895	102.96	123.72
Kano	87.43	0.906	105.38	82.97
Kwara	17.95	0.840	96.67	18.57
Lagos	222.69	2.374	273.03	81.56
Niger	36.99	0.281	32.33	114.41
Ogun	30.21	0.936	107.64	28.07
Ondo	27.29	1.257	44.61	18.87
Oyo	90.88	4.096	471.15	19.29
Plateau	31.25	0.390	44.96	69.51
Rivers	61.98	0.732	84.24	73.58
Sokoto	41.36	0.669	76.95	53.49
Total	1147.375	17.966	2066.24	50.69

Source: Adopted From Sani, 2004

Problems of Urban Water Supply

In spite of the importance of adequate water supply to humans, access to potable water supply in Nigerian cities lag behind demand. For instance, the joint report on Water and Sanitation by the WHO/UNICEF reveals that Nigeria and many other sub-Saharan African countries are lagging behind in achieving the Millennium Development Goals and targets set for water and sanitation, as drinking water coverage in Nigeria decreased from 49% in 1990 to 48% in 2004, as against the expected 65% coverage.

Traditionally, the service provides by public water agencies in developing countries, Nigeria inclusive; have been plagued by a series of problems, which help to explain the poor performances and low productivity of most the agencies and thus, inadequate water supply.

In a survey carried out by Park Nigeria PLC for the World Bank (1999) stated that, in Nigeria, like any other developing country these problems

may be divided into four categories: Technical and Operational, Commercial and Financial, Human and Institutional, and Environmental.

- 1. Technical and Operational Problems:** The operation and maintenance of water infrastructure has been very poor. The government has become increasingly concerned by this poor level of operation and maintenance. In its 16th meeting in Asaba (2002), the National Council on Water Resources set up a National Committee to recommend ways and policies initiatives to address the problem in order to make our water resources infrastructure sustainable. Operational practices are inefficient, regular maintenance is inadequate. Unaccounted for water is high; about 40-50% of the water produced, compared with well-managed systems in industrialized countries. This is partly due to physical losses through pipes, which are neither properly maintained nor replacement in a timely manner. Under such circumstances, services expansion is rather limited and not coping with population growth. Intermittent power supply is also a major problem of urban water supply in Nigerian cities; Outrageously, high electricity bills by PHCN increase operational cost of urban water supply, high cost of chemical and distribution system maintenances. In a study carried out by Alkali et al (2012) also maintain that, lack and/or poor operation and maintenance led to the breakdown of systems. The situation has led to the dependence of the residents on unreliable wells. Untreated water from rivers and streams. This put them at a risk of an epidemic from water related and/or excreta related disease.
- 2. Human and Institutional Problems:** Poor water supply is a universal phenomenon among Nigeria urban areas. The situation is increasingly deteriorating and being compounded by rapid population growth. This is despite the availability of vast surface and underground water sources. This includes problems such as lack of skilled manpower, mismanagement of water by domestic

users, their indifferent attitude towards leakages and illegal connections as a result of subsidies or low tariffs, lack of records and low literacy levels of high population increase and expansion of land use activities. Yunusa (2004) observed that, water supply lines are extended to the government, private and corporate premises (in Kaduna) on a simple request without due regard for the capacity of the supply system to meet the demand. However, the data on access to water in cities, volume of use, frequency and quality is becoming challenging these are key issues in urban areas where hundreds and even thousands of people may be packed into a square kilometers. Furthermore, service quality and coverage can have profound effect on the health and well being of the urban poor who may be spending long hours waiting in line to get water of questionable quality, that they may be forced to store in less sanitary conditions.

Unnecessary and excessive political interventions in the activities of state water board. This led to the appointment of people who have managerial inability to run the affairs of the water board. Furthermore, government unfortunately does not give water sector issues high priority in reality. Often politicians tend to interfere in the sector, the legal and administrative framework is inadequate, utilities are under performing, and there is lack of transparency and accountability. In a study carried out by Atser *et al* (2004) argue that, the provision of adequate water both in quantity and quality depend on the political will just like the provision of any other infrastructure.

3. **Environmental Problems:** The major problems that exists here is the pollution of the main sources of potable water for the town. High population increase leads to high urbanization rate, which in turn leads to higher demand for water and higher generation of wastes, thus, more urban management problems. This endangers

the main sources of potable water. In addition to that, poor watershed management, deteriorating water quality, drought and desertification are inexorably increasing water scarcity. This threatens urban and rural development with rapid rising water cost and reduce reliability of water supplies. This are symptoms of poor and uncoordinated management of the resources, which in turn affects the quality of water consume by the urban dwellers leading to health challenges, and increase the cost of water treatment and consequently cause its shortage.

4. **Commercial and Financial Problems:** These are mostly the problems of water boards/agencies. Consumption metering is limited to very few places. Even where it exist, regular meter reading and billing based on actual consumption are rarely practiced. In many cases, water charges are based on lot size and property value, regardless of the amount of water consumed. The un-metered-flat rate-system creates distortions in consumers' charges. Poor consumer records, combined with inefficient billing and collection practices, create commercial losses- the main reason for the high levels of unaccounted- for water. Shortage of funds is also a major problem to Water Boards. For example, Zaria Water Board has projected revenue from water for seven month (February-August, 1999) was N4, 610,817. However, only N554,929.65 (12.04%) was actually collected. This low revenue base undermines the ability of the Board to carry out the mandatory maintenance routines. Finances for new and expansion projects are simply not available. Most of the water boards do not receive subvention from their various state governments; governments consider them economically unproductive, and also due to a number of the commitments and the economic dislocation of the national economy. Another major problem is low per capital income; the majority of Nigerian urban populace are low-income earners, this leads to both low revenue generation and complete

absence of private investments in water supply (A'ishat et al, 2010). The cost of water treatment chemicals has also hit the roof; and this has unfavorably affected the quality and quantity of water supply. The combination and the interrelationship between all these problems, ultimately exposes the urban population to unnecessary and unacceptable health hazards.

Furthermore, In a study carried out by Onibokun (1989) in three selected cities from three geographical zones of Nigeria (i.e. Kaduna, Enugu, and Ibadan. From North, East and Western part respectively) identified the following as the problems of water supply in Nigeria.

1. **Bureaucratic process:** This is in terms of the command and undue interference in the day to day running of the agencies by the parent Ministries.
2. **Finance:** Although the enabling legislation establishing these state water agencies empowers them to levy rates and charges that would enable them to cover their operating costs, the revenue accruing from the consumers account less when compared to the operating cost. In many cases water charges are based on plot sizes and property value, regardless of the amount of water consumed. Inadequate funding of the agencies responsible for water supply serves as a constraint for the expansion of services to other places as well as procurement of chemicals equipment and maintenance. In a related development the absence of financial discipline and accountability for performance, along with political interference in decision about allocations and pricing are reflected in a litany of problems.
3. **Inadequacy and Unreliability of electricity supply:** Frequent power failure is another major handicap to the water supply. Power failure is endemic in the country, and this disrupts the water

supply and leads to extensive damage to the water pumps and to the treatment plants.

4. **Widespread of Illegal connection:** This is done by the people in collusion with the Junior Technical Officers of the water agencies. Investigation shows that, apart from using potable water free of charge, Illegal consumers also increase the maintenance cost of water agencies because of damages done to water mains while making illegal connections. Treated water is contaminated through leakages and this affects the quality of potable water that ultimately gets to the consumers. For instance, stagnant water resulting from seepage caused by illegal connections to water main breeds mosquitoes. The larvae of mosquitoes escape in to the mains together with muddy water there by polluting potable water.
5. **Procurement of treatment chemicals:** In the procurement of treatment chemicals and other related equipments long procedures for import license couple with the long delivery dates create battle neck for the importation of such chemicals and equipment. Likewise the unpatriotic practice of some contractors who are in the habit of hoarding imported materials in order to create artificial scarcity and to force the water agencies to pay prohibitive prices, which in turn affect both the quality and quantity of water supply.

Further, in a study carried out by Yunusa (2001) in Zaria. He identified other causes of water shortages as follows.

- i. **Form and structure of the town:** Parts of the town that are well laid out are bound to be easier in laying water supply lines as well as management of the supply problems. But in the old city center, mass of building structures separated by footpath, ill-define access

ways serve as the main constraints in such informal and traditional settlements.

2. **Plan provision:** Plan provisions are hardly uniform in the estimation of urban water needs, such that there are variations in the provision and design standard. For instance, United Nation recommends 160 liters per capital per day (120 liters), Zaria master plan proposes 136.5 liters per person per day, Bauchi master plan recommend 112 liters per person per day while Gusau master plan recommended 250 liters per capital per day etc. These variations in design standard of urban water provision only make room for inadequate estimation and design for the provision of urban water supply.
3. **Data:** In another study carried out in Kaduna by Yunusa (2004), reveals that, Data on quality and quantity of water supplied and consumed were not available.

Causes of Urban Water Supply Problems

1. **Technical and Operational Problems:** Although the state boards do not have the adequately qualified staff to operate and maintain their systems efficiently, it should be noted that, these staff are usually not supplied with operational support facilities such as workshops, tools, vehicles, communication system, equipment and spare parts. It is difficult to expect them to discharge efficiently their responsibilities if they do not have the basic tools of their trade.
2. **Human and Institutional:** Problems such as inappropriate use of taps and indifferent attitude towards leakages and burst are generally brought about by low tariffs. Which made consumers to take water as a cheap commodity, and of low value. The problems are also brought about by low literacy or mobilization level of the

consumers. A greater proportion of our society is considered to have low literacy. High birth rate and rural-urban migration bring about high population increase and expansion of land use activities. High birth rate is attributed to religious, culture and educational factors while the rural-urban migration is as a result of poor standard of living and lack of job opportunities in the rural areas. The apparent lack of autonomy does not allow for a good organizational structure and also prevent the institutional development of many state water boards. There are some state water boards with no qualified Senior Officers in their employment that could run the organization and at the same time be able to develop and implement any institutional development plans. The majority also does not have the required technical competent personnel to operate and maintain their existing installations. A recent analysis by Parkman on the structure of state water boards nationwide revealed that quite a number of them do not even have the required organizational structure necessary to enable them function efficiently. Many functions and jobs are being carried out on an ad hoc basis with majority of staff having no work schedule or job description.

3. **Environmental Problems:** Environmental problems are caused by high population increase, high urbanization rate, lack of facilities for treating industrial effluent, lack of laws guiding their discharge, and lack of waste disposal facilities. In Kaduna for instance, the main source of raw water (River Kaduna) is being polluted by textile effluent. According to study carried out by the Department of Chemical Engineering, Ahmadu Bello University, Zaria revealed that even the Vegetable and crops cultivated along the Bank of River Kaduna are polluted or contaminated by chemicals from the industrial effluents that are usually discharged directly into the river.

4. **Commercial and Financial Problems:** As government established to provide essential services, state water boards were not originally established with commercial orientation. It has even gone to the extent that some state water boards cannot procure enough chemicals to treat water because of cost and in some areas lack of support from the State Governments.

However, the reality of the general situation of urban water supply in this country is that with increasing demand for services due to population increase and competing demands for resources, attempts by governments over the years have not been able to provide water for all and it is doubtful that this objectives may be achieved in the near future because of myriad of reasons.

CONCLUSION

The development of water resources is a dynamic process, due to the expansion of land use, population growth, and changes in the pattern of demand of water supply. The research has attempted to review the urban water supply and causes of water supply problems in Nigeria. It reveals also that, the main challenge in urban water supply is in the aspect of demand and distribution coverage; the quantity demanded will give the bases for planning while the extent of distribution network will show the services and un-serviced areas that will help in pointing out the rate of town expansion, vis-à-vis help in proper future projections based on agreed water planning standards capable of meeting the water demand of people to curtail the menace of its shortage. The fact is, if nothing done, such problems can lead to serious economic disruptions and human suffering.

RECOMMENDATIONS

- i. The sector has been under funded because it is almost left to the Government; there is need for active private sector participation,

the collaboration of the External Support Agencies should also be encourage.

2. As Nigeria was blessed with abundant water resources, government at all level; Federal, State, and Local should try to harness these resources to ensure a sustainable and adequate access to safe, adequate, improved and affordable water supply and sanitation to the population.
3. Required political will should be mobilize at lower levels of government and to include all relevant stakeholders in the work.

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