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The Contending Issues of Domestic Water Supply in Makurdi Metropolis, Benue State, Nigeria

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Abstract

This research investigates the various sources of water available in Makurdi metropolis, the state capital of Benue State, Its distribution across the various wards, its availability and frequency using both primary and secondary sources of data. A total of 200 respondents (households) were chosen randomly across the various wards of Makurdi. The questionnaire was administered to 200 households, 193 returned the questionnaires while 7 of them were lost. The results of the analysis show that 53.7% of all the respondents had running public taps in their homes while 46.3% do not have such facilities at home and of those that had running taps at home indicates that only 23.8% of them had water running more than three times in a week. Also about 45.4% of the respondents only had water occasionally and 18.8% had water once a week. The remaining 15% had water running in their taps two to three times in a week. More so, this study here shows how sufficient and adequate is water supply from Water Board. This revealed that 7.1% of the household have sufficient and adequate water supply due to storage system in their houses and about 19.2% have not adequate water supply. This confirms that the problem of water supply in the area is affiliated to the increase in the demand for water as against the inadequate supply of water due to insufficient power supply and problem of inadequate pumping infrastructure. Consequently, some parts of the study area which are closer to the Benue State Water Board have water supply more than the area that are far away from the water board who suffer inadequate water availability and abundance. This study therefore suggests some solutions in which if properly implemented will help to a greater extent in solving the problem of water supply in area.

Keywords: Domestic Water Supply; Makurdi; Water shortage; Sources.

1.   Introduction

Domestic water supplies are among the fundamental requirements for human life. Without water, life cannot be sustained beyond a few days and the lack of access to adequate water supplies leads to the spread of diseases. Safe drinking water remains inaccessible for about 1.1 billion people in the world [1]. Those most susceptible to water borne illnesses are children, the elderly, pregnant women and immune-compromised individuals, making water-borne illnesses one of the five leading causes of death among children under age five [2]. Diarrhea diseases, attributed to poor water supply, sanitation and hygiene, accounts for 1.73 million deaths each year and contributes over 54 million Disability Adjusted Life Years, a total equivalent to 3.7% of the global burden of disease [3]. The failure to provide safe drinking water and adequate sanitation services to all is perhaps the greatest development failure of the 20th century. If no action is taken to address unmet basic needs for water, as many as 135 million will die from these diseases by 2020 [4].

Public water supply is generally inadequate and in most cases inaccessible, the supply is intermittent and unreliable, thus resulting into high dependency on unsafe supplementary sources such as streams, hand dug wells and ponds ([5], [6], [7] - [9]). As population grows and urbanization increases, more water is required and greater demand is made on ground and surface water. The rate of urbanization in Nigeria is alarming and the major cities are growing at rates between 10-15% per annum [10] and thus, human activities including soil fertility remediation, indiscriminate refuse and waste disposal, and the use of septic tanks, soak-away pits and pit latrines are on the increase. Groundwater pollution has been attributed to the process of industrialization and urbanization that has progressively developed over time without any regard for environmental consequences [11] which eventually results in the deterioration of physical, chemical and biological properties of water [12].

According to Orebiyi et al. [13], about 52% of Nigerians do not have access to improved drinking water supply as for most communities the most secure source of safe drinking water is pipe-borne water from municipal water treatment plants. Often, most of water treatment facilities do not deliver or fail to meet the water requirements of the served community; due to corruption, lack of maintenance or increased population. The scarcity of piped water has made communities to find alternative sources of water: ground water sources being a ready source. Wells are a common ground water source readily explored to meet community water requirement or make up the short fall [14]. This is the situation in Makurdi.

Makurdi which is by the River Benue that is second largest river to River Niger still suffers from water scarcity as compared to other cities with small rivers or none at all. Although, Makurdi is situated on the banks

of River Benue, just a small fraction of its 600,000 residents has reliable access to safe drinking water [15]. The rest have been waiting for almost three decades for their pipes to run. There is the challenge of lack of supply of pipe borne water: hence households here are forced to use unreliable and unsafe sources of water like shallow wells, water vendors, small streams, and the Benue River itself with wells been the major source of water for household uses (drinking, cooking, washing etc.). Currently, this is insufficient to supply adequate water to the rapid population increase. Water supply that is provided and controlled by the Water Board is inefficient and, in spite of the increased demand, the services have not been extended to cover the people waiting to be connected. Therefore, thousands of people, especially the poor, lack adequate access to safe drinking water.

It is against this background that this paper examines contending issues hindering the effective domestic water supply in Makurdi metropolis. The objectives of the paper include; identifying the main and alternative sources of water supply in Makurdi Metropolis, examining the nature of the problem of pipe-borne water supply and alternative sources in the area, and proffering possible solutions to the problem of water supply in the area.

2. METHODOLOGY

2.1 Study area

Makurdi is the capital city of Benue state in north central Nigeria. Makurdi lies between Lat. 7° 44 N and Long. 8° 54 N. It is located within the flood plain of lower River Benue valley. The physiographic characteristics span between 73-167 m above sea level. Due to the general low relief, sizeable portions of Makurdi are water logged and flooded during heavy rainstorms. This is reflected in the general rise in the level of groundwater in wells during wet season. The drainage system is dominated by River Benue which traverses the town into Makurdi North and South banks.

Temperatures are generally high throughout the year due to constancy of isolation with the maximum of 32^oC and mean minimum of 26^oC. The hottest months are March and April. The rainfall here is convective, and occurs mostly between the months of April and October and is derived from the moist and unstable southwest trade wind from St. Helena Subtropical Anticyclones (STA). Mean annual rainfall total is 1190 mm and ranges from 775-1792 mm. Rainfall distribution is controlled by the annual movement and prevalence of Inter-Tropical Discontinuity (ITD).The mean monthly relative humidity varies from 43% in January to 81% in July-August period [16].

The geology is of cretaceous sediments of fluvial-deltaic origin with well-bedded sandstones of hydrogeological significance in terms of groundwater yield and exploitation [17]. Makurdi town which started as a small river port in 1920 has grown to a population of 297,393 people [18].

2.2 Data Collection

Primary and secondary sources of data were used in this research work to collect data. The primary sources of data that were used include questionnaire, oral interviews and observation. Secondary sources of information were gotten from relevant textbooks, journals, seminar papers, conference proceedings and the internet.

Systematic sampling technique was adopted in this research work. The study area (Makurdi metropolis) was stratified into 4 sections (High-Level, North Bank, Wurukum and Wadata). From each of the four areas, 50 x 4 = 200 respondents (households) were chosen randomly. Age was measured as the number of years from the time of birth to period the questionnaire was administered. The level of formal education attained at the time of interview was also noted. The questionnaire was administered to 200 households, 193 returned the questionnaires while 7 of them were lost.

Simple statistical techniques were employed to present and analyze the data obtained from the field. Simple frequency tables were employed to present result in percentages, pie charts and bar charts.

3. Results and Discussion

Information extracted from the questionnaire indicates that about 68% of the respondents have tertiary education, meaning they are highly literate. They include Tiv, Idoma, who are mostly civil servants and Igbo and other tribes that give more priority to business activities of the area. The analysis of household size reveals that 43% of the respondents had between 1-5 dependents; about 39% of the respondents had between 4-7 dependents; about 18% had between 8-11 dependents, and about 11% had 11 or more dependents. More so, the survey revealed the water provisions and commercialization in Makurdi metropolis. This is shown in Table 1 below.

Table 1. Water provision and commercialization in Makurdi metropolis.

Delivery system	Providers	Source	Price and payment System	Cost to Provider	Remark
Dug wells	Household owners	Households	Nill	Nill	Shallow and mostly dry up season, usually not safe.
Private owned boreholes	Private individuals	Private Systems	N10.00 sold to hawkers and Individual	Not disclosed by the owners	Price depends on the electricity source. it is N10.00 when run from National grid and N15.00 when run from owners' generator
Household Taps	Utility		N400 per month to the utility upon receipt of a bill		Where utility water exists, some households are connected to the utility supply system.
Hawkers/ Vendors	Individuals	Individuals utility	N20/ N25 per 20 litre jerricans depending on the season	N10/N15 depending on the source	The hawkers collect water in 20 litre jerricans (some time load as many as 10 kegs in a cart) from, water board premises and the river where they pay nothing, or water selling kiosk and where they pay N10.00 or N15.00 per jerricans
Water selling points and kioks	Individuals	Private	N20/N25 per 20 litre keg depending on the season	N 2500 per Tanker/ more depending on the distance	This was introduced due to the scarcity of water.

3.1 Duration of Water Supply for Households

Table 2 below shows that 53.7% of all the respondents had running public taps in their homes while 46.3% do not have such facilities at home. Of those that had running taps at home only 23.8% of them had water running more than three times in a week. About 45.4% of the respondents had water occasionally only and 18.8% had water once a week. The remaining 15% had water running in their taps two to three times in a week. This study shows here how insufficient and inadequate the water supply from Water Board is. This revealed that 7.1% of the households have sufficient and adequate water supply due to storage system in their houses and about 19.2% have not adequate water supply. 65.0% of the households show that the water supply is highly inadequate and 3.3% did not response to the question.

Table 2. Duration of water supply for households

Variables	Frequency	(%)
Respondents connected to Water supply system		
Houses running with Taps	41	21
Houses not running with Taps	152	79
Total	193	100
How often Tap run per Day/Month		
Occasionally	57	47.5
Once a week	22	18.3
2 -3 times a week	17	14.2
>3 times a week	24	20.0
Total	120	100
Average Supply of Water per Hours/Day		
2 hrs	69	57.5
3hrs	19	15.8
4hrs	14	11.7
5hrs	18	15.0
Total	120	100
Respondents' perception on Adequacy of water.		
Adequate	15	12.5
Not Adequate	23	19.2
Highly in adequate	78	65.0
No Response	4	3.3
Total	120	100

3.2 Available Source of Water Used By the Respondents

Table 3. The responses to available source of water used by the respondents.

Area of Respondents	Available sources of Water				Total
	Tap	**Borehole**	**Wells**	**Hawker /vendors**	
High-level	05	03	25	17	**50**
Wurukum	04	02	19	23	**48**
Wadata	08	04	20	14	**46**
North-Bank	06	03	18	22	**49**
Total	**23(12%)**	**12(6%)**	**82(43%)**	**76(39%)**	**193**

From Table 3 above 12% of respondents agreed that tap water is the main source water with North bank and Wadata having the highest proportion of people that have tap water as their main source of water. This is due to the proximity of some of the sampled areas to the Water Board. 6% of respondents are commonly associated with boreholes which are very few in all the areas due to high cost of digging them. Also 43% respondents obtain their source of water from wells while 39% use Water Vendors (Mai-ruwa) as their water suppliers. This is due to the insufficiency of the water supply from the Benue State Water Board
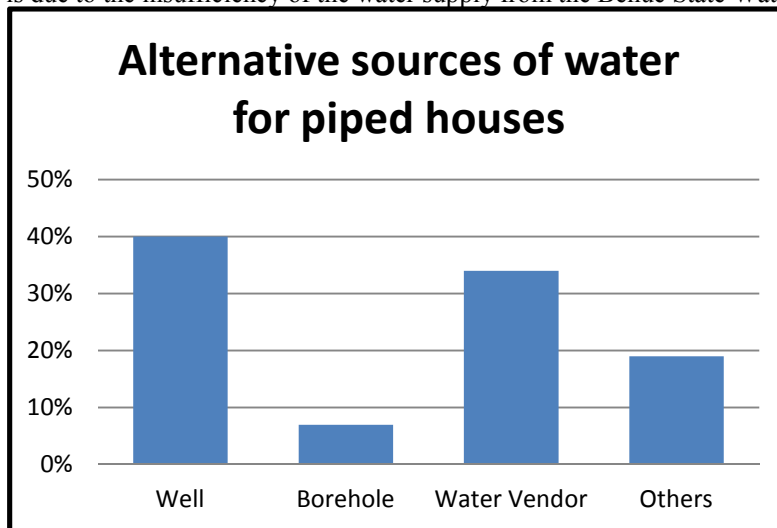

Figure 1 Alternative sources of water used by respondents

Because the public water supply to residents of Makurdi has not been sufficient, the people resort to any form of alternative water supply for their domestic use. From the survey conducted, it has been revealed that about 40% of the households still depend on well water to supplement the public stand-pipe for domestic use. About 32 % of respondents rely on the water vendors for their water whereas 7% also depends on public boreholes. From the result 19% respondents rely on other sources like tankers, rivers/stream and rain water which is basically available during the rainy seasons of the year only.
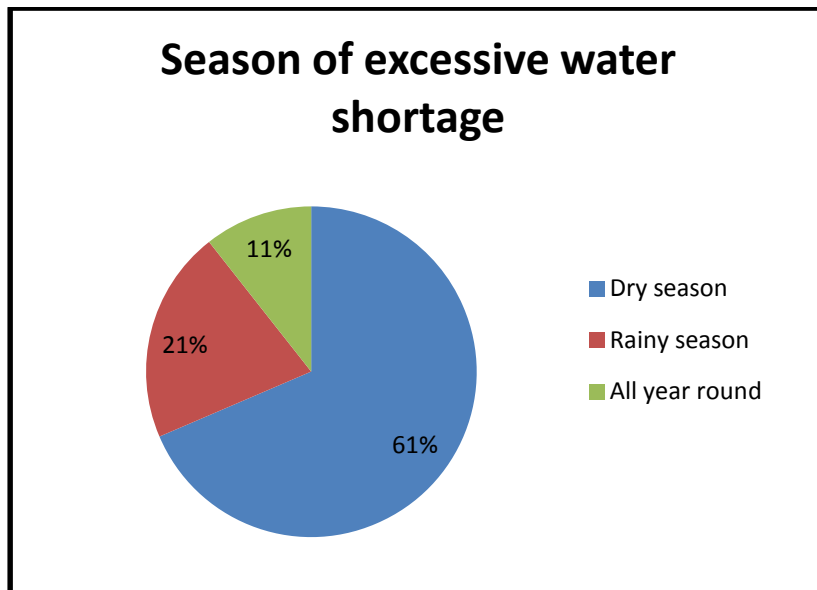
Season of excessive water shortage

- Dry season
- Rainy season
- All year round

11%

21%

61%

Fig 2: Pie Chart Showing Responses to Water Shortage by the Respondents

From the figure above, shortage of water supply is much higher during the dry season and this is obvious; in the dry season there is no rainfall to supply the surface and the underground water and so the Water Board also runs short of water. Consequently the water shortage will be more. 21% respondents complain of water shortage during the rainy season. This low water shortage in this case is due to the availability of rainfall. The water shortage during this period may be related to inconsistency of water supply from the Water Board. 11% of the respondents complain of water shortage throughout the year. These are the group that does not benefit from water supplied by Water Board and depend mostly on both well water and water vendors for their water sources

3.3   Sources of Water to be Improved Upon

Prefered source of water

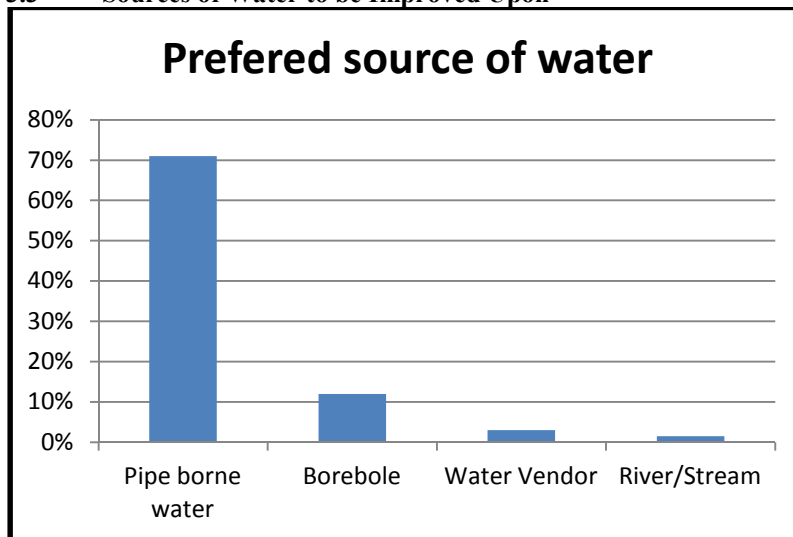| | Pipe borne water | Borebole | Water Vendor | River/Stream |

Fig. 3: Bar Chart Showing the Preferred Sources of water to be improved upon

Figure 3 above shows that the majority of the respondents prefer pipe-borne water to any other source of water supply as shown by 71% responses for pipe-borne water. This response is followed by respondents using boreholes, wells and streams as seen by the responses of 12%, 3%, and 1% respectively. It is therefore imperative for the government to strive hard in developing and sustaining regular pipe-borne water supply in the study area.

The response from the water works of was obtained from the Head office of the water board. From the

water board it was affirmed that the kind of water treatment used was chemical treatment process. It was also said that the facilities used is not adequate and well maintained enough to supply a good quality of water to the area. More so the water supplied to the area is of national standard of drinking water.

In addition to water supply to the area the supply is daily and the distribution is rationed.. This is because the supply cannot cover up the area at once; implying greater demand than supply. More so, the supply is mostly in the daytime and it is not enough to meet the daily need of the people in the area which is said to be as a result of broken pipes. Furthermore the government funding and activities were said not to be enough for the adequate supply of water to the areas. Furthermore, some people do not pay water bills. Water Board officials further stated that this is due to the fact that most households within the metropolis are not connected to the water distribution networks as some pipes in the distribution network are no more capable of giving the required supply to meet up with the demand.

The major problems encountered in the process of water treatment and supply as added by the water work district manager is the non- steady energy supply, high cost of fuel and break down of electrical/mechanical components. Also, some of the plans put in place to improve the level of water supply experienced constraints such as the partial involvement of government in the system, misappropriation of funds, unstable power supply, and inadequate pumping equipments.

4.0 Contending Issues of Domestic Water Supply in Makurdi

From the survey, the following have been deduced as the contending issues of domestic water supply in Makurdi metropolis.

1) Pipe-borne water is largely absent and where it is available, it's unreliable and may not be safe for drinking as most pipes are rusty and have leakages. This is because the town's pipe network is old and rusty. Leaks sprout all over when water is pumped from the existing water treatment plant, which has a capacity of just 6,000 cubic meters per day. When the Water Board is not pumping water, the contaminated pool of water at the leakage points may flow back into the pipes and may be pumped into households when pumping activity resumes. Also, during the rainy seasons for instance, water contaminated by feaces deposited in open spaces is washed into the pipes through these leakages. Thus contaminated water may be distributed into households when pumping activity is resumed. Consumers of such contaminated water are exposed to high health risk. Ineffective service delivery has also meant that those that are connected cannot rely on the State Water Board for their source of water due to the inconsistent supply.

2) Water supply that is provided and controlled by Water Board is inefficient and in spite of the increased demand, the services have not been extended to cover the people waiting to be connected. This inadequate water supply problem is a universal phenomenon among Nigerian urban centres; the situation is increasingly deteriorating and being compounded by rapid growth of these urban centres.

3) The domestic water supply is through water hawkers, who peddle their wares in 20 litres jerry cans, and are popularly known as "Mai Ruwa,'' Water Tankers, hand dug wells, and river/streams.

4) The Benue State Water Board, which is responsible for maintaining all state water resource facilities and providing affordable potable water, suffers from difficulties in management and operation. The water supply system it oversees was built in the early seventies. Today, it has deteriorated and is poorly utilized due to lack of maintenance and limited funds.

5) Variety of factors constrain water supply and these manifest in lack of adequate finance, inadequate data on operation and maintenance; insufficient and inefficient use of funds; poor management of water supply facilities; inappropriate system design; low profile of operation and maintenance; inadequate policies, legal frameworks and overlapping responsibilities as well as political interference and technical standing of the agency. The result is the near incapacitation of the State Water Agency. The factors include corruption and absence of clear institutional objectives.

5. Conclusion

This paper assesses the problem of domestic water supply in Makurdi metropolis, Benue state. It identified the main source of water, alternative sources of water, and examined the pattern of water supply problem. Data collected were both primary and secondary in nature. The primary data were obtained from oral interviews and the use of questionnaires which were administered using systematic sampling technique. The questionnaires were administered to both the consumer and the high ranking staff of the Water Works while the secondary data were obtained from past written documents that are water related.

The findings revealed that Makurdi coupled with the increasing population has caused a serious water stress in the area. Water supply in the area reflects that the areas closer to the water works have more water supplies than those areas that are farther away from the Water Board have (High-level). The water supply reduces as we move away from the Water Board.

Although water is the most abundant natural resource, the scarcity of treated pipe-borne water in this area is due to misplacement of priority by governments, increasing cost of water treatment and distribution equipments as shown in the response from the water works. The water works have also revealed that the major causes of the inadequate supply of pipe-borne water to the area include unstable power supply, insufficient pumping equipments and increasing population. However, civil society blames inefficient utilization of funds, poor governance and misplaced priorities for the water woes. Government voices say the failing is caused by lack of money, poor power supply and a population with a mindset that insists "water is free."

6.   Recommendations

The foregoing analysis leads to the conclusion that inadequate supply of treated water is causing problem of poor sanitation, economic and social backwardness and poor health condition leading to low life expectancies. If this problem is not well addressed it can affect the sustainable development of the area and the country as a whole.

In view of the above findings on the research the following are recommended;

1) Government should release funds for water distribution network project to be carried out. Both state and federal government should put water as a major priority.

2) Expansion of treatment plant and more distribution lines for the purpose of pumping water at the water works is expedient. There should also be other alternative sources of power apart from the hydro-electric power (HEP) to help in the case of power failure. Government should put in money for installation of generators and for fuel purchase or they should work on the use of solar energy. These are alternatives that will enable sufficient pumping of water at any time irrespective of the general supply of the hydro-electric power (HEP).

3) Conservation which involve the careful use of water resources for sustainable development is a way water resources can be maintained in term of its quality and quantity, therefore modest use of water, re-distribution of water, recycling of waste, building of shelter belt on lakes and removal of water loving plant near water body, reduction in water pollution and many others are all technique by which water can be conserved.

4) Improving services significantly will require more efficient operation of Benue State Water Board in rehabilitating and extending supply systems. Improving the efficiency of the existing public water supply system by reducing losses, detecting leakage conveyance efficiency. Inefficient water systems are a major source of water loss. In the developing world, in many cities, faulty pipes and illegal connections waste between 20 to 50 percent of public water supplies. Current losses in the distribution system are considered too high.

5) Government should review the water supply policy and give due concern on Water Board activities, this can be achieved by giving priorities to the water board activities alongside other activities they are into. This would permit direct state government involvement to pumping equipments, power supply and other things that can help in the regular supply of potable water in order to promote the well being and also improve the living standard thus enhancing the sustainable development of the people in the area and the country as a whole.

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