

## An Assessment of Alternative Water Source for Domestic Used in Minna Metropolis, Niger State, Nigeria

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### Abstract

Making freshwater available in urban centre are major challenge to be faced in 21<sup>st</sup> century globally. Population growth and industrialisation have put a lot of pressure on water resources the world over. Minna, the capital city of Niger State Nigeria, has witnessed population growth due to the influx of people from the various regions to seek greener pastures. The population growths have resulted in an inadequate water supply to the populace by conventional means. These problems result in an individual effort to meet their daily water demand. To explore this problem, structured questionnaire were distributed to two hundred households purposively selected from six areas in the town and semi-structured interviews were administered on five water analyst. Statistical Package for Social Science (SPSS) was used to analyze the data collected. The study reveals that inadequate budgetary allocation to ministry of water resources is the major problem hindering water availability in Minna. The three alternative sources of water supply for domestic use identified were well water, water from vendors and boreholes. Consequently increase in resource allocation to the ministry of water resources in a way of policy framework that guaranty private investment in water sector, among others to improve water availability in the study area.

**Key words:** alternative, water, sources, domestics, borehole, well, vendors

### Introduction

The available water sources throughout the world are becoming depleted and this problem is aggravated by the rate at which populations are increasing, especially in developing countries. With increasing global change pressures coupled with existing un-sustainable factors and risks inherent in conventional urban water management, cities of the future will experience difficulties in efficiently managing scarcer and less reliable water resources (Khatri & Vairavamoorthy 2007). **As populations grow and water use per person rises, demand for freshwater is soaring. Yet the supply of freshwater is finite and threatened by pollution.** Caught between growing demand for fresh-water, on one hand, and limited and increasingly polluted water supplies on the other, many developing countries face difficult choices. Sustaining healthy environments in the urbanized world of the 21st century represents a major challenge for human settlements, development and management (Khatri & Vairavamoorthy 2007). Pipe-borne water is the major way of urban water distribution globally. However population growth and industrialisation have put a lot of pressure on water resources the world over.

Today many state capitals in Nigeria are facing chronic freshwater shortages by a conventional means of pipe-borne water. Minna is one of the capitals facing water problems in Nigeria. Population growth and rapid urbanization have created a severe scarcity of water as well as tremendous impact on the natural environment. Assessment of alternative water source for water consumers in Minna Metropolis will offer an opportunity in addressing some of the challenges.

### Statement of the Problems

Water is needed in all spheres of human life. Water is put into so many uses, from domestic to industrial. Though a renewable resource, it is limited in supply at a point in time. In recent years, water availability has been increasingly assuming not only significant, but also threatening proportions, especially in the urban areas where uncontrolled (indiscriminate) activities bring about immeasurable degrees of water shortage, thus contributing substantially to water scarcity in the capital city of Minna.

Over the years and especially in recent times Minna has witnessed unprecedented growth with its attendant problems occasioned by influx of people from other parts of the state for administrative, political, economic, educational as well as other purposes, just like most modern areas (Sule, 2011). Consequent upon the aforementioned it becomes expedient to assess the water resource sources and the extent in order to formulate policies and to come up with water management techniques geared towards ensuring a sustainable and comfortable urban development.

The fundamental questions that readily come to the mind of the researcher include:

- a. What are the other alternative water sources to meet water demand of Minna?
- b. Is there any regulation governing private water provision in Minna.
- c. What could be the cause of conventional pipe-borne water scarcity in Minna?

### Aim and Objectives

The aim of the study is to assess alternative water source for domestic use in Minna Metropolis. In specific the objectives of the study are as follow:

- a. To identify the major alternative water sources in Minna
- b. To identify the rules governing the private water provision in Minna
- c. To identify the major cause pipe-borne water scarcity in Minna
- d. To recommend based on findings

### Description of the Study Area

The study area is Minna Metropolis. Minna city which is both the administrative headquarters of Niger State and the Chanchaga Local Government Area is shown on figure 1.1. The city is estimated with population of 350,287 (2006 Census) people and a land area of about 6,789 square kilometers and is the emirate council headquarters. Minna lies at latitudes 9°37'N- 9°79'N and longitude 6°16'E - 6°65'E on a geological base of undifferentiated basement complex of mainly gneiss and magnetite. To the North of the town, more or less continuous steep outcrop granite occurs limiting any urban development in that direction.

The climate of Minna lies within a region described as tropical climate (Aw). It has a tropical dry and wet climate. The region is characterized by double rainfall maxima. The town has a mean annual precipitation of 1300mm. The rainy season commences most of the time in April and lasts till October, with fluctuations in amount of rainfall received per year. The highest mean monthly rainfall is September with almost 300mm. Temperature is uniformly high throughout the year reaching the peaks of 40°C (Feb./March) and 30°C (Nov./Dec.). These climatic characteristics favour the availability of domestic water to the people during wet season.

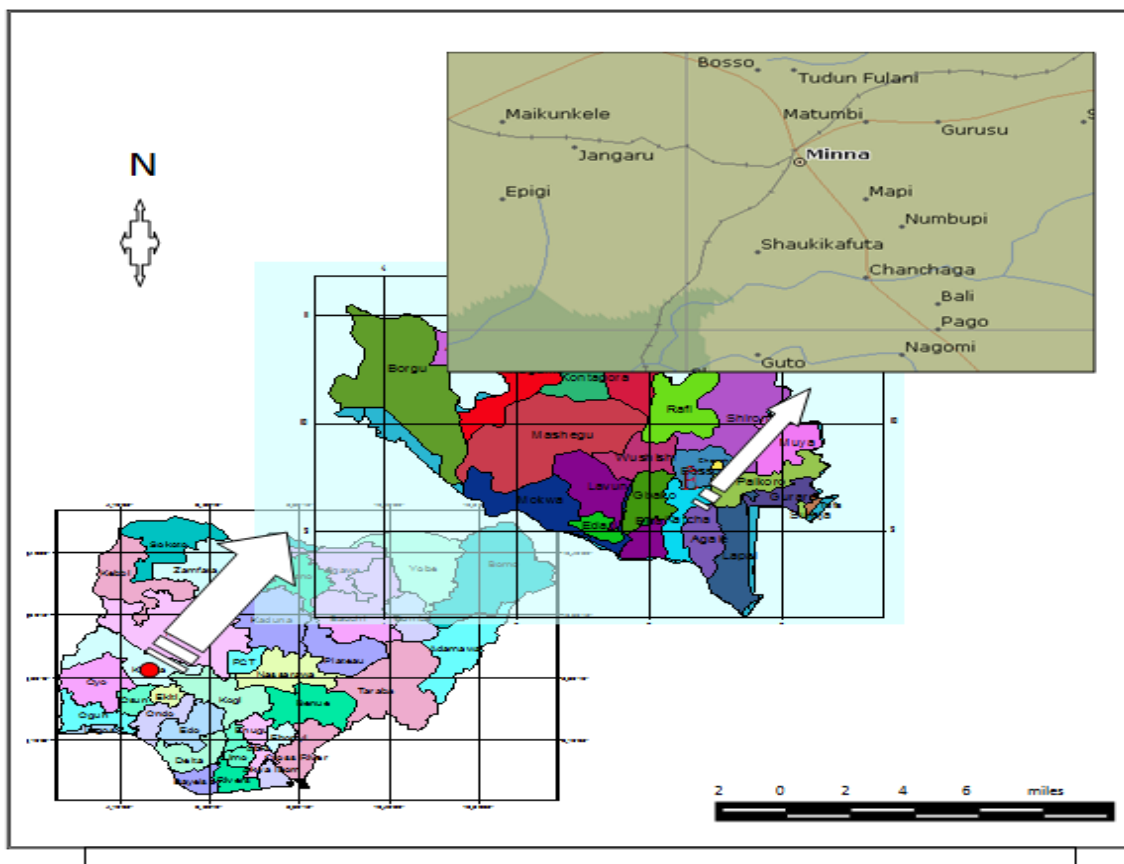


Figure 1.1 Location of Minna, Niger State, Nigeria

### Methodology

This phase of the research describes the field techniques that were used to obtain primary data for the field study in Minna Metropolis. The fieldwork comprised administration of questionnaires to the general public and

interviews with officials of Niger State Water Board.

### Administration of Questionnaires and Interviews

The administration of questionnaires represents the first phase of collection of primary data. The first sets of questionnaires for this study were those administered to the general public. The main respondents here were water consumers who make use of pipe-borne water. Two hundred copies were administered as follows: 30 administered in Kpakungu, 40 in Chanchaga, 30 in Limawa, 20 in Sabon Gari, 30 in Keteren Gwari, 30 in Anguwar Sarkin Minna and 20 in Tunga. In the Chanchaga region more copies of the questionnaires (40) were administered because of the relatively larger size of the area. Purposive sampling was used to select the sample for this research. The reason was to select cases that are informative and assumed to be familiar with some fundamental issues concerning urban water supply in Minna Metropolis. At the consumer level, purposive sampling was used to select one consumer representing households, who make use of pipe-borne water for domestic purpose. The purpose was to choose consumers that adequately represented the characteristic of the study area and whose experiences with water supply situation may be representative. The questionnaires were administered on the respondents in their houses to establish accuracy and to determine the exact origin of the data.

In addition to the distribution of questionnaires to the pipe-borne water consumers, a second category of questions were directed to officials in the ministry of Niger State Water Resources and in particular Niger State Water Board. In total, five officials were interviewed. At Niger State Water Board, the water supply analysts were purposively selected. This is because the analysts as well as the planning engineer are strategically placed in the sense that they are responsible for regulating the urban water service delivery. They were thus sampled for this study and were believed to be capable of providing in-depth data that are required for the study. The questions were designed to be semi-structured since the respondents were allowed to express themselves beyond the limits of the questions (Williman, 2006).

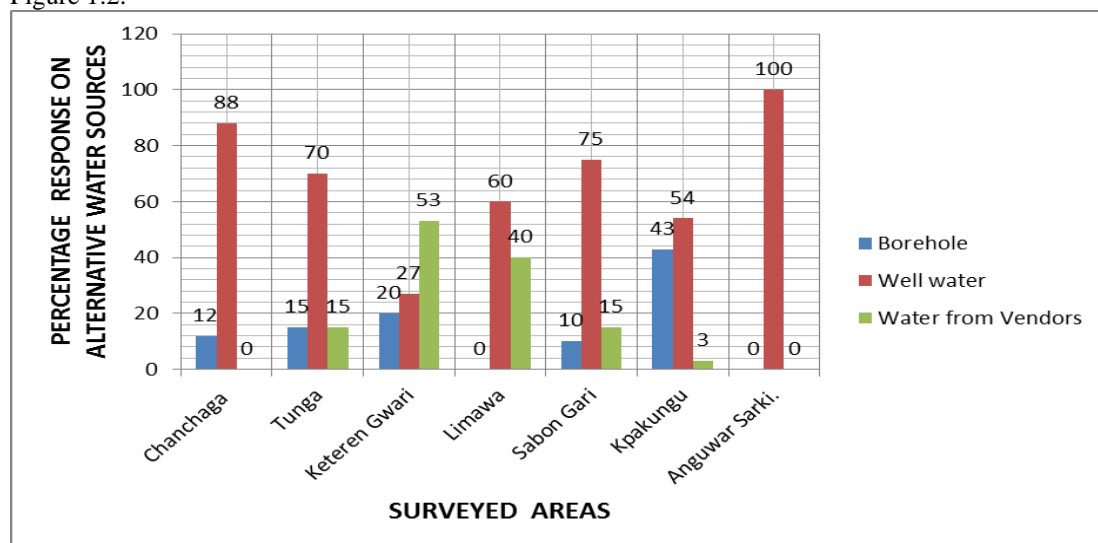
### Data Analysis

This phase of data analysis made use of the statistical package for social sciences (SPSS). This assisted in the analysis of the questionnaires. Interview and questionnaire responses were recorded as required. The data were summarised and categorised into themes. The aim was to provide some coherence and structure to the data while holding on the original accounts and observations. Patterns and commonalities in responses were then identified and coded. This allowed for data analysis and the identification of common themes to come out with different perceptions of the population and officials with respect to the various objectives of the study (Bushnaq, 2004). The software was then run to reveal the different trends further discussed in the next chapter

### Results and Discussion

#### Cross tabulation of alternative water source for domestic use in the study area.

The analysis of the cross tabulation of respondents' responses to alternative sources for domestic water in the study areas compared the characteristics of the surveyed areas. The various characteristics are clearly revealed in Figure 1.2.



**Figure 1.2 Cross tabulation of alternative water source for domestic use in the study area**

The figure shows that 88% of the respondents make use of well-water in Chanchaga to complement the

pipe-borne water. Similarly 12% of them make use of bore-hole as their alternative source for water. The 12% bore-hole use can be linked with government intervention to solve the problem of pipe-borne water shortage in the study area. It is seen from the figure that 70% of the respondents make use of well water as an alternative water source. This represents the highest percentage in the study area. 15% of the respondents make use of bore holes, as well as water from vendors as an alternative source of water for domestic use. in Keteren Gwari it reveals that 53% of the respondents use water from vendor as an alternative source of water, 27% of the respondents use well-water as an alternative source, while 20% makes use of bore-hole as an alternative source of water. This is the only area with water from vendor as the highest alternative source. The figure also reveals that 60% of the respondents use well-water as an alternative source in Limawa while 40% of the respondents use bore-hole as an alternative source of water. This is probably one of the areas that enjoyed government intervention in domestic urban water supply. In Sabon Gari the figure shows that 75% of the respondents make use of well-water as an alternative source, 15% of them make use of water from vendors, while 10% use bore-hole to complement pipe-borne water for domestic purposes.

The figure reveals that 70% of the respondents in Kpakungu make use of well water as an alternative source of water in the study area. 43% use water from vendors, while only 3% make use of borehole as an alternative source of water.

The figure further point out that, all of the respondents in Anguwar Sarki use well water to compliment the pipe-borne water. It is the only area with 100% water use on a single water source.

The above figure shows that there are variations in the alternative sources of water for domestic use in the surveyed area. The well water appears to be the major source of alternative water for domestic use in the surveyed area. Anguwar Sarki with 100% has the highest percentage respondents of well water users while Keteren Gwari has the least with 27%. Generally over 50% of the respondents use well water as an alternative source with an exception from Keteren Gwari. The Figure also revealed that borehole water is used more in Kpakungu with 43%. Limawa and Anguwar Sarki do not make use of borehole as an alternative source of water. Because of the proximity of the two areas it may confirm the fact that some geological areas in Minna do not support drilling of borehole. Water from vendors is mainly used in Keteren Gwari with 53%. Chanchaga and Anguwar Sarki do not use water from vendors. Characteristically, less than 50% of the respondents make use of water from vendors with the exception of Keteren Gwari.

**Table 1:** Stakeholders' Interview Responses

	Frequency	Percentage
Profession		
Engineers	5	100%
<b>Total</b>	<b>5</b>	<b>100%</b>
Major problem facing pipe-borne water availability in Minna		
Inadequate funding	5	100%
<b>Total</b>	<b>5</b>	<b>100%</b>
Law governing private water provision such as well-water and borehole		
No law	5	100%
<b>Total</b>	<b>5</b>	<b>100%</b>
Role play by the ministry in addressing pipe-borne water shortages		
drilling of boreholes and distribution of water with tankers	5	100%
<b>Total</b>	<b>5</b>	<b>100%</b>

Table 1 reveals that the entire water analysts interviewed in the Niger state Water Board were engineers by

profession. 100% of them believe that the major problem of pipe-borne water in the study area is inadequate funding. The inadequate funding culminated into obsolete equipments, insufficient pumps, insufficient funds for new water works and inadequate electricity to power the existing water pumps. In addition to this the water analysts believe that there is no law in the state that govern where well-water are dug as well as bore-hole drilling by an individual household. The respondents were also in accord that the government has intervened in terms of chronic water crisis in years past by measures such as drilling of boreholes and distribution of water with tankers. This explains why 14% of the water consumers use borehole as their alternative source of water for domestic use. However none of the water consumers use tanker water as their alternative source of water. Therefore, water distribution with the use of tankers may probably be viewed as a political statement from the water analysts.

### **Conclusions**

The aim of the study is to assess alternative water source for domestic use in Minna Metropolis, Niger State, Nigeria. To achieve this aim, primary data were collected. Structured questionnaire were administered on pipe-borne water consumer in Minna metropolis and interview were conducted using semi-structure questionnaires with water analysts in the Niger State Water Board. The data were analyzed using SPSS. Method such as simple percentage and graph, were adopted. The results are presented in the previous chapter. Inadequate budgetary allocation to the ministry of water resources has been identified as the major problem affecting the pipe-borne water availability in Minna. This problem was found to culminate in the inability of the ministry to replace the obsolete equipments as well as its inability to embark on new water works. If these trends continue, the state capital may end up in acute water crisis in the nearest future. Well water, water from vendors and boreholes has been identified as the major alternative sources of water in the study area. Of these three alternative sources water, only borehole water supply is supported by the government. The remaining two result from individual households' efforts to meet their domestic water requirements. It is therefore expedient for the authority concern to formulate policies to ensure safety in private water provisions.

### **Recommendations**

1. More resource allocation to the Ministry of water resources is highly recommended. This may not be only on budgetary allocation but a policy framework where investors are encouraged to invest in the water sector.
2. Strict implementation and management of the resources allocation to this ministry of water resources needs to be adhered to for good quality water provision.
3. The Ministry of water resources should formulate and regulate policies on private water provision most especially with respect to well water since this water source form substantial water need of the study area. This will help guarantee the portability of well water source.

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