

WATER SUPPLY SHORTAGE IN MAIDUGURI: AN ENGINEERING POINT OF VIEW

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ABSTRACT

Field investigation into the water supply characteristics and water supply shortage pattern have become necessary to provide data for planning and record for analysis. In line with the above, this study was initiated to investigate and establish engineering questions related to causes of water supply shortage in Maiduguri Metropolitan using questionnaires, oral interviews, and study of past maintenance records/machines log books. A descriptive statistical technique was enlisted to breakdown the data presentation and analysis. The result shows that engineering related factors contribute substantially to the water shortage problem in Maiduguri. It was established from data analysis that lack and/or inadequate power supply due to fluctuation and failure of electricity, among others, affected water supply in Maiduguri the most.

INTRODUCTION

WATER

Water is the most precious natural resource needed for the sustenance of life after oxygen, and is acclaimed the “key to health” [1]. Lack of access to water for meeting basic needs such as health, hygiene, and food security undermines development and inflicts enormous hardship on large number of the human families. Availability of water for People indicates the central importance of water in improving the human livelihood as well as the environmental conditions of landscapes increasingly dominated by humanity. The challenge of water for all is one that has taken on renewed interest toward reducing a large proportion of the people without sustainable access to safe drinking water [2]. In spite of this, many urban and peri-urban areas have been facing shortages of water supply, especially in the dry seasons, often leading to short- and/or long-term effects on the populace. So, it seems improbable that over a billion people currently do not have adequate access to one of the most basic human needs – water.

Self [3] defined water shortage as a situation whereby the water supplier chooses, or is unavoidably able to supply the total water demand for intended population. This phenomenon is commonly experienced by inhabitants of Maiduguri. Examples of this effort are reflected in the high profile given to water at the international level, for example, beginning in 1970 and continuing to the present there has been a numerous international meetings, conferences, and declarations, with various strategies, plans and goals proposed to solve the water supply problem at each one [2]

It is widely accepted that in order to achieve a basic level of health and dignity, an

adequate amount of clean water is a daily necessity. There is also wide international consensus that the sustainable provision of basic water needs for populations in the developing world is both a global priority and global responsibility [4]. The World Health Organization (WHO) [5] recommends that a minimum of fifty liters of clean freshwater be available to each person, every day in order to maintain basic health and cleanliness.

Progress has been made towards meeting the water supply needs for the world's poor, for example, in 2002, 79% of the population in developing countries had access to improved water supplies, bringing up the total world coverage to 83%. This is an increase of 8% from 1990 to 2002 (WHO/UNICEF 2006). These increases have resulted in more than 1 billion additional people gaining access to improved water supplies over the past two decades. However, due to population growth and increasing rural-to-urban migration, there continues to be a large proportion of people in the rural and peri-urban areas of the developing world that do not have access to adequate water supplies (United Nations 2006). With over 75% of the world's poor living in rural areas the need to expand sustainable water service to these areas is imperative [6].

In view of the significance of water to mankind, exploring the sources, impacts, and solution of water shortages to the public is imperative. The main objectives of the study is to find out the causes of water supply shortage with particular reference to engineering causes in Maiduguri Metropolis and make provide a roadmap on how to tackle the menace.

Water supply in Maiduguri

A water treatment plant (WTP) completed in 1986 located about 15 km on the Maiduguri-Konduga road serves as the major source of water to the communities, this is

only the phase I of water supply project, thus its distribution network did not cover the entire city. Borehole, hand dug wells and in few locations, streams become the source of water. Owing to the increasing demand for water, the proliferation of numbers of boreholes in the city have been correspondingly increasing annually to the extent that borehole water is becoming the principal and sometimes only source of drinking water in many communities in Maiduguri.

MATERIALS AND METHODS

Both primary and secondary data related to water supply in Maiduguri were gathered and analyzed. The primary data were obtained via questionnaire, personal contact, and interviews with relevant groups and authorities concerned with subject matter. The secondary data are obtained from literature such as government gazette and technical reports respectively. The study adopted a survey design, which used a systematic sampling technique in choosing some settlements for the research to cater for spatial representation for the region that lies within Maiduguri.

The study chooses to divide the entire Maiduguri city into eight (8) zones, namely Bulumkutu, Maduganari, Baga road, Government residential areas (GRA), Polo, Gwange, Custom Shehuri, and Mairi. The results obtained there from were bulked and analysed. The descriptive and inferential statistical techniques were used in the analysis of the generated data. The descriptive statistics included data summaries in the form of frequencies and percentages.

Results and Discussion

An average family in Maiduguri Metropolis is made up of 10 people and each family uses about 200 liters (10-20) liters of water per person daily. On the average of 80% of the domestic consumers in Maiduguri have been facing water supply shortages daily (Table 1). The Table also shows that only 6 % of inhabitants of Maiduguri are facing the shortages occasionally and 10 % are not getting any water supply, this represents the worst hit sub set of the populace.

Table 1: frequency of water shortages in Maiduguri

WATER SUPPLY SHORTAGE BY RESPONDENTS	PERCENTAGE (%)
Daily	80
Weekly	4
Occasionally	6
No supply	10

Alternative Sources of Water

About 25% of the consumers are getting water through nearby taps, boreholes or reservoirs around them (Table 2). Then 48% are buying from water hawkers like Maimoya's or water tank. While 25% utilizing reserves stores in reservoirs and 2% are obtaining from nearby rivers.

Table 2: Alternative Sources of Water During Water Shortage

ALTERNATIVE SOURCES OF WATER DURING WATER SHORTAGE	PERCENTAGE (%)
Supply by nearby taps, boreholes or reservoirs	25
Buying from the hawkers like <i>Maimoya</i> or water tanks	48
Utilizing reserves stored in reservoirs	25
Nearby rivers	2

With reference to various maintenance record and machines/equipment log books, table 4.5 above summarized the available data/information collected. Poor construction techniques contributes about 6%, power failure and fluctuation 48%, lack of spare parts contributes 13%, while 4% of the failure is contributed by pipe breakage, 7% is been contributed by well failure and 6% is contributed by pump failure.

Table 3: Engineering Causes to Borehole Failure

ENGINEERING CAUSES OF BOREHOLE FAILURE	PERCENTAGE (%)
Poor construction	6
Power failure and fluctuation	48
Lack of spare parts	13
Lack of maintenance	16
Pipe breakage/ leakages	4
Well failure	7
Pump failure	6

CONCLUSION

From the findings and the analysis, it was established that engineering related factors contribute substantially to water shortage in Maiduguri Metropolis. The analysis of data collected shows that Engineering causes includes, power fluctuation and failures, well failure, lack of spare parts for treatment plant and boreholes, lack of proper maintenance, pipe leakage, uncoordinated infrastructural development such as road constructions and rapid increase in industrial water requirement. From the above, power fluctuation and failure contributed the highest percentage and pipe leakage was found to be contributing the lowest percentage. The study recommends the involvement of the communities in the construction and maintenance of water supply facilities and public awareness on water supply matters to augment the responsiveness of the public to a broader scale and forestall all engineering and social-cultural tribulations related to water supply.

REFERENCES

- B.G. Umara, J.M. Dibal and Abubakar K. Isa. Quality analysis of water from river Kumadugu for human consumption and irrigation suitability. *Journal of Life and Environmental Sci.* 9(1):521-526 2007.
- Gleick PH. The World's Water. *Issues in Science & Technology*, 14(4), 1998.
- Self, J.R. Domestic water criteria. Colorado state university cooperative extension. P. 98, 2006.
- Edungbola, L.D. Water-Related Health Problems In Primary Health Care. A guide for Research in the Human Science. Igene, J.O. (ed). P.111-122, 1986.
- World Health Organisation (WHO), Guidelines for drinking water quality. Revision of the 1984 guidelines. Final task group meeting. Geneva, 21-25, 1993.
- Food and Agricultural Organiz-ation Quality of irrigation water. In: Agricultural handbook No. 60. US. Dept. of Agriculture, Rome. P 687, 1998.