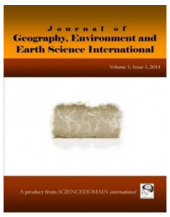

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Problems of Domestic Water Supply in Dutsen Kura Gwari, Chanchaga Local Government Area of Niger State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author ABA designed the entire study and compiled the manuscript from the first draft to the last stage of publication. Author YOY wrote the protocol and managed the literature searches. Author ENA analyze the data required for the study and lastly author AUS wrote the discussion of the field investigations, conclusion and recommendations. All authors read and approved the final manuscript.

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ABSTRACT

The aim of this study was to identify the problems of domestic water supply in Dutsen Kura Gwari Area of Chanchaga Local Government Area, Niger State, Nigeria and to determine the major source of domestic water supply in the area, while finding out the extent and challenges encountered in the process of sorting out drinking water and examining the health effect of water problems on the residents. This was carried out by getting first hand information from the residents, water board officials and health workers in order to get more reliable conclusion and provide strategies in which the adverse effect of this problem can be curtailed. Field investigations and statistical analysis revealed that tap water supply in the area is not sufficient and most of the wells

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dry up in the dry season. However, 33.3% of the total sampled population have tap water supply in their homes and feel little or no impact of water problems while 67% are without tap water supply. This has compelled most of the residents of the area to resort to other alternatives which are privately owned commercial boreholes, water vendors and hand dug wells. Observation and findings showed that most parts of the area was very dirty with feces and domestic wastes dumped; and the most common water borne diseases experienced in the area in the order as reported by health officials are as follows; typhoid (40%) cholera (34%), dysentery (20.8%) and guinea worm (4.1%). Investigation revealed that water problems have brought up a lot of hardships to the residents irrespective of their age, sex, occupation. So in view of these, it was concluded that water supply is a serious problem in the study area and it was recommended that the inhabitants of this area who are in better position should do their best in trying to reduce these prevailing problems. Communal efforts were also encouraged and the government was also advised to play its own role.

Keywords: Water vendors; tap water; boreholes; wells; water borne diseases.

1. INTRODUCTION

Water is one of nature's most important gifts to mankind, it is essential to life and a person's survival depends on drinking water. Water is one of the most essential elements to good health [1]. Domestic water is the water used for cooking, bathing, washing and drinking, all in an effort to make a healthy life. However this precious resource is being pressured upon, thereby making it a scarce resource especially in larger cities that falls in the region with a limited amount of rainfall in the year.

According to Ojutiku, Ibrahim and Raymond [2], from time immemorial, poor living conditions are always associated with rural areas, but today city dwellers are bounded with problem of poor living conditions and low standard of living. This is because rural-urban migration was set in a motion through the search for employment and social amenities and this as mounted pressures on these facilities, which has resulted in the decline of general social amenities as a result of over population and high demand on water. This has also resulted in the death of thousands of people in the urban areas because of poor sanitation and lack of portable drinking water. Dutse Kura Gwari is presently facing varieties of problems among which are problems of domestic water availability associated with various challenges, the residents search for water for most part of the year.

Many scholars have carried out research works on domestic water supply related issues, all aimed at improving and making drinking water available in many parts of the world, especially in developing countries. Doe and Gustafson [3], assessed the challenges of water supply in urban Ghana: The case of North Teshie. The study reveals that the continuous haphazard nature of development projects in the study area combined with the lack of support from the Ghana Water Company Limited has contributed to the water crisis and its associated negative impacts in the North Teshie residential communities. Similarly, Adegbehin [4], carried out a research work on domestic water supply and its associated problems in Sabon Gari Local Government Area (LGA) of Kaduna State; the study found out that scarcity of water affects the residents of the area in various negative ways and concluded that the situation will improve if the government can increase the quantity of water being supplied to the residents by maintaining all the abandoned manually constructed boreholes in the area and making policies which will in the long run improve the quality of water consumed by the people.

Similarly, Mohammed, Emigilati, Kuta, Usman and Hassan [5], worked on assessment of alternative water source for domestic use in Minna metropolis, Niger State, Nigeria. Their findings revealed that population growth has resulted in the inadequate water supply to the populace by conventional means. The study revealed that inadequate budgetary allocation to ministry of water resources is the major problem hindering water availability in Minna.

Adeleye, Medayese and Okelola [1], worked on problems of water supply and sanitation in Kpakungu area of Minna using Geographic Information System (GIS); the research findings revealed that the problems of poor water supply and sanitation often leave most women and children on queues for several hours and those that cannot endure are forced to travel long miles in search for alternative source of water which may not be fit for drinking. In the light of this,

mothers are prevented from domestic work and most children are kept away from school. At the end of their research, water and sanitation blue print for the study area was designed and a proposal was sent to relevant government agencies and ministries for the provision of more sources of potable water in the community. In this regard, Public Private Dialogue (PPD) was initiated and adequate follow up process was made until their aim of the research was achieved. The study above is related to this work, but however this research was aimed at investigating the present situation at Dutse Kura Gwari by getting first hand information from the residents, water board officials and health workers as this helped to get a more recent conclusion and provide strategies in which the adverse effect of the problem can be curtailed. The objectives were; to determine the major source of domestic water supply in the area, find out the extent and challenges encountered in the process of sorting out drinking water, and examine the health effect of water problems on residents.

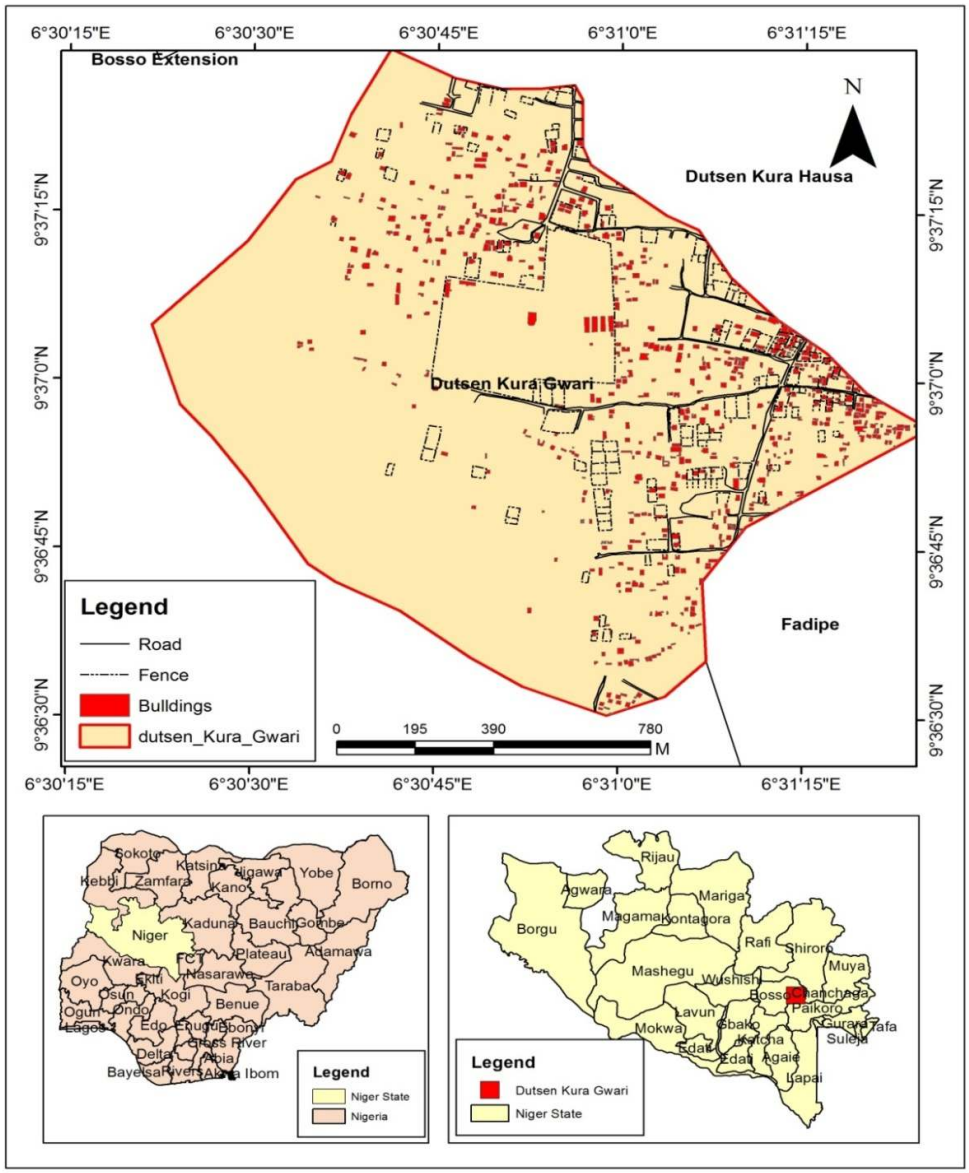

Fig. 1. Dutse Kura Gwari area

Source: Adapted from the Quickbird imagery 2014

1.1 Study Area

The study area Dutsen kura gwari at Chanchanga Local Government area is located on longitude 9°35'0" to 9°40'0N and latitude 6°30'0" to 6°35'0E, its land mass covers about 72 km^2 and a population of 201,429 at the 2006 census, and is projected to be, 299,815 in 2015. Dutsen kura gwari has a combination of dry and wet season a hybrid of northern and southern Nigeria climate. Progressively it has experienced a decrease in length and amount of rainfall from south to north with a mean annual rainfall between 110 mm in the north to 1600 mm in the south.

The climate of Dutsen Kura Gwari 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 area has a mean annual precipitation of 1300 mm. 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 300 mm. Temperature is uniformly high throughout the year reaching the peaks of 40℃ (Feb./March) and 30℃ (Nov./Dec.). These climatic characteristics favor the availability of domestic water to the people during wet season while in October it experiences dry season with north-east winds from Sahara which brings about harmattan and last till February. The relative humidity could be as low as 14°. The in-habitants of Dutse Kura Gwari are mostly traders and farmers who are into production of crops like maize, millet, rice cassava and yam. Although some of them are government workers but they still do other things to support themselves and their families.

2. METHODOLOGY

In this research two sources of data collection were employed; primary and secondary sources of data collection. The primary source of data involved the collection of data by questionnaires, conduction of oral interviews and reconnaissance survey. The questionnaire has three sections A, B, and C. Section A was meant for residents of the study area while section B was meant for health sector officials, and section C for the water board officials. Questionnaires were administered on the study area using purposive and accidental random sampling techniques. Purposive random sampling technique was used for the health workers and water board officials while accidental random sampling was used for the residents. The questionnaires were distributed only to respondents who could read and write, while oral interviews were conducted for those who could not read or write. The questionnaires were designed to solicit information from water board officials regarding quantity of supply, health workers regarding the major water borne diseases in the area and to residents regarding the adequacy of water supplied to them by the water board, through the tap, it also solicit information on water from alternative sources and the implications of lack of inadequate public water supply.

The secondary sources of data used in this research include literary works on the related problems such as books, seminar papers, magazines, news papers, journals, files/records and other published data. The data was analyzed using descriptive statistics which include frequency distribution; mean, percentages, pie-charts and plates. Qualitative technique was mainly used to analyzed the response from the questionnaire.

3. RESULTS AND DISCUSSION

This chapter deals with data analysis of field investigation and detailed discussion on the subject matter. One hundred and twenty (120) questionnaires were received from the respondents; the analysis and discussions here are based on these figures.

From the questionnaire only 19 respondents said they had access to tap water which translated to 16.6%, though they don't receive supply regularly. While 33 respondents (27.5%) said they had access to hand dug well, though they experience severe shortage of water during the dry season period, Spring and stream water are not available in the study area while, 36 respondents (30%) gets their water from vendors especially during the scarcity period. While 30 respondents (25%) gets water from boreholes directly. This is shown in Fig. 2.

Investigations revealed that there are many commercial bore holes operators in the area and this reduces water supply problem in the area. Table 1, shows, that a lot of efforts is been made by the local communities in the study area to provide alternative sources of water to the people by operating commercial boreholes, This is because, 99 respondents which accounts for about 83% of the total sampled population

agreed that something is being done in the area by their community members to relieve them of the problems of domestic water supply in the area while 21 respondents (17.5%) of the total sampled population said that much have not been done in the area by their community members to provide alternative sources of water supply. The result here is similar to the results revealed in the research work carried out by Adegbehin [4], although the study area is different but this clearly shows that community developmental approach in Nigeria is actively limiting the problem of water supply in various communities.

From the Table 2, investigations reveal that the search for water supply from some of the alternative sources by the respondents had negative consequences. The result is also similar to the findings of Adegbehin [4], although the study area is different but this shows that there is still much to tackle when it comes to health related issues and water. The percentage of those who experience negative effects from water is (23%) as compared to the study of Adeyinka, John and Akintayo [6] who carried out a research on the review on prevalence of water borne diseases in Nigeria where water borne diseases cases are over 60% in the study area. In this study 80 respondents which account for 66.6% said they experience negative effects while 40 respondents (33%) do not experience negative effects from alterative source of water, finding reveals that this category of people have access to borehole or tap water.

Table 1. The effort of local communities in providing water sources

Responses	No of respondents	Percentages %
Yes to local community efforts in providing water	99	82.5%
No to local community effort in providing water	21	17.5%
Total	120	100%

Sources: Field survey, 2016

Table 2. Negative effect resulting from water scarcity

Respondents	No of respondents	Percentages %
Number of those who said yes to negative effects of alternative sources of water supply	80	66.6%
Number of those who said No to negative effects of alterative water supply	40	33.3%
Total	120	100%

Sources: Field survey, 2016

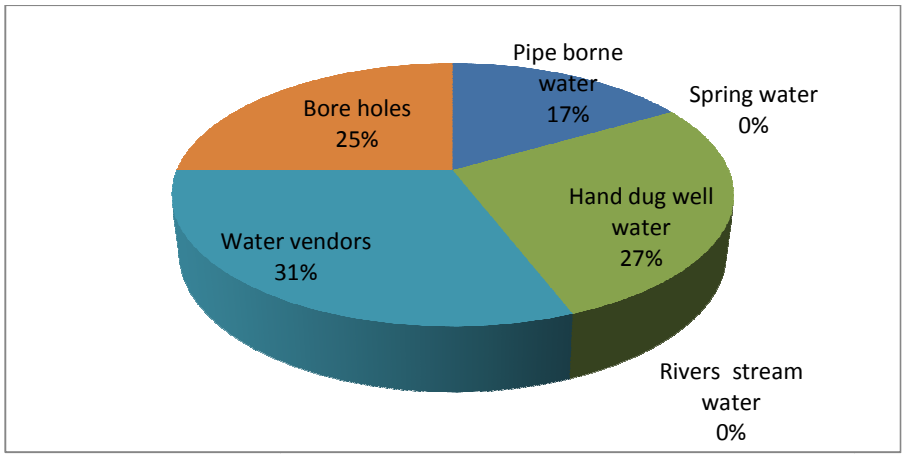

Fig. 2. Major source of water to the study area
Source: Field survey, 2016

From Table 3, shows the common diseases in the study area according to the numbers of respondents which are mainly health officials. 25 respondents which is 20.8% of the total sampled population gave response according to their hospital data that dysentery is common in the area. Typhoid fever had the highest number of respondents with 50 which is 41.6% of the sampled population while, cholera had 40 respondents equalling 33.3%. Guinea worm had only 5 respondents (4.1%). Most of the water related diseases found in the area were mostly caused by poor sanitary conditions of the environment as reported by respondents seen in the health sectors.

Similarly Adeyinka, John and Akintayo [6], who carried out a research on the prevalence of water borne diseases in Nigeria, found out that typhoid ranked the highest, followed by cholera, hepatitis. Based on the problems facing Nigeria, it was strongly recommended that ministries of water resources and environment at both state and federal levels should organize sensitization programmes addressing water borne diseases while working closely with world health organization (WHO) and other health bodies to provide necessary support to Nigerian government and mitigate unsafe drinking water and waterborne diseases in Nigeria.

Table 3. Common water borne diseases in the study area

Type of diseases	No of respondents	Percentages %
Dysentery	25	20.8%
Typhoid fever	50	41.6%
Cholera	40	33.3%
Guinea Worm	5	4.1%
Total	120	100%

Sources: Field survey, 2016

3.1 Challenges Reported From the Respondents

As reported by 90 respondents which accounted for 75% of the total sampled population, the distance travelled in order to get water from alternative sources of water supply are relatively short but coupled with competition most times. 60 respondents said, in the previous years they normally travel far in search of water but now, there is no need for that, as they could always get water around their homes either from water vendors, or from commercial boreholes. They added, saying another problem is the price at which the water is being sold to them, and struggling are involved if one is to get the water directly from the boreholes. The price for water, directly from the boreholes is relatively lower than from water vendors. (In the borehole it's #20.00 for 25litres while it's #30 from the water vendors for 25 litres).The struggling most times is mostly between the water vendors and the nearby neighbors, close to these boreholes.

The findings of this work is similar to the findings from the work of Adeleye, Medayese, Okelola [1] titled; problems of water supply and sanitation in kpakungu area of Minna, a close by Local Government to the study area which revealed that the problems of water supply and sanitation often leave most women and children on queues for several hours and those that cannot endure are forced to travel long miles in search for alternative source of water, which may not be fit for drinking. In the light of this, mothers are prevented from domestic work and most children are kept away from school. This generally implies that the problem of water is not just limited to Dutse Kura Gwari area but to many other areas in Niger state.

From the Fig. 3, 91 respondents which is 76% of the total sample population reported that Chanchaga Local Government has not made any effort in improving water supply in the study area, while only 28 respondents (24.1%) of the sampled population reported that the Local Government is making effort to improve water supply in the area. Fifteen (15) respondents who are water board officials reported that optimum amount of water gets to the people, but 79 respondents (65.83%) of the samples population reported that the water board is performing below expectation and the government constructed manually operated boreholes close to their homes are not even functioning properly. In support of the claim that the government has done little or nothing to improve the situation of water in the area, Adeyinka, John and Akintayo [6], revealed that from investigations carried out, the government is unserious about provision of safe drinking water, and this has been the reason for outbreak of waterborne diseases in the country; Nigeria is one of the countries suffering from the crippling burden of water related diseases.

Table 4 shows the number of house hold size and the number sampled for each house hold size, for example for two (2) house hold size, twelve households were sampled and their

average water use was 75 litres per day and for the house hold size of four (4), fifteen households were sampled and their average water use was 100 litres/ day, etc. The table also shows that, the average water used per day during the dry season was 225 litres for a household of 8-10 people, and the people involved were not using water system toilets. If they were using toilets with water system, consumption might increase by 25-50%, (i.e between 285-343 litres per day) with an average consumption of 314 litres per day for a household of 8-10 people, which translates to about #377 per day, at the current rate of #30 per each 25 litres, this amount also translates to #11,310 per month. Assuming the dry season lasts for (4) months (February to May), the amount that would be spent on water for this period would be #45,240, even if the amount of money spent on water for the year has not been calculated, this amount already tells very much on the people's income for a period of four months.

The consumption of 225 litres of water per day for a house hold of 8-10 people can be regarded as minimum water supply per day to be met by the water board, and this would amount to 82,125 litres of water per year for this class of household. Shen [7], who carried a research on the amount of water use per person in a day for the United Nations reveals that in developed nations like the USA, Japan, Italy, Australia, Spain etc, they used about 400 to 500 litres of water per person in a day, this figure is much lower in the developing countries like Nigeria, Kenya Ghana, Ethiopia etc and ranges from 27 to 46 litres per person in a day.

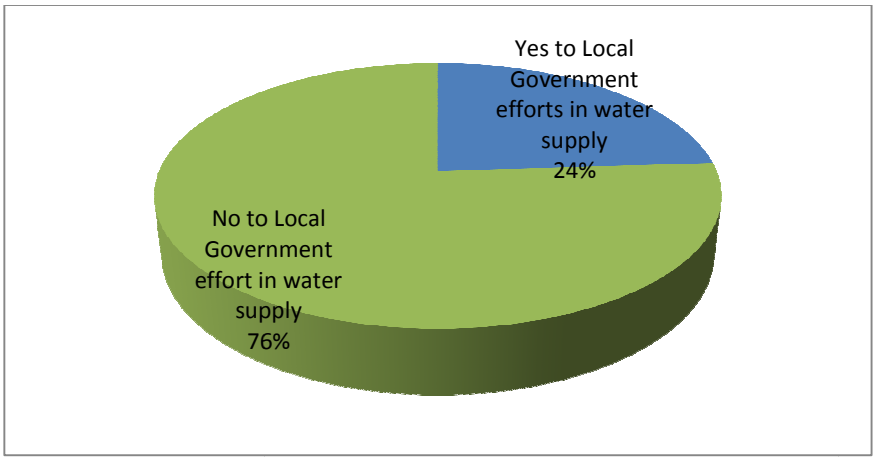

Fig. 3. The effort of local government authority in solving water problem
Source: Field survey, 2016

Table 4. Water consumption per day by households in the study area

House hold size	No of house holds (n)	Water consumption (litres/ day) (x)	Total consumption by house holds (nx)
2	12	75	900
4	15	100	1500
6	15	150	2250
8	17	200	3400
10	15	250	3750
12	14	300	4200
14	10	325	3250
16	8	350	2800
18	8	375	3000
20	6	400	2400
	120		27,450

$$\text{Mean} = \frac{ENX}{N} = \frac{27,450}{120} = 228.75 \text{ litres/ house hold 8-10 people}$$

Sources: Field survey, 2016

3.2 Plates

The pictures of water vendors and residents of the study area competing for water from commercial boreholes are available from Plates 1 to 3.

Plate 1. Vendor harking water
Source: Field Survey, 2016

Plate 2. Residents competing for water
Source: Field Survey, 2016

Plate 3. Residents competing for water
Source: Field Survey, 2016

4. CONCLUSION

Findings revealed that the residents in many occasions have to compete for water on daily basis with one another and sometimes with water vendors. This has brought up a lot of inconveniences to the residents as the education of primary, secondary school students is being affected since they are mostly the ones who go to search for water for themselves and their parents. Also most parents who are government workers complain of getting to work late because of the inability to access water in time in the morning, while those who want to avoid competitions and inconveniences have to buy from water vendors. So in view of these findings, water is a serious problem in the study area.

5. RECOMMENDATIONS

Sequel to these findings, I tabled a plea to the inhabitants of the area who are in better position of helping the people to please do their best and try to reduce these prevailing problems, because the time has come when we can no longer wait for the government to provide for all our needs most especially the essential components of life (water) and its roles in the social economic development of the populace. Communal efforts should be made in order to improve water situation in the area to the residents by drilling function able boreholes while the government should also try to play its own role.

CONSENT

All authors declare that 'written informed consent was obtained from the respondents for publication of this paper and accompanying images.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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