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CONSTRAINTS TO DOMESTIC WATER SUPPLY AND UTILIZATION IN DUKKU L.G.A., GOMBE STATE, NIGERIA

Bala Rabiu Hashidu[1], Ali Abdu[2] Musa Iliya[3], and Yusuf Umar Ahmad4
[1,2]Dpartment of Geography, Federal University of Kashere, Gombe State, Nigeria
[3,4] Department of Geography, Gombe State University, Gombe State, Nigeria
Correspondence: rbhashidu@gmail.com, rbhashidu@fukashere.edu.ng

Abstract

This study evaluates the patterns and problems of domestic water supply and utilization in Dukku L.G.A. A sample of 150 respondents randomly selected from six (6) wards, out of which eleven (11) were sampled. The data were collected by means of questionnaire administration and analysed using descriptive statistics. Analysis of Variance (ANOVA) and Chi-squareX were deployed to test the research hypothesis. The results revealed that there were about five (5) sources of water supply in the study area, which are: borehole, rainfall, ponds, streams and wells. The households faced with the problems of distance (1-4km) to these sources of water and the shortage in the quantity of water supplied from those sources. About 50% of the respondents who source water from wells and streams/rivers expressed dissatisfaction with these sources. The ANOVA result shows a significant difference between the amount of water used and the sources of water. The χ^2 result further revealed that per-capita water consumption in the wards varied significantly from the expected International Standard of 110 litres/person/day.

Keywords: *Constraints, Domestic, Supply, Utilization of Water, Dukku L.G.A., Gombe State.*

1. Introduction

Attempt in making water available for domestic purposes are as old as human existence on earth. For example in Nigeria, the traditional methods of obtaining water for domestic uses comprise direct collection of rainwater in containers, extraction of raw water from springs, streams, ponds and hand dug wells (Ayoade and Oyabande, 1978). Accessing adequate domestic water supply has been man's age long problem. The availability of clean water and adequate water supply has been the prime factors in the survival of mankind (Worthington 1978). The availability of adequate water for drinking, cooking, washing among other domestic purposes is essential for healthy survival of every community.

In most cases, it is not easy to define, let alone quantify, the quality of life of a community or a family in relation to the quantity of water available for domestic use (Aswathanarayana 2001). The rate of consumption of water for domestic purposes bears a general direct relationship to the quality of life. Water has been initially regarded as a free good, and therefore its use has not been considered with all the care it deserves.

The provision of safe, adequate and clean water has been the concern of the federal, states and local governments in Nigeria. However, little has been achieved, to provide regular supply in most if not all cities, towns and villages in the Nigeria as safe, clean and adequate water supply for domestic needs is still a challenge.

Most studies on domestic water supply demand and use have focused on urban areas. Not much attention has been given to rural areas where majority of the population live. Therefore, the need to undertake studies on domestic water supply and utilization in rural settlements cannot be over emphasized. Domestic water supply has been a serious problem on earth. Studies have shown that owing to the rapid increase in population, urbanization, industrialization and expansion of household's activities, the quantity of water available for use has been on decrease. Similarly the quantity of water available to residents of Dukku L.G.A. and the demand for domestic and other purposes have not been adequately understood through empirical research hence measures of providing sustainable solution are not yet known. This is a gap in knowledge that this paper addresses.

Recent realities reveal that water is usually a scarce resource in Dukku L.G.A. over the years especially during dry seasons due to limited supply and difficulties in management even in the rainy season. Generally Dukku L.G.A. has problems with the sources of water. Most of the sources were traditional in nature such as hand dug wells, streams, boreholes and tankers which were common suppliers to the town. The study therefore, focused on the challenges and patterns of domestic water supply and utilization in Dukku L.G.A. Gombe State. The objectives of the study are however to identify the various water sources in the Dukku LGA; to determine the quantity of water abstracted from those sources and to determine the quantity of water used for different domestic purpose in the study area.

1.2 Study Area

Dukku Local Government Area (LGA) is located between latitude 10^{o} 20' 19" and 11^{o} 10' 14"N and longitude 10^{o} 30' 29" and 11^{o} 10' 56"E. It is situated at a distance of about 78km from Gombe, the capital city of Gombe State (Figure 1). Dukku L.G.A is bounded by Bauchi State to the west and north-west, to the north-east by Nafada L.G.A, Funakaye L.G.A is to the east, Kwami L.G.A. is to the south, and finally Akko L.G.A to the south-west. In terms of size, Dukku L.G.A occupies a total land area of about 3,815km^2, with a total population of 315,763 (National Population Commission, 2009).

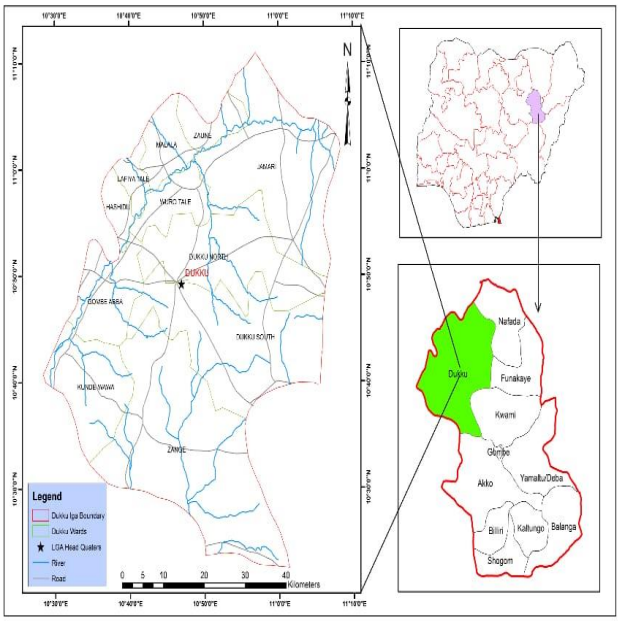

Figure 1: A Map Showing the Study Area
Source: Author's Work, 2019.

Materials and Methods

The data for the study were obtained from two main sources: primary and secondary. The primary data was collected through the use of a questionnaire, personal interviews and field observation. The secondary information on the other hand was

obtained from textbooks, base maps, population figures, published and unpublished articles, information from journals and magazine, previous research work and several internets sources. Systematic sampling technique was adopted to select the households. The first house in each of the neighbourhood identified in a ward was selected in the street, followed by the 10th, 20th, 30th, etc. where a house was not occupied, the next house in the street automatically becomes the sample point for consideration. The head of the households were mostly targeted for the response. The information generated from the respondents was presented in tables, interpreted using statistical tool of simple percentage and analyse qualitatively. Analysis of Variance (ANOVA) and Chi-square (χ^2) were also used to test the research hypotheses postulated using SPSS software.A total of 150 respondents were drawn from the total number of about 900 households sampled in the study area, see Figure 2. The number (150) represents 25% of the total number of the households sampled. Then copies of questionnaire were administered to them. The study was limited to Dukku L.G.A. of Gombe State and six (6) wards were selected. The wards were selected at random out of the eleven (11) wards in the L.G.A. (see Table 1).

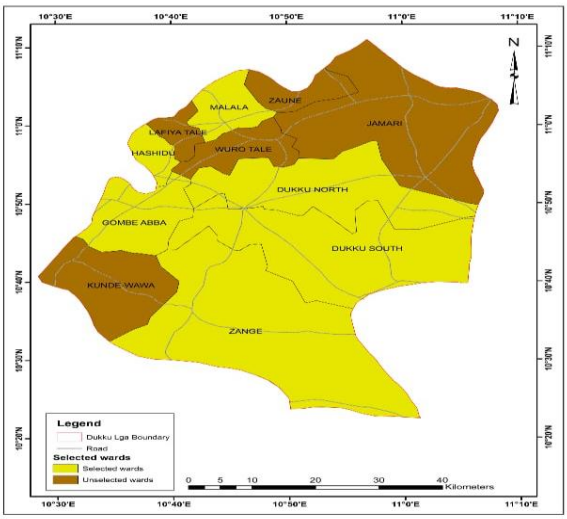

Figure 2: Dukku Local Government Area Showing the Study Area
Source: Authors' Work, 2019.

Table 1: Sample Size of the Respondents

S/No	Wards	No. of Questionnaire Administered	Percentage
1.	Dukku North	30	20
2.	Dukku South	30	20
3.	Gombe Abba	25	17
4.	Hashidu	25	17
5.	Malala	20	13
6.	Zange	20	13
	Total	**150**	**100**

Source: Authors' Work, 2019.

1.4. Discussion and Results

1.4.1 Wards and Sources of Water Supply

According to Table 2, Gombe Abba ward has the highest number of households that depend on streams or rivers especially river Gongola as source of water supply, while Dukku North and Dukku South have the highest number of households that depend on borehole and wells as sources of water supply respectively. The information reveals that about 54 (36%) of the households in the selected wards depend on wells as source of water supply, while 33 (22%) and 4 (2.7%) of

them depend or have borehole and others as source of water supply in the study area. The results further indicates that only 5 (3.3%) of the households depend on rainfall as source of water supply. This shows why people in some wards have access to boreholes while others rely on well or stream in other wards.

Table 2: Wards and Sources of Water Supply

S/No	Wards	Rainfall	Stream (River)	Ponds	Bore-hole	Wells	Others
1.	Dukku North	2	2	6	8	12	-
2.	Dukku South	1	-	5	11	12	1
3.	Gombe Abba	-	16	1	3	5	-
4.	Hashidu	-	11	1	9	4	-
5.	Malala	-	6	2	2	10	-
6.	Zange	2	2	2	-	11	3
	Total	**5**	**37**	**17**	**33**	**54**	**4**

Source: Authors' Work, 2019.

Table 3 presents the information on the level of satisfaction with the various sources of water supply from the six (6) selected wards and reasons for the satisfaction (or dissatisfaction) from the water sources by the respondents in the study area. The results show that about 78.7% of the respondents in the study area revealed that they were not satisfied with the water sources. Only 21.3% indicated that they were satisfied with the sources of water supply in the area under study. As for the reasons for the lack of satisfaction with the sources of water supply, distance to water sources accounted for 40.7%, depth of the wells accounted for 22%, high cost of borehole construction accounted for 12.7%, poor supply channels account for 10.2% and impure nature (colour) of water account for 14.4%. The results so far revealed that bulk of the respondents were not satisfied with stream/river as source of water supply. This is due to distance they had to cover (40.7%) each day to fetch water. Other reasons for the lack of satisfaction with water sources had to do with the depth of the wells ranging from 30m to 120m to reach the water level. It was also understood that water level was very low in Dukku L.G.A. particularly during dry season and that has led to high cost of borehole construction in the study area as majority of the people cannot afford to dig boreholes at their individual residences. The level of purity of the water was another source of concern because reasonable proportion of the respondents believed that the water fetched from streams/rivers, wells and particularly ponds was not pure and could lead to health problems.

Table 3: Satisfaction Level of People with the Sources of Water Supply

Satisfaction Level	Freq.	Percentage
Very Satisfied	32	21.3%
Not Satisfied	118	78.7
Total	**150**	**100%**
Reasons	**Freq.**	**Percentage**
Distance to water sources	48	40.7%
Depth of the well	26	22.0%
High cost of Borehole Construction	15	12.7%
Poor Supply Channels	12	10.2%
Impure nature (colour) of water	17	14.4%
Total		**118**
100%		

Source: Authors' Work, 2019.

1.4.2 Quantity of Water Demand and Supply Daily in Litres in the Households by Wards

Table 4 shows that Dukku South ward has the highest quantities of water demanded and supplied on daily basis. It is only Hashidu ward that had excess of daily water supply over the quantity demanded. Generally speaking, the whole six selected wards in Dukku L.G.A have the shortage of 8,844 litres of water supply daily. The information also reveals that Hashidu ward had the highest

excess of daily water supply. This was due to the presence of boreholes, wells and the shorter distance from the village to the sources of water supply. Among all the wards, Zange has the highest shortage of daily water supply. The Table also implies that 78% of the wards have shortage of water supply since the quantity of water demanded or required is more than the quantity supplied per day in these wards.

Table 4: Quantity of Water Demand and Supply Daily (in Litres) in the Households.

S/No	Wards	Estimated Quantity of Water Demanded (Qd)	Estimated Quantity of Water Supplied (Qs)	Difference D=(Qs-Qd)
1.	Dukku North	15,156	14,150	- 1,006
2.	Dukku South	16,300	15,100	- 1,200
3.	Gombe Abba	12,225	10,102	- 2,123
4.	Hashidu	14,425	18,250	+ 3,825
5.	Malala	13,750	9,220	- 4,530
6.	Zange	11,760	7,950	- 3,810
	Total	**83,616**	**74,772**	**- 8,844**

Source: Authors' Work, 2019.

1.4.3 Distribution of Respondents by Distance Covered to Fetch Water Daily.

Figure 3 presents the distribution of respondents by distance covered to get water for domestic use. The results reveal that 25.3% of the respondents in the six selected wards travelled within the range of 5-10km in order to fetch water, with 17.3% traveling beyond 11-14km in search of water. Also, 57.3% of respondents covered about 1-4km to fetch water for domestic uses. Hashidu and Gombe Abba wards have most of their people covering not beyond four kilometres to fetch water. This may be due to location advantage to water sources. While those wards such as Dukku north and south have people that are covering about 15-20km to fetch water. Generally, these are people that depend on water vendors (Tankers) to supply water to them for different domestic uses. The results, show that majority of the people in Dukku L.G.A. covered about 5km daily to get water for domestic uses. This also revealed that distance was a constraint to domestic water access in the study area.

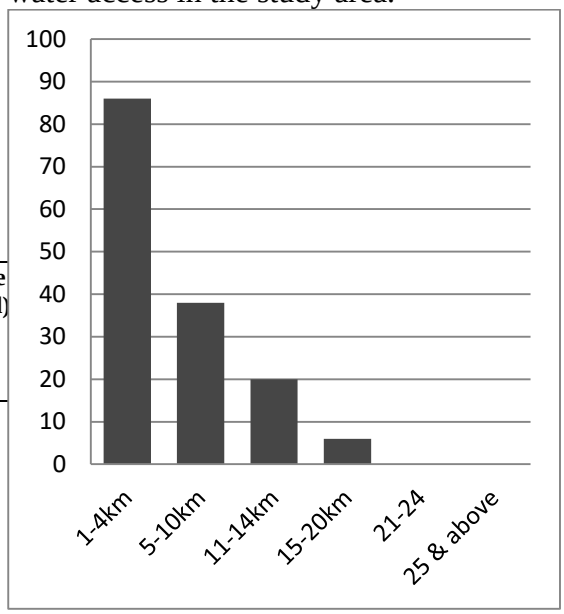

Figure 3: Distribution of Respondents by Distance Covered to Fetch Water
Source: Authors' Work, 2019.

1.4.4 Decision Taken by the Respondents on Water Shortage

Table 5 shows that three different decisions were taken by the people of the various wards over shortage of water supply. The results revealed that a lot of people could buy more; some said they managed with the quantity supplied to them each day and yet others indicated that they could change their sources of water supply if they witness any shortage in the sources that used to supply the water for daily used.

The results further reveal that more than half of the respondents (69%) were of the view that they could manage with the quantity of water supplied to them each day. Another 20% buy more during the period of water shortage, while 10% opted for change of the source of water supply when there was any shortage

Table 5: Decisions Taken by the Respondents on Water Shortage

S/No	Wards	Decisions Taken About Water Shortage		
		Buy More	Manage	Change The Source
1.	Dukku North	7	20	3
2.	Dukku South	6	21	3
3.	Gombe Abba	2	19	4
4.	Hashidu	5	16	4
5.	Malala	8	11	1
6.	Zange	3	16	1
	Total	**31 (20%)**	**103 (69%)**	**16 (11%)**

Source: Author's Work, 2019.

1.4.5 Daily Expenses on Water According to Wards

Table 6 presents daily information on the expenses people incurred on water by ward. The results show that in Dukku South ward about ₦17, 950.00 was spent daily in buying water. This is about 27% of the total amount of money spent on water daily in all the selected wards. This is followed by Dukku North ward, which spent about ₦13, 200.00 daily on water, and that made up about 20% of the total amount spent on water daily. The ward that spent the least amount of money on water was Zange ward with about ₦5, 230.00 (8%). Dukku South spent the highest amount of money on water, as much as ₦17, 950.00 (27.3%). However, the result shows that people in the six sampled wards spent a lot of money on water for various domestic purposes; a total sum of about ₦65, 780.00 was spent daily on water.

Table 6: Amount Spends Daily on Water by Ward

S/No	Wards	Amount Spent (Naira)	Percentage
1.	Dukku North	13,200.00	20.1
2.	Dukku South	17,950.00	27.3
3.	Gombe Abba	8,250.00	12.5
4.	Hashidu	11,600.00	17.6
5.	Malala	9,550.00	14.5
6.	Zange	5,230.00	8.1
	Total	**65,780.00**	**100.0**

Source: Author's Work, 2019.

1.4.6 Estimated Quantity of Water Required and Accessed Daily for Conventional Domestic Purposes (in Litres)

Table 7 shows the quantities of water supplied and consumed on daily basis for various conventional domestic uses by wards. The domestic uses include: drinking, cooking, bathing, washing/laundry, sanitation/ablution and others. The information moreover, indicates that all the wards consumed an estimated quantity of 17,715 litres of water for drinking, 5,880 litres for sanitation/ablution, and 18,067 for bathing, 13,923 litres for cooking, 15,950 litres for washing/laundry and 3,790 litres for other things, on daily basis. The quantity of water used for cooking was above the quantity supplied for the same purposes. However, for drinking, bathing and washing/laundry the quantities of water supplied were much more than the quantities used daily by the households in the wards, while in sanitary/ablution and other things the quantities of water supplied was less than the quantities of water used.

Table 7: Estimated Quantity of Water Required and Accessed for Conventional Domestic Purposes Daily in Litres by Ward

Wards	Drinking		Bathing		Cooking		Washing/ Laundry		Sanitary/ Ablution		Others	
	Qty. Sup	Qty. Used	Qty. Sup	Qty. Used	Qty. Sup	Qty. Used	Qty. Sup	Qty. Used	Qty. Sup	Qty. Used	Qty. Sup	Qty. Used
Dukku North	3,022	2,375	3,500	2,317	1,118	918	2,800	2,500	1,200	1,950	1,760	1,130
Dukku South	3,550	3,800	3,100	3,600	2,800	2,980	4,380	4,210	1,100	1,100	260	300
Gombe Abba	2,100	2,150	2,300	2,450	1,825	1,920	3,110	3,250	500	450	317	415
Hashidu	5,200	5,350	4,890	4,910	3,790	3,805	2,350	2,150	1,600	1,350	670	915
Malala	1,900	2,150	2,330	2,460	2,155	2,410	2,320	2,525	390	315	200	340
Zange	1,785	1,890	2,150	2,330	1,765	1,890	1,040	1,315	815	715	495	690
Total	**17,557**	**17,715**	**18,270**	**18,067**	**13,453**	**13,923**	**16,000**	**15,950**	**5,605**	**5,880**	**3,702**	**3,790**

Note: Qty. Sup. = Quantity Supplied; Qty. Used = Quantity Used

Source: Author's Work, 2019.

1.4.7 Testing of Research Hypothesis

Hypothesis 1:

H_0: The amount of water obtained in litres from different sources does not vary from one ward to another.

The analysis of variance (ANOVA) was used to test this hypothesis.

SPSS was used in testing this hypothesis using analysis of variance (ANOVA). The result shows a significant difference between the amounts of water obtained from the different sources of water.

Hypothesis 2:

H_0: The amount of water used for various purposes in litres does not vary between the wards.

The analysis of variance (ANOVA) was used in testing the hypothesis using SPSS. The result shows a significant difference between the amount of water used and the sources of water.

Hypothesis 3:

The per-capita water consumed is consistent with the internationally accepted standard.

Chi-square statistics (χ^2) was used to test the consistency of the observed per-capita water consumption in the wards with those of internationally accepted standards. The result shows that the consumption per-capita of water in the wards varies significantly from International Standard. (110 litres).

1.4.8 Summary

The study was able to consider some of the factors that are responsible for the problems of domestic water supply and utilization in the study area. The results however, revealed that distance to water sources, cost of water for domestic uses, seasons, depth of the wells and location of boreholes were identified as constraints to domestic water supply and utilization in the study area. It is therefore important to note that distance to water sources was viewed as the most crucial factor affecting water supply for domestic uses. However, high cost of water remained a glaring problem in water supply and utilisation in the area.

The study further reveals that the amount of water obtained in litres from different sources vary significantly from one ward to another. This is because in dry season streams, rivers and ponds often dry as if they had never the flow. As such the only borehole and wells were patronized. Additional advantage was that they had tasty water fairly good for domestic drinking and cooking purposes. Finally the results show that the quantity of water used for various domestic purposes varied greatly from one ward to another. This may not be unconnected with the problem of the shortage of water supply in the households.

1.4.9 Conclusion

In conclusion, it is revealed from the available empirical evidences that Dukku Local Government Area has a serious challenge meeting domestic water needs and access hence the per-capita water consumption level is grossly lower than internationally accepted standards for rural areas.

1.4.10 Recommendations

i. Government should make adequate provision of water supply for consumption and other uses in the area by establishing a water treatment plant at Gombe Abba River in order to supply Dukku LGA with water thereby reducing the hardship the faced by the people in the area.
ii. More boreholes should be dug in the remote areas of the Local government where access to water is a biggest challenge.
iii. More water tankers should be provided by the State and Local governments' authorities and individuals to be involved in selling water to the town and other villages.

References

Aguigwo E.N. (1998). Demand, Use and Problem of Household Water Supply in a sub-Sahelian Village of Northern Nigeria. *Journal of Environmental Sciences* 2(1), pp 16-28.

Akintola, F.A. and Areola, F.O. (1980). Domestic Water Use Consumption in Urban Areas. A case Study of Ibadan City, Nigeria.

Ayoade, J.O. (1985); Perspective on Water Development and Management Policy in Nigeria (a seminar paper).

Ayoade J.O. and Oyebande L. (1978) Water Resources, In J.S. Oguntoyinbo (ed.); A Geography of Nigerian Development. Ibadan: Heinemann Educational Books Ltd., 180-235.

Aswathanarayana, U. (2001): *Water Management and the Environment.* Published by Taylor and Francis Group (London and New York).

Dabi, D.D. (2000). Rural Water Resources Management Problems in Katarko, a Village in Semi-Arid Northern Nigeria. *Journal of Environmental Sciences* 4(1), 103-111.

Eziashi, A.C. (1989); Problems and Prospects of Rural Water Supply in Plateau State, Nigeria A Paper Presented at the Regional Workshop on Rural Development in Nigeria held at Jos in 1