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RESEARCH ARTICLE

EVALUATION OF HOUSEHOLD WATER SUPPLY AND STORAGE FOR DOMESTIC USE IN LOKOJA METROPOLIS, KOGI STATE, NIGERIA

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ABSTRACT

This study evaluates urban household supply and storage of water for domestic use in the Lokoja Metropolis, Kogi State, Nigeria. The objectives were: to examine sources of household water supply, identify factors affecting household water supply, ascertain various household domestic uses of water, examine means of storing water and types of water storage facilities used in storing water in Lokoja Metropolis. Primary and secondary data were employed in the study. The primary data were from field observations and questionnaire administration, while the secondary data sources were from already published materials such as text books, articles in journals and other relevant materials. Data collected were analyzed by simple descriptive statistical methods such as tables and percentages. Canonical Correlation Analysis (CCA) and Analysis of Variance (ANOVA) were used to test hypotheses. Results and findings from the study are as follows: The sources of water supply in the study area were pipe borne water, hand- dug well, borehole, river and water vendor. Residents of the area used water for drinking, bathing, convenience, cooking, washing, lawn and gardening. Factors that militated against water supply in the area included distance from source, seasonality, electric supply, pipe leakage, road construction, poor funding and topography. There were five different types of facilities used in storing water by residents of the area, these included buckets, overhead plastic tank, jerry can, plastic drum and larger plastic container. Based on the findings, this study recommends that the state government should connect water close to residents of the area that are far from other sources of municipal water supply. To maintain and sustain the availability and adequacy of water supply in Lokoja, Kogi State government should adequately fund Water Board by way of constant supply of chlorine, alum and other logistics needed.

Keywords: Household, water supply, water storage, accessibility, affordability.

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INTRODUCTION

In 2015, United Nations (UN) member states, adopted the Sustainable Development Goals (also called Global Goals) as a universal call for action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The sixth out of seventeen life – changing Sustainable Development Goals (SDGs) is to ensure access to water and sanitation for all (UN General Assembly 2015). This is targeted towards eliminating neglected tropical diseases by promoting good hygiene (Ezugwu et al, 2021). Sustainable Development Goal, Target 6.1, addresses universal and equitable access to safe and affordable drinking water, implying that it is geared towards ensuring that all people worldwide have access water in adequate quantity, quality, and at an affordable cost, in a sustainable manner (Manga et al., 2021).

In Africa today, water scarcity is a menace and it has been estimated that by 2030, 75 to 250 million people will be living in water stressed areas. In Nigeria, about 57 million people do not have access to safe water. The scarcity of water in Nigeria is taking new dimension as residents of many urban and semi – urban areas do not have access to a readily available source of domestic water (Ojo, 2014; Olufayokemi, 2018). Contextually, it took the Kogi State Government two decades (1991 to 2011) after the state was created, to achieve some form of importance in the provision of potable water in Lokoja through the Greater Lokoja Water Supply Scheme. The sustained rise in population has continued to drag the demand for water upward, putting pressure on the existing water infrastructure (Abenu *et al*, 2017).

Water is an essential natural resource that plays central role in human welfare and the environment, and is the primary resource for daily human activity, industrial operation, and agricultural production (Yadeta, 2022). Provision of water in both urban and rural areas is crucial for development considering its importance for domestic use, livestock consumption, irrigation and industrial use (Adedotun et al, 2022). Apart from air, water is the next important resource to human beings and water has been described as a daily necessity and a key factor in human health and well- being. The survival and continued well-being of human and animal lives depend on the supply of potable water of the right quality and quantity (Adedotun et al, 2022).

As a result of population growth and urbanization in Lokoja Metropolis, following its transformation from a Local Government Headquarter to State Capital in 1999, there is a high demand for water. The question here is; if there is a demand for water, then there should be a supply to prevent the collapse and paralysis of household and other economic activities. And owing to inconsistency and inadequacy of supply, there is need for water storage to ensure availability for future use and for unforeseen situations. On this backdrop, this study beamed a scholarly satellite on the sources of domestic water supply, factors that affect water supply, the uses of water as well as various water storage facilities used in storing water in Lokoja, the Kogi State capital.

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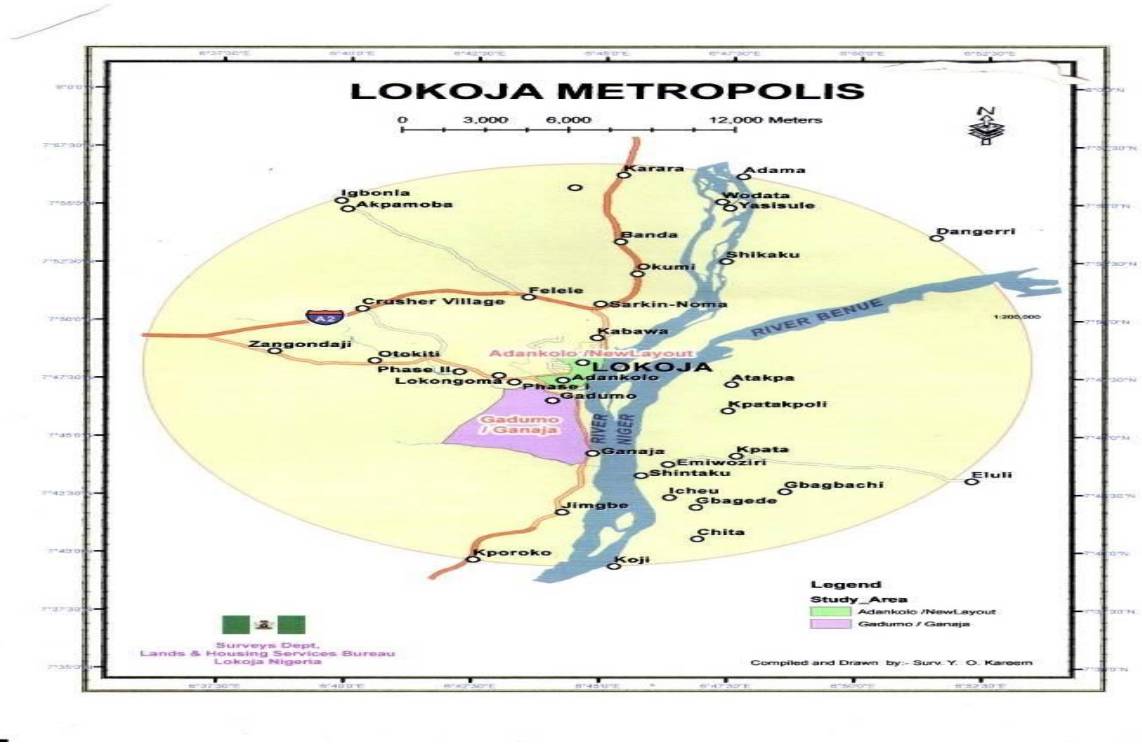
MATERIALS AND METHODS

The study area is the Lokoja Metropolis in Kogi State, Nigeria. It is located between latitudes $7^{o}45^{'}$ and $7^{o}52^{'}$N and between longitudes $6^{o}39^{'}$ to $7^{o}49^{'}$E (Audu, 2012). The town has a land mass of 3.518 km^2 (Abenu, 2016). Its population of 196,643 in 2006 (National Population Commission, 2006) has been estimated to be growing at 3.2% annually (National Population Commission, 2009). It is the administrative capital of Kogi State and the confluence town where River Niger and River Benue meet. It is an ancient town that was once the headquarters of the Lord Lugard - led administration in Nigeria (Ifatimehin and Ufuah, 2006). Lokoja is situated 76 km from Okene, along the Okene – Abuja high way and it is a gateway of sorts between the eastern, western and northern parts of the country. The town shares common boundaries with Ajaokuta, Adavi, Kabba/Bunu and Bassa Local Government Areas of the state (Opaluwa and Aribigbola, 2015).

Wet and dry seasons are the two distinct seasons in the metropolis. The wet season, records an average of 1215mm of rain annually, mainly from April to October, with the peak occurring in September (Audu, 2012; Abenu, 2016). The mean daily temperature is 27.7^{o}c (Audu and Rizama, 2012). In addition to Rivers Niger and Benue, which are the main sources of surface water in the area, there are also other smaller streams like Mmeme, Akpomoba and Donko. In Lokoja metropolis, groundwater sources also form a major component of the water resources. It is drawn from unconfined aquifers (Abenu et al, 2019; Omali, 2014).



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In terms of the methods, the data used in this study were obtained from both primary and secondary sources. The primary sources were from field observation and questionnaire. In terms of the methods, the data used in this study were obtained from both primary and secondary sources. The primary sources were from field observation and questionnaire administration. The secondary data were obtained from already published materials such as text books, articles in journals and other research materials relevant to this study. For the purpose of this study, seven (7) neighbourhoods were selected on the basis of their population densities and distribution. Using a stratified sampling method, three highest populated, two medium populated and two least populated neghbourhoods were selected. A total number of 809 questionnaires were administered in the study area, 784 were retrieved from the field and 24 were lost. 290 questionnaires were administered in Kabawa/Galilee, 47 in Adankolo/ New layout, 78 in Lokongoma/ Phase 1 &2, 117 in Felele/ Crusher, 47 in Zango Daji, 43 in Army Barracks and 162 in Gadumo/ Ganaja respectively.

A systematic sampling technique was used for questionnaire distribution. Within each neighbourhood, every third street was selected for questionnaire distribution. In each selected street, the same sampling technique was used to select houses for questionnaire administration. The data collected were analyzed using descriptive and inferential statistics. Descriptively, the data were analyzed using tables and percentages. In order to test the first hypothesis, which states that sources of household water supply and the types of water storage facilities in the study area are not correlated, the Canonical Correlation Analysis (CCA) was used. Also, to test the second hypothesis which states that there is no significant variation among factors that affect household water supply in the study area, Analysis of Variance (ANOVA) was used

PRESENTATION OF RESULTS AND DISCUSSION

Presentation Of Results

Sources of Household Water Supply in Lokoja Metropolis

Domestic water supply means the source and infrastructure that provides water to household. The sources could be a stream, hand dug well, spring, borehole, collection system, piped water supply with tap - water stand and water vendor. Table 1 shows the various major sources of household water supply in the area.

From Table 1, the sources of water supply identified in the study were: pipe borne water, hand dug well, borehole, river and vendor. From the study, it is observed that 254 respondents (32.4 percent) sourced their domestic water consumption from hand - dug wells and ranks first in the series. 243 respondents (31 percent), sourced their domestic water consumption from boreholes, and ranks second. Additionally, 180 respondents (23 percent), sourced their household water consumption from pipe borne water and ranks third.

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Furthermore, 61 respondents (7.7 percent), sourced their domestic water consumption from water vendors ranking fourth. Lastly, 46 respondents (5.9 percent), sourced their domestic water consumption from River Niger and River Benue. This result is in line with the work of Olufayokemi (2017) that posited that the source of water supply to the people of Lokoja was mainly through the Kogi State Water Board, boreholes, wells, River/ streams, and water vendors.

Table 1: Sources of Household Water Supply in Lokoja Metropolis.

	Sources of Water Supply					
Neighbourhoods	Tap	Hand – dug Well	Borehole	River	Vendor	Total
Kabawa/Galilee	68	86	64	38	34	290
	38%	34%	26.3%	82.6%	56%	
Adankolo/New layout	20	10	10	03	04	47
	11.1%	3.9%	4.1%	6.5%	6.6%	
Lokongoma/Phase1&2	40	25	11	00	02	78
	22.2%	9.8%	4.5%		3.3%	
Felele/Crusher	00	60	50	00	07	117
		23.6%	20.6%		11.5%	
Zango Daji	00	14	30	00	03	47
		5.5%	12.4%		4.9%	
Army Barracks	00	21	18	00	04	43
		8.5%	7.4%		6.6%	
Gadumo/Ganaja	52	38	60	05	07	162
	28.9%	15%	24.7%	10.9%	11.4%	
Total	180	254	341	46	61	784
Percentage (%)	23%	32.4%	31%	5.9%	7.7	100%

Source: Field survey, 2019.

Factors Affecting Household Water Supply in Lokoja Metropolis

There were a range of factors in the study area that affected the availability of water for household use. These included: Distance from source, seasonality, electricity, pipe leakages, road construction, poor funding of water board and topography. Table 2 shows factors affecting household water supply in Lokoja.

From the result presented in Table 2, 55 respondents (representing 7 percent) said that distance from water sources such as well, borehole, river, pipe borne water and water vendor was the factor militating against water supply. 65 respondents (8.3 percent) linked the factor hindering the supply of water to seasonality. In the rainy season, the volume of water available in river, hand - dug wells and boreholes were usually very high, but in the dry season, the volume became low. These changes affect water supply in the study area. 32.1 percent of the respondents linked poor water supply to inadequate electricity supply, 6.1 percent agreed that pipe leakage in various channels was responsible, while 7.8 percent linked the factor to road construction and repairs in some areas, while 23 percent agreed that

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poor funding of water board was a factor. This has made water board unable to adequately supply water to residents. Similarly, 15.7 percent of the respondents linked the factor affecting water supply to topography of some area. Some houses are located on upland area and due to low water pressure, they were not adequately supplied.

Table 2: Factors Affecting Household Water Supply in Lokoja Metropolis.

Neighbourhoods	Distance	Seasonality	Electricity Supply	Pipe Leakage	Road Construction	Poor Funding	Topography	Total
Kabawa/Galilee	20	12	98	15	40	95	10	290
Adakolo/Newlayout	3	6	15	4	5	7	7	47
Lokongoma/Phase1&2	4	6	26	5	5	16	16	78
Felele/Crusher	12	10	34	-	-	20	41	117
Zango Daji	2	5	12	2	-	12	14	47
Army Barracks	4	6	8	1	-	11	13	43
Gadumo/Ganaja	10	20	59	21	11	20	21	162
Total	55 (7%)	65 (8.3%)	252 (32.1%)	48 (6.1%)	61 (7.9%)	181 (23%)	122 2(15.7%)	784

Source: Field Survey (2019).

Apart from the data gathered from respondents via questionnaires administration, oral interview with members of staff of Greater Lokoja Water Treatment Plant revealed that the major factor affecting regular supply of water was poor funding on the part of the government, which is responsible for inadequate and irregular supply of materials like chlorine, alum and other water purifying substances. Another constraint was epileptic power supply.

Household Uses of Water in Lokoja Metropolis

Domestic water uses include indoor and outdoor uses of water by residents. The uses in Nigeria according to Habeeb and Bilewa (2021) were: cloth washing, bathing, drinking and cooking, utensils, body washing, house cleaning, water close (WC) and miscellaneous. From this study, the uses of water for domestic purposes included drinking, bathing, cooking, cleaning and washing.

From the Table .3, the residents of the study area used water for the following: Drinking, bathing, convenience, cooking, washing, lawn and gardening. From the result, 19.9% used water for drinking, 17 percent for bathing, 9.3 percent for flushing their toilets, 21 percent for cooking, 14.4 percent for washing, 9.3 percent use for lawn and 9 percent of the respondents use water for watering their garden. From this analysis, it is obvious that the major use of water in the study area is for cooking, drinking and bathing and this amounted to 57.9 percent of the total use. This result is in line with the study of Scheele & Malz (2007), in their work on water demand and water use in the domestic and industrial sector. They posited that water in households is mainly needed for cleaning and washing, for personal hygiene, and for toilet

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flushing while Gleick (1996), opined attests that to satisfy the basic human needs like drinking, washing and cooking a minimum of about 5 litres water per day and person is estimated.

Table 3 Household Uses of Water in Lokoja Metropolis

Neighbourhood	Domestic Uses of Water							
	Drinking	Bathing	Flushing	Cooking	Washing	Lawn	Watering Garden	Total
Kabawa/Galilee	60	50	20	69	30	31	30	290
Adankolo/Newlayout	8	7	6	6	10	5	5	47
Lokongoma/Phase1&2	13	12	9	14	10	10	10	78
Felele/Crusher	20	26	12	20	25	7	7	117
Zango Daji	9	8	6	10	6	4	4	47
Army Barracks	6	6	5	7	7	6	6	43
Gadumo/Ganaja	40	25	15	35	25	10	12	162
Total	156	134	73	161	113	73	74	784
	19.9%	17%	9.3%	21%	14.4%	9.3%	9%	100%

Source: Field Survey, 2019.

Subdivision of Uses of Domestic Water

Sub – dividing uses of domestic water is useful in understanding minimum quantities of domestic water required and to inform management options. White et al. (1972) suggested that three types of use could be defined in relation to domestic supply:

- Consumption (drinking and cooking)
- Hygiene (including basic needs for personal and domestic cleanliness)
- Amenity use (for instance car washing, lawn watering).

Thompson et al. (2001) suggest a fourth category can be included which is productive use. Productive use of water includes uses such as brewing, animal watering, construction and small scale horticulture.

Types of Water Storage Facilities Used in the Study Area

Water storage is a broad term referring to storage of both potable water for consumption and none potable water for use in agriculture. Water storage facilities are materials, containers or reservoirs for collecting and storing water such as buckets, overhead plastic tank, jerry cans, plastic drums and other bigger containers. Household water storage is necessary in many communities worldwide, especially in the developing countries where water crisis is high as a result of poor infrastructures. To provide a clearer understanding of the types of water supply, the results of the assessment presented in Table 4 reveal diversities based on the selected neighbourhood and the types of storage facilities used.

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Table 4: Types of Water Storage Facilities in Lokoja Metropolis

S/N	Neighbourhoods	Bucket	Overhead Plastic Tank >2000L	Jerry Can	Plastic Drum >180L	Large Plastic Container 200–400L	Sum/ percentage
1	Kabawa/Galilee	58	35	160	19	18	290
2	Adankolo/New layout	18	9	12	4	4	47
3	Lokongoma/Phase1&2	17	16	15	15	15	78
4	Felele/Crusher	28	20	30	19	20	117
5	Zango Daji	9	6	15	10	7	47
6	Army Barrack	8	9	10	5	11	43
7	Gadumo/Ganaja	32	25	40	39	26	162
	Total	170	120	282	111	101	784
		21.7%	15.3%	56%	14.2%	12.8%	100

Source: Field Survey (2019).

In Table 4, 170 respondents, (21.7 percent) admitted that they used buckets as water storage facilities, 120 respondents (15.3 percent) used overhead plastic tank, 282 respondents (56 percent) used jerry can, 111 respondents (14.2 percent) used plastic drums and 101 respondents (12.8 percent) used big plastic containers. The analysis shows that majority of the respondents used jerry cans to store water in their houses. The reason for the high usage of jerry cans by these residents could be attributed to the fact that jerry cans come in different sizes such as 10, 20, 25 and 50 Liters. They have covers for safety, and can be easily carried from one place to another, such as from the tap, hand - dug well, borehole and river to the house for domestic use and storage. This is also evidence in the fact that water vendors use jerry cans for the sale of water because of its convenience, portability and easy mobility.

Factors Responsible for the Use of the Types of Water Storage Facilities

There are various types of water storage facilities used in the home and these can be influenced by several factors such as cost, space, water availability, cultural practices, government policy and climate.

1. Cost: Some types of water storage facilities, such as tanks or cistern, can be expensive to install and maintain. Other options, such as buckets or jugs may be more affordable.
2. Space: The amount of space available for water storage can also be a factor. For example, if there is limited space in a home, a smaller storage option, such as a bucket or jerry can, may be more practical.
3. Water Availability: The availability of water can also affect the type of storage facility used. For example, if water is only available from a community tap or hand - dug well, a larger storage container, such as a barrel or tank or cistern may be necessary.
4. Cultural Practices: In Egan in culture in Kogi State, certain types of water storage containers may be preferred. For example, clay pots or jars may be used for storage in some regions, while buckets or jugs may be used in others.

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5. Government Policy and Regulations: In Kogi State, the government requires certain types of water storage facilities for public health and safety reasons. For example, some parts of Lokoja metropolis may require covered water storage containers to prevent contamination.
6. Climate: The climate of the study area can also affect the type of water storage facilities used. For example, in regions with high temperatures, metal or plastic storage containers may be preferred over clay or wood containers to prevent the growth of harmful bacteria. Table 5 shows factors affecting the use of water storage facilities in the area.

Table 5: Factors Affecting the Use of Water Storage Facilities in the Study Area

Neighbourhoods	**Factors** Cost	Water Availability	Education	supply Source	Sum
Kabawa/Galilee	120	41	58	71	290
Adankolo/New layout	15	10	11	11	47
Lokongoma/Phase 1&2	38	9	21	10	78
Felele/Crusher	85	10	15	17	117
Zango Daji	12	5	18	12	47
Army Barracks	9	11	13	10	43
Gadumo/ Ganaja	96	14	36	16	162
Total	375	100	172	147	784
	54%	14%	24%	21%	

Source: Field Survey (2019).

Results of analysis showed in Table 4.19 revealed that 375 respondents which amounts to 54 percent said that cost or prize of water was the factor militating against the types of water storage facilities in the area, 100 respondents which represents 14 percent said that water availability influences the types of water storage facilities in the area, 172 respondents which accounts for 25 percent admitted that level of education of residents affects their choice of water storage facilities, and 147 respondents which accounts for 21 percent said that source of water supply such as river, well, pipe borne water, borehole and water vendor influence the type of water storage facilities used in the area. This outcome is a fact in that the households in the area that have wells and bore holes in their compounds relatively have overhead plastic tanks as their water storage facility whereas those that have river, water vendors as their source use other containers to store water.

Test of Hypotheses 1

H_O: There is no correlation between sources of household water supply and types of water storage facilities in the study area.

H_1: There is correlation between sources of household water supply and types of water storage facilities in the study area.

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Table 6: Multiple Correlation Analyses

		Sources of HH Water Supply					Types of Water Storage Facility				
		Tap	Well	Borehole	River	Vendor	Bucket	Overhead Plastic Tank	Jerry Can	Plastic Drum	Other Bigger Containers
Tap	Pearson Correlate	1									
	Sig. (2-tailed)										
Well	Pearson Correlate	.761	1								
	Sig. (2-tailed)	.000*									
Borehole	Pearson Correlate	.755	.909	1							
	Sig. (2-tailed)	.000*	.000*								
River	Pearson Correlate	.691	.659	.550	1						
	Sig. (2-tailed)	.000*	.000*	.000*							
Vendor	Pearson Correlate	.612	.707	.572	.768	1					
	Sig. (2-tailed)	.000*	.000*	.000*	.000*						
Bucket	Pearson Correlate	.834	.889	.867	.684	.646	1				
	Sig. (2-tailed)	.000*	.000*	.000*	.000*	.000*					
Overhead Plastic Tank	Pearson Correlate	.778	.834	.833	.559	.517	.911	1			
	Sig. (2-tailed)	.000*	.000*	.000*	.000*	.000*	.000*				
Jerry Can	Pearson Correlate	.799	.860	.781	.877	.771	.872	.773	1		
	Sig. (2-tailed)	.000*	.000*	.000*	.000*	.000*	.000*	.000*			
Plastic Drum	Pearson Correlate	.676	.652	.768	.296	.388	.592	.556	.486	1	
	Sig. (2-tailed)	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*		
Other Bigger Containers	Pearson Correlate	.669	.702	.705	.369	.614	.679	.622	.498	.661	1
	Sig. (2-tailed)	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*	.000*	

*. Correlation is significant at 0.05 level.

The multiple correlation analyses suggest that there is significant correlation between all the pairs of sources of household water supply and types of water storage facilities in the study at 5 percent level. Further confirmatory analysis is carried out using the canonical correlations.

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Table 4.26: Canonical Correlations

	Correlation (r)	Eigenvalue	Wilks Statistic	F	Numerator D.F	Denominator D.F.	Sig.
1	.983	28.100	.008	147.732	25.000	1368.561	.000
2	.811	1.922	.226	44.245	16.000	1127.951	.000
3	.550	.434	.660	18.647	9.000	900.633	.000
4	.232	.057	.946	5.199	4.000	742.000	.000
5	.007	.000	1.000	.020	1.000	372.000	.887

H_0 for Wilks test is that the correlations in the current and following rows are zero
Source: Statistical Package for the Social Science (SPSS).

The canonical correlation analyses revealed that types of water storage facilities such as bucket, overhead plastic tank, jerry can, and plastic drum significantly depend on source of household water supply (tap, well, borehole, river, and vendor) at F-value = 147.732 ($p<0.05$), 44.245 ($p<0.05$), 18.647 ($p<0.05$), and 5.199 ($p<0.05$) respectively. Hence, the hypothesis is rejected, therefore, there is significant correlation between sources of household water supply and types of water storage facilities in the study at r = 0.983 ($p<0.05$), 0.811 ($p<0.05$), 0.550 ($p<0.05$), 0.232 (0.005) respectively. The proportion of variance explained by the relationships is obtained from the first row since the eigenvalue is the highest with 28.100. Therefore, the proportion of variance explained are adequate and obtained as 0.750 (75.0 percent), 0.724 (72.4 percent), 0.709 (70.9 percent), and 0.685 (68.5 percent) respectively.

Table 7: Proportion of Variance Explained

Canonical Variable	Set 1 by Self	Set 1 by Set 2	Set 2 by Self	Set 2 by Set 1
1	.750	.724	.709	.685
2	.120	.079	.108	.071
3	.052	.016	.088	.027
4	.019	.001	.081	.004
5	.059	.000	.014	.000
3	.052	.016	.088	.027
4	.019	.001	.081	.004
5	.059	.000	.014	.000

Source: Statistical Package for the Social Science (SPSS).

Test of Hypothesis 2

H_O: There is no significant variation among factors affecting Household water supply in the study area.

In a nut shell, the factors affecting household water supply in the Lokoja Metropolis are: distance from source, seasonality, demand, population and erratic power supply. In this vein, one of the pivotal quantitative aspect of this study is to find out if there are variations among

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the aforementioned factors that affect household water supply in the study area. To test the second hypothesis which states that there is no significant variation among factors affecting household water supply in the study area, the Analysis of Variance (ANOVA) was used at 0.05 level of significance.

Table 8: Descriptive Statistics on Factors Affecting Household Water Supply

Factor	N	Mean	Std. Deviation	CV	Mini	Maxi
Distance From Source	7	7.29	2.910	0.40	2	25
Seasonality	7	5.00	1.633	0.33	3	7
Demand	7	13.57	6.289	0.46	5	29
Population	7	23.71	10.589	0.45	7	64
Erratic Power Supply	7	62.43	29.626	0.47	20	186
Total	35	22.40	10.418	0.47	2	186

Source: Researcher's Field and Statistical Analysis 2019.

The descriptive statistics results indicate that the mean score on the factors affecting household water supply is obtained for Distance from source as (7.29), Seasonality (5.00), Demand (13.57), Population (23.71) and epileptic power supply (62.43). These results are supported by the coefficient of variation (CV) values of 0.40, 0.33, 0.46, 0.45, 0.47, and 0.47, which are respectively less than 0.50 threshold value, indicating homogeneity on how the respondents rated the items. The test for significant variation is determined in the ANOVA table as in table 4.29

Table 9. ANOVA Model of Vraitions

Model	Sum of Square	Df	Mean of Square	F	Sig.
Between Groups	15492.114	4	3873.029	4.688	.005
Within Groups	24784.286	30	826.143		
Total	40276.400	34			

Source: Researcher's Field and Statistical Analysis 2019.

The ANOVA test shows that there is significant variation among factors affecting Household water supply in the study area at F – value= 4.688, since P = 0.000< 0.05 significance level. Hence the null hypothesis is rejected. Multiple comparisons of means (post – hoc test) are further carried out to conclude which factor has the greatest effect.

Post Hoc Tests

The result indicates that there is a significant mean difference between Distance from source and Erratic power supply, Seasonality and Erratic power supply, Demand and Erratic power supply, Population and Erratic power supply since ($p<0.05$) respectively. This implied that erratic power supply is a major factor affecting household water supply in the study area.

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Table 10: Multiple Comparisons: Least Significance Difference (LSD)

(I) Factors affecting Household water supply	(J) Factors affecting Household water supply	Mean Diff. (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Distance from source	Seasonality	2.286	15.364	.883	-29.09	33.66
Distance from source	Demand	-6.286	15.364	.685	-37.66	25.09
Distance from source	Population	-16.429	15.364	.293	-47.81	14.95
Distance from source	Erratic Power Supply	-55.143*	15.364	.001*	-86.52	-23.77
Seasonality	Demand	-8.571	15.364	.581	-39.95	22.81
Seasonality	Population	-18.714	15.364	.233	-50.09	12.66
Seasonality	Erratic Power Supply	-57.429*	15.364	.001*	-88.81	-26.05
Demand	Population	-10.143	15.364	.514	-41.52	21.23
Demand	Erratic Power Supply	-48.857*	15.364	.003*	-80.23	-17.48
Population	Erratic Power Supply	-38.714*	15.364	.017*	-70.09	-7.34

*. The mean difference is significant at the 0.05 level.

SUMMARY AND CONCLUSION

This study evaluated household water supply and storage for domestic use in Lokoja metropolis in Kogi State, Nigeria. The research work revealed that there were five (5) sources of water supply in the study area, including: tap borne water, well, borehole, vendor and river. Aside from these, the residents of the area also used rain - harvested water as another source of supply in the rainy season that was not captured in this study owning to seasonal factors. In spite these aforementioned sources of water supply in lokoja town, there are factors that affected household water supply in the study area, these were: distance from source, seasonality, epileptic power supply, pipe leakages, road construction, poor funding of water board and topography.

As a result of inconsistency and irregularity of water supply in the town due to the aforementioned factors, residents of the study area adopted measures of water storage, using different water storage facilities, which included: bucket, overhead plastic tank, jerry can, plastic drum and large plastic containers. The supplied or stored water was used by the residents for drinking, bathing, flushing of toilet, washing, cooking and for lawn. It is worthy of note, that before 1991, Lokoja was a Local Government Headquarter, but the creation of states in1991, made Lokoja the capital of Kogi State.

The highlighted metamorphosis brought about the influx of people, ministries and institutions into the town. In spite of the population growth and urbanization process in Lokoja, and government effort to provide municipal potable water for the people, there were still water crisis in some parts of the metropolis. To ameliorate this, individual landlords embarked on drilling of boreholes and construction of hand - dug wells in their compounds for regular

domestic water supply. The results showed a significant correlation between water sources and the types of storage facilities used by residents.

Competing Interest

The authors had declared that no conflicting interest exist in this manuscript.

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