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IMPACT OF HOUSEHOLD CHARACTERISTICS ON WATER ACCESS AND USE IN IKORODU LOCAL GOVERNMENT AREA OF LAGOS, NIGERIA

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ABSTRACT
Water is a basic resource to the existence of man and his livelihood. Despite its importance, a significant global population does not have adequate access to this vital resource. This is a major problem in developing countries where household water needs outstrip supply. It is therefore imperative to understand the drivers of household water demand. This study was designed to determine the household characteristic features that influence water use in homes within the Ikorodu LGA of Lagos State, Nigeria. A questionnaire survey was carried out in 377 households, and the results show that income has a positive significant effect on the choice of the water source. The average water consumed daily for drinking purposes by households is 27.1 litres. Marital status, the size of households and toilet status were the household features found to be significantly related to the quantity of water used for drinking purposes. On the average, a household consumes about 1947 litres of water monthly for various purposes. The study concludes that limited access to water has reduced the amount of water used by families. The paper, therefore, recommends that infrastructure for water provision to both urban and rural residents be improved.

Keywords: Ikorodu; water use; access to water; drinking water; water source

1. Introduction
The problem of access to potable water is a worldwide phenomenon. The scarcity of clean, fresh water is one of the world's most pressing environmental problem (Arms, 2008). According to WHO/UN-Water (2004), accessibility to water includes a continuous supply of a minimum amount of water which is sufficient for drinking, personal and domestic hygiene, for an affordable price, within a reasonable distance. The UN-Water Taskforce (2010) described access as the availability of at least 20 litres of drinking water per person per day within a distance of not more than 1 km of the dwelling.

In 2002, nearly 1.1 billion people lacked access to safe drinking water (WHO, 2004a; Cech, 2005; Bates et al., 2008). The international community through its various arms engaged in worldwide programs to make water accessible to the people. Notable among such programs is the Water for Life International decade for Action 2005 -2015. Resulting from such persistent global actions, the proportion of the global population using safely managed drinking water services increased from 61% in 2000 to 71% in 2017 (UN, 2020). Between 1990 and 2015, the proportion of people in the least developed countries using improved drinking water sources increased from 51% to 69%, but use of piped water on premises only increased from 7% to 12%. Despite this level of progress, 2.2 billion people around the world still lacked safely managed drinking water, including 785 million without basic drinking water (UN, 2020).

However, despite attempts made by both governmental and non-governmental bodies globally, there is still a wide disparity in the availability of pure and good quality water to the populace. While the problem may not be as despairing in the developed countries of Europe and America, it is a threat to survival in many developing countries of the world. Africa has 11% of the world's waters and has 13% of the world's population (UNESCO/WWAP, 2003; UNFPA, 2003). According to Ellen and Kellog (2005), water is

unavailable to many, mainly those located in Sub-Saharan Africa, South Asia and East Asia. In 2015, UNICEF and WHO estimated that 663 million people still use unimproved drinking water sources out of which 319 million live in the sub-Saharan region (UNICEF/WHO, 2015).

Meanwhile, the importance of water in the existence and development of mankind cannot be underestimated. The role of water in development is recognized by including it in the Millennium Development Goals. The Goal 7 Target 10 is to halve the proportion of the people without sustainable access to safe drinking water and basic sanitation by 2015 (WHO, 2005). Towards the achievement of this goal, efforts were made to improve water supply to the populace, particularly in developing countries.

For Nigeria, a 2005 Millennium Development Goals (MDGs) project task force national survey on water and sanitation ranked the country among countries having moderate water access. Worse still is the improvement in the sanitation sector. As a result, Nigeria was classified as countries that are making low progress and are having low access (UN-Water/Africa, 2006). The water situation in the country is precarious, and the improvement in the domestic water supply has not been impressive (Olajuyigbe, 2010). Despite the abundant water resources available in the country, the task of meeting domestic water needs in both rural and urban areas in Nigeria is enormous. Residents resort to the use of water from unimproved sources that may not be safe for drinking.

It is of interest that the ease of access of households to water varies even within the same locality. While some people pay very dearly for domestic water, others have easy access to adequate, clean water and sanitation due to their location and social status in society (Hunter et al., 2009). Many households spend considerable time and effort fetching water from sources such as rivers, streams, ponds, wells and boreholes. In most cases, these sources are far from home and may not be of good quality as observed by Arms (2008). This study was therefore carried out to evaluate the role of some salient characteristics of households on water use and accessibility in Ikorodu Local Government. The specific objectives are to:

(i) examine the effects of household characteristics on the use of water in the area
(ii) assess the influence of household characteristics on the water consumption rate
(iii) evaluate the relationship between the source of water and the household characteristics

2. The Study Area

Ikorodu Local Government Area is located between latitude 6^0 37' N - 6^0 45' N and longitude 3^0 3' E - 3^0 5'. It is bounded on the east by Epe Local Government Area, to the south by the Lagos lagoon, to the north by Ogun state and the west by Somolu Local Government Area (Odumosu & Balogun, 1991). It has a land area of about 394 km^2. Ikorodu is characterized by a tropical climate with distinct dry and rainy seasons. The dry season is between November and March while the rainy season is from April to November. Rainfall is less than 2500mm every year while the average temperature is about 30^{o}C. The vegetation is made up of mangrove plants of different species such as mahogany.

The topography enhances effective drainage through which several rivers flow into the Lagos lagoon. The geology is the Benin formation that consists largely of sands/sandstones. According to Offodile (2002), the formation is thin in Ikorodu, and this does not favour it as an important aquifer. Also, the arenaceous nature of the Benin Formation makes it susceptible to contamination from anthropogenic sources.

Located outside the Lagos Metropolis, Ikorodu local government area is a typical peri-urban area with urban and rural land-use mix. The area is undergoing accelerated urbanization with the influx of people on a daily basis largely from other parts of the state. The population figure for the 2006 population census was 535,619. The projected 2015 population figure for the local government, as given by the Lagos Bureau of Statistics (2011), is 914,882. As observed by Adeoye et al., (2013), as the population is increasing, and towns are expanding, the demand for potable water in both quantity and quality is equally on the increase.

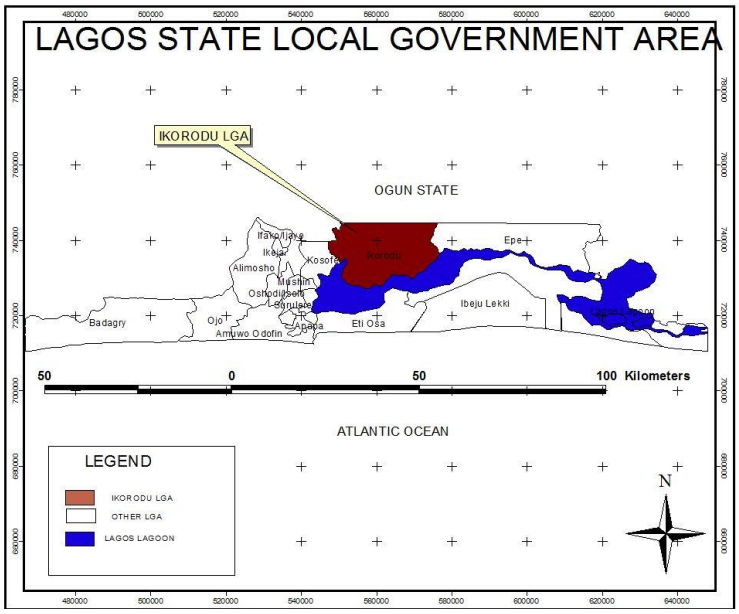

Figure 1: Map of Ikorodu Local Government Area

However, despite the growing population in Ikorodu, there is no commensurate increase in infrastructure particularly the provision of water facilities. Dominguez and Foster (2011) observed that urban population growth in Africa out spaced the rate of expansion of improved services. Water distribution within the study area is very minimal and confined to areas near or around the water works. Residents within the study area depend largely on water from wells and boreholes that are either privately owned or constructed for commercial purposes by individuals. Such wells are located away from the homes of the users, and valuable man-hours are spent on fetching water on a daily basis.

3. Methods and Materials

A structured questionnaire was designed to source for information on the household characteristics of respondents and the water consumption rate. The household characteristics of interest here are sex, marital status, monthly income, household size, occupation and educational background. Also, information was requested on some basic features of the houses occupied by respondents. Such housing features include building type, the number of rooms, presence/ absence of private garden, toilet type and Toilet status. Toilet status refers to whether the toilet is shared with other households or not. Each household feature was allocated a code, as shown in Table 1, for ease of reference in subsequent discussions.

The questionnaires were administered in twenty-five communities in the local government. The communities include Agura, Ason, Ewu Ebi, Gberigbe, Igbaga, Igbalu, Igbe, Igbogbo, Ijede, Imota and Isawo. Others are Isiwu, Itamaga, Madigan, Majidun, Mebisere, Mopenifa, Odo, Ogijo, Ogunlogun, Oguntoye, Oke Agbo, Oke Eletu, Oke Ito and Ologede. At the end of the survey, a total of 377 questionnaires were correctly filled and completed and were used in the study.

Respondents were requested to quantify the volume of water consumed on daily and monthly basis. The quantifying was done by asking for the number of buckets and jerry cans of water fetched and the capacity of the containers. In cases where respondents have boreholes at home, the size of storage tanks were taken, and the frequency of water pumping was noted. The information thereby collected was used in the estimation of the volume of water used by households.

Data collected was subjected to both descriptive and regression methods using the SPSS 20 software. The descriptive methods adopted were frequencies and percentages that were used to explain the distribution of responses into pre-determined categories. The stepwise regression method was used to assess the effects of household characteristics on the use of water.

4. Results and Discussions:

4.1 Socio-economic Characteristics of respondents:

Out of a total number of 377 respondents used in the study, 62.6% were women while 37.4% were men. A majority 90% of these were married. The educational qualification of the respondents varied from primary school (26%), secondary (49.6%), degree holders (19.1%) and postgraduate qualification (5.3%). The majority (37.9%) were business men and women while 30.8% were self-employed. Only 11% were civil servants and 9.8% were professionals. Monthly income of respondents was largely within the 11,000 – 50,000 naira range (55.7%) which implies that they were mainly low-income earners. The respondents that earn 51,000 – 100,000 Nigerian Naira were 16.2% of the population while the higher income earners (above 100,000 Nigerian Naira monthly) were only 4%. Household sizes were moderate with majority 43.5% having 5 – 6 persons within the household. The smaller household size of 1 – 4 persons constitute about 30% while the larger ones were 7 – 8 persons (18.3%) and 9 and above (5.8%). More details are in Table 1.

Table 1: Descriptive Statistics of household characteristics

Variables	Household Feature Code	Average Code	Remark	Number of respondents
Building type	V1	2.16	Mainly Face-to-Face buildings	377
No of rooms	V2	2.69	7 – 9 rooms (7 rooms)	377
Private garden	V3	0.11	Mainly No private Gardens	377
Toilet type	V4	1.59	Mainly Flush Toilets	377
Toilet status	V5	0.55	Shared toilets	377
Size of household	V6	1.95	5 -8 peoples	377
Monthly Income	V7	1.99	N11000 - N50000	377
Occupation	V8	1.94	Mainly Businessmen	377
Education background	V9	2.04	Secondary School Certificate Holders	377
Marital status	V10	0.90	Mainly married people	377
Sex	V11	1.63	Mainly Females	377

4.2 Household characteristics and the source of water

The collection time to the water source was studied, and the result of the frequency distribution is shown in Table 2. Collection time to a water source is the time it took to travel from the home to the source, collect water and return home. It is evident that it takes a majority 39% between 11-30 minutes to collect a round of water. The average collection time was 20 minutes.

Table 2: Frequency distribution of water collection time

Variable	Categories	Freq.	%	Mean	Total
Water collection time	Don't know	123	32.6		
	Under 11 minutes	81	21.5		
	11 - 30 minutes	148	39.3		
	31 - 60 minutes	23	6.1		
	Above 60 minutes	2	.5	20mins.	377

Four major sources of water were identified namely indoor tap, shared tap, well and buying from a water tanker. Water from indoor taps and shared taps are mainly from boreholes, but the location differs. Indoor taps are within house premises and usually for private use while shared taps are primarily for commercial purposes. From Table 3, the primary source of water for households in Ikorodu LGA is well (41%) while shared tap and indoor water carry 35.8% and 18.8% respectively. Also, it is evident from the results that accessing water through the use of tankers is not common in the study area.

Table 3: Frequency distribution of sources of water

Variable	Available Options	Freq.	%	Total
Source of water supply	Indoor tap water	71	18.8	
	Shared tap	135	35.8	
	Well	158	41.9	
	Water tanker	13	3.4	377

Stepwise regression analysis is used to determine the effect of Household Characteristics on Household source of drinking water. Household source of drinking water represents the dependent variable. The Building type (V1), Number of rooms (V2), Private garden (V3), Toilet type (V4), Status of toilet (V5), Size of household (V6), Monthly Income (V7), Occupation (V8), Education background (V9), Marital status (V10) and Sex (V11) represent the independent variables. The result of the analysis reveals that Monthly income has a significant effect on Household source of drinking water at $t = 2.641$, $P < 0.05$. The result further implied that Monthly income has a direct effect on Household source of drinking water. Therefore, an increase in earnings and consequent improvement in the standard of living will influence the selection of improved sources of water by the residents of the study area.

4.3 The effect of Household Characteristics on water use.

From the questionnaire survey, water is used for drinking, cooking, laundering, bathing, toilet flushing, flower watering, car washing. Of these, respondents were to indicate as many as apply to them. The response is summarized in Table 4 which shows that the majority of the respondents (46.7%) use water for not more than four purposes.

Table 4: Frequency distribution of uses

Variable	Categories	Freq.	%	Total
Water use	1 - 4 uses	176	46.7	
	5 uses	78	20.7	
	6 uses	10	2.7	
	Above 6 uses	113	30.0	377

The stepwise regression method of analysis was used to assess the effect of household characteristics on the uses of water. The uses of water represents the dependent variable, while Building type (V1), Number of rooms (V2), Private garden (V3), Toilet type (V4), Toilet status (V5), Size of household (V6), Monthly Income (V7), Occupation (V8), Education background (V9), Marital Status (V10) and Sex (V11) represent the independent variables. The result of the analysis reveals that V1, V4, V10, V2, V9, V5, and V7 have significant effect on the uses of water at $t = 4.312$, -6.196, -3.532, -3.729, 3.065, -2.786 and 2.435 respectively, $P < 0.05$. The results further implied that V3, V9 and V7 have direct effect while V4, V10, V2 and V5 have an indirect effect.

4.4 Household characteristics and quantity of drinking water consumed daily.

Table 5 shows the frequency distribution of the daily water consumption. The average amount of water consumed for drinking by households is 27.1 litres daily. However, the majority 67.1% consumes about 31 litres daily.

Table 5: Frequency distribution of quantity of drinking water used daily

Variable	Categories	Freq.	%	Mean	Total
Quantity of drinking water consumed daily	Don't know	50	13.3		
	under 5 litres	17	4.5		
	6 -10 litres	14	3.7		
	11 - 20 litres	27	7.2		
	21-30 litres	16	4.2		
	Above 31 litres	253	67.1	27.1 litres	377

Stepwise regression analysis is used to determine the effect of Household Characteristics on the Quantity of drinking water consumed daily. The volume of drinking water consumed daily represents the dependent variable while the household features represent the independent variables. The result of the analysis reveals that V10, V9, V6 and V5 have significant effect on the amount of drinking water consumed daily at t = 5.263, -4.655, 3.306 and 3.016 respectively, $P < 0.05$. The results further implied that V10, V6, and V5 have direct effect while V9 has an indirect effect on the quantity of drinking water consumed daily. These results are supported by the correlation results obtained for each characteristic respectively. The adequacy of this outcome is supported by Variance Inflation Factor (VIF), which shows no significant multi-collinearity since the values are all below (2). The ANOVA shows that the variation in the dependent variable accounted for by the model is adequate at $F = 18.875$, $p < 0.05$. Hence, the model is acceptable for result utilization. The Stepwise regression model is:

$D = 2.589 + 1.529V10 - 0.509V9 + 0.323V6 + 0.542V5$

4.5 The effect of household characteristics on quantity of water consumed monthly

Table 6 shows the frequency distribution of the amount of water consumed monthly by respondents. About 48% of respondents were unable to give an estimate of the monthly water consumption rate. However, the mean quantity consumed from the other responses was 1947 litre with 48% consuming more than 2000 litres per month.

Table 6: Frequency distribution of quantity of water consumed monthly

Variable	Categories	Freq.	%	Mean	Total
Quantity of water consumed by family per month	Don't know	183	48.5		
	Less than 500litres	2	0.5		
	501 - 1000litres	3	0.8		
	1001 - 2000litres	7	1.9		
	Above 2000litres	182	48.3	1947.2litres	377

Stepwise regression analysis is used to determine the influence of Household Characteristics on the Quantity of water utilized by each family monthly. The Quantity of water consumed by family monthly represents the dependent variable while the household features represent the independent variables. The result reveals that V5, V8, and V6 have a significant effect on the Quantity of water consumed by family monthly at t = 2.843, -2.355 and 2.323 respectively, $P < 0.05$. The results further implied that V5 and V6 have direct effect while V8 has an indirect effect on the quantity of water consumed by family monthly. These results are supported by the correlation results obtained for each characteristic respectively. The adequacy of this result is supported by Variance inflation factor (VIF), which shows no significant multi-collinearity since the values are all below (2). The ANOVA shows that the variation in the dependent variable accounted for by the model is adequate at $F = 5.725$, $p < 0.05$. Hence, the model is acceptable for result utilization. The Stepwise regression model is:

$$D = 1.751 + 0.578V5 - 0.194V8 + 0.260V6$$

5. Conclusion and Recommendation

An attempt has been made to determine the household characteristic features that influences water use in homes within the Ikorodu LGA of Lagos State. Results show that income has a positively significant effect on the choice of the water source. In essence, higher income will improve the source of water that residents use. The average water consumed daily for drinking purpose by households is 27.1 litres. Marital status, the size of households and toilet status were the features found to be significantly related to the quantity of water used for drinking purpose. On the average, a household consumes about 1947 litres of water on a monthly basis for various purposes. This quantity is much lower than the volume of water needed by households with piped water and indoor sanitation that was given as 115 litres per head per day by Ayoade and Oyebande (1983). In essence, the limited access to water has reduced the amount of water used by families. Consequently, the level of sanitation and personal hygiene in affected homes will reduce in response to the limited access. Thus, it can be deduced from the findings of this study that improvement in the living standards of households will facilitate the accessibility of households to water sources. The study recommends that infrastructure for water provision to both urban and rural residents should be improved. Also, it is believed that a general improvement in the standard of living of the populace will promote both the quantity and quality of water available for the use of the people.

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