Pattern of household access to water supply in sub-urban settlements in parts of Lagos State, Nigeria

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Abstract

Access to safe water supply is one of the fundamental basic needs for human survival. This study examined patterns of household access to water supply in sub-urban settlements in parts of Lagos State,Nigeria.Data used for this study were obtained from social survey on access through questionnaire administration of randomly sampled 200 household members from four settlements each from Badagry and Ikorodu local government areas during the month of September 2012.The results showed that, boreholes, protected dug wells, vendors providing water, and rainwater harvesting were the main sources of water in the study area. Access to improved water source revealed that Igbogbo, a settlement from Ikorodu had the highest score with about 16.1%. About 21.7% of the households have access to safe water. A dependent relationship was established at p<.000 between the settlements and safe water sources. The pattern of access to improved water source showed that, households from Iworo-Ajido and Igbogbo had the highest access in Badagry and Ikorodu local government areas respectively. The attributes of water access showed about 60%, 79.8%, 42.7% and 62.1% of the respective households gained access to water based on distance, time taken, number of trips and quantity of water consumed per capita per day. The study concluded that access to safe water supply was low in the area. It recommended rainwater harvesting technology, extension of piped water connections and public standpipes for safe water supply provision to the suburb settlements.

Keywords: access to water, household, improved water source, Lagos-Nigeria, safe water supply, sub-urban settlement

Introduction

Safe drinking water remains a major challenge for about 1.1 billion people over the globe (Mintz *et al.,* 2001). The current rise in population growth, urbanization and increasing demand exceeding the supply pose a major challenge to children, the elderly and pregnant women who are more susceptible to water borne diseases. This problem has been attributed to one of the five leading causes of death among children under five years old (Chia *et al.,* 2014). The provision of domestic water supply is one of the fundamental basic needs for human survival. Lack of access to adequate water supply induces the spread of water borne diseases. Access to water supply implies having sufficient water for personal and domestic uses of at least 50 to 100 litres of water/ person/ day from a safe source, that is acceptable and affordable (i.e. cost of water should not exceed 3% of household income), and physically accessible (i.e. the water source should be within 1km of the home and collection time should not exceed 30 minutes) (UN, 2012). The global response to the problem of sustainable access to safe drinking water and basic sanitation culminated in the inclusion of specific water-related targets in the Millennium Development Goal (MDG) number seven. The goal aimed at halving the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015 for improved human health, development and well-being.

The global trend in access to improved water supply shows that, in 2010, approximately 89% of the world's population representing 6.1 billion people had access to improved drinking water sources. The implication of this is that, 11% of the global population representing 783 million people still lacks access to an improved source of drinking water (UN, 2012). Studies have shown that, water supply coverage remains very low in Oceania and sub-Saharan Africa (SSA). This clearly shows that, these regions are not on track to meet the MDG drinking water target by 2015. In SSA, over 40% of the population lack access to improved drinking water. It has been reported that the gap between the urban and rural areas is very wide, with the number of people in rural areas without access to improved water source is five times greater than in urban areas (UN, 2012). The challenges of expanding piped water connection in SSA are constrained by demand and supply factors. With respect to demand side, high connection fees amounting to about $265 and weak land tenure system constitute some of the problems of household's inability to gain access to piped water connections. On the supply side, insufficient production capacity and inefficiencies of service providers in the region hinders household's access to safe water supply (Banerjee & Morella, 2011).

Despite the various initiatives and steps taken by the Federal government, State and the local councils in Nigeria to improve on the delivery of potable water supply, the majority of the population still lack access to improved water sources. This situation is more worrisome in the sub-urban and rural areas in the country. According to the (WHO/UNICEF, 2008), Nigeria is not on track to meet the MDG targets of 75% coverage for safe drinking water by the year 2015. It is estimated that, less than half (47%) gained access to improved water sources in 2006.The breakdown shows that, 65% and 30% of the population have access to improved water sources in the urban and rural areas respectively (WHO/UNICEF, 2008).
Various researchers have carried out a study on access to water supply across the globe. For instance, Nyong and Kanaroglou (1991) examined domestic water patterns in a rural area in the semiarid region of northeastern Nigeria. Fadare and Olawuni (2008) assessed the health effects of domestic water supply across three residential areas in Osogbo, Nigeria. Olajuyigbe (2010) investigated the various attributes of domestic water sources across three residential zones in Ado-Ekiti, Nigeria. Others, including Amori and Makinde (2012), examined the public perception of access to potable water supply on the basis of socio-demographic factors in some major cities in Nigeria. Chia et al. (2014) investigated the various sources of water available in Makurdi, Nigeria. Odafivwotu and Abel (2014), assessed household's access to potable water supply in terms of quality and quantity in Yenogoa, Nigeria. Daniel et al. (2013), analyses the factors that influence water quality in Tamale, Ghana. Amitabh (1991) examined the nature and magnitude of disparities in access to water supply and sanitation of people's perception in different levels of consumption and expenditure in urban areas in India. Bajpai and Bhandari (2001) examined the relationship between economic status and access to water among urban households in India. Despite the vast literature on access to water supply, there is little literature on the spatial pattern of the attributes of household's access to domestic water supply in sub-urban settlements. Therefore, this study is aimed at examining the pattern of household's access to water supply in sub-urban settlements in parts of Lagos State, Nigeria with a view to fill this gap in knowledge.

The study area

This study was conducted in two Local Government Areas (LGAs) comprising four sub-urban settlements each. The settlements are; Ajara, Iworo-Ajido, Seme and Topo in Badagry LGA while Ibeshe, Igbogbo, Ijede and Majidun are located in Ikorodu LGA of Lagos State, Nigeria. By virtue of its geographical location, the climate is of the tropical type. The average temperature is about 30^0C while average annual rainfall is 1,532 mm with the relative humidity around 80% all the year round (Balogun *et al.,* 1999). Three of the settlements each of the LGA's namely; Iworo-Ajido, Seme, Topo; Ibeshe, Ijede and Majidun are located around the coastal environment while Ajara and Igbogbo are located in the inland area. Therefore, the justification for the selection of these settlements was based on their distinct geographical characteristics and the level of physical development in the area (Balogun *et al.,* 1999).

Badagry LGA is one of the study areas. It is located approximately on Longitude $2^0$0'W and $3^0$0'W and latitude $6^0$15'N and $6^0$0'N. It is bounded on the East by Ologe Lagoon, in the North by Ogun state, South by Atlantic Ocean and in the West by Benin republic (Fig.1a). The vegetation is characterized by marshy terrain in areas close to the Lagoon while towards the eastern end is the mangrove forest with some few grassland areas (Balogun *et al.,* 1999). Despite its proximity to the international border and its vast tourism potential, aquatic splendor and relatively low population density, the majority of the suburb and rural settlements in Badagry LGA lacks modern amenities such as piped water connection, public standpipe and basic sanitation facilities. According to NPC (2006) the population is estimated at about 241,093 people. The main ethnic groups in Badagry LGA include the Ogu and the Aworis. Others include the Hausas and the migrants from the neighbouring West African countries. Major sources of water supply include shallow wells and water vendors. The cost of constructing borehole or hand dug well in the area is relatively cheap because depth to water table is very low. This might have contributed to the relatively high water availability. The major human activities in the area include farming, fishing, trading among others (Balogun *et al.,* 1999). Ikorodu LGA is located approximately on Longitude $3^0$3'W and $3^0$5'W and Latitude $6^0$37'N and $6^0$45'N. The LGA is bounded on the East by Epe LGA, North by Ogun state, South by Lagos Lagoon and on the West by Kosofe LGA.

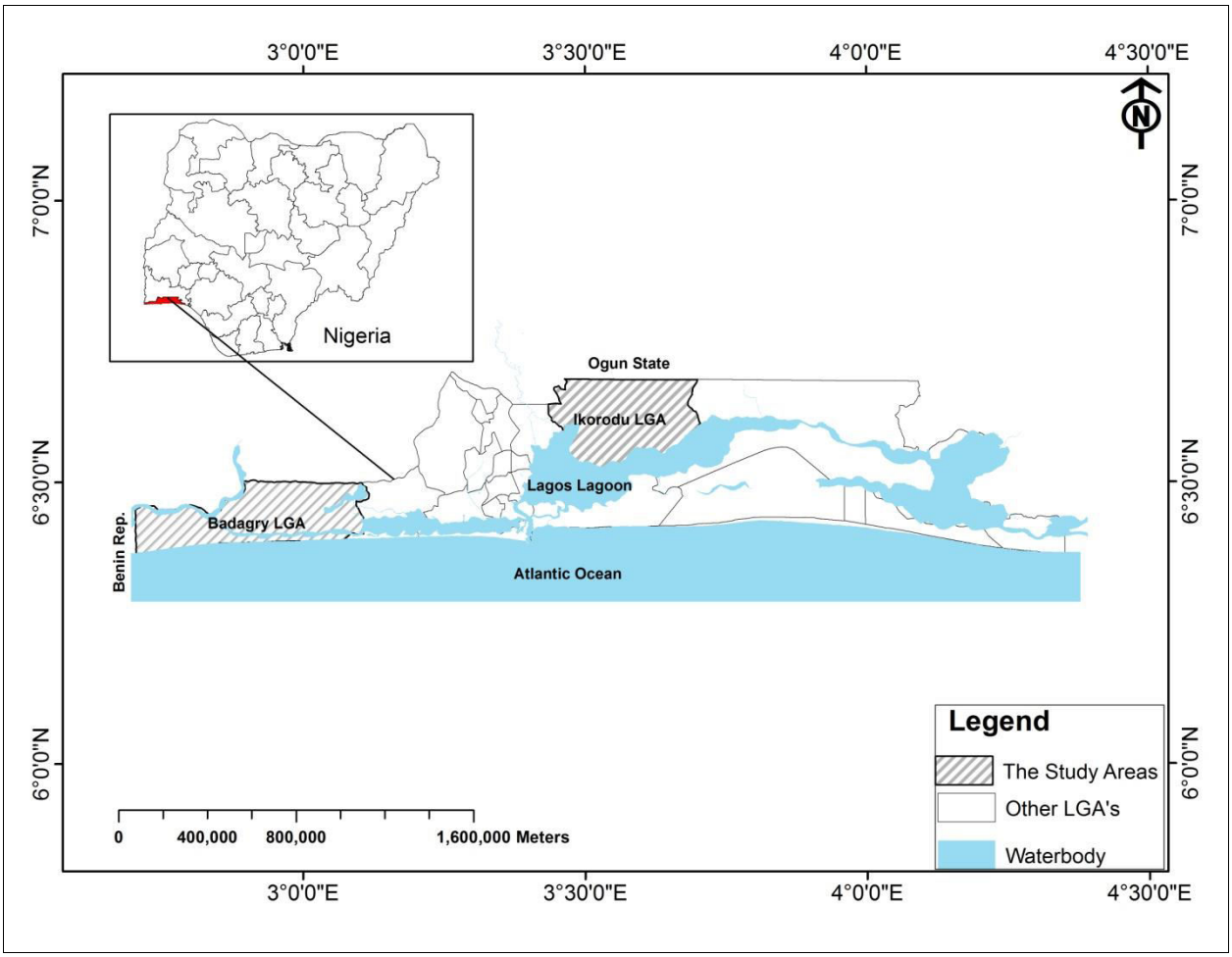


Figure 1. *The study area*

Ikorodu LGA covers an area of about 394 km^2 (Soneye, 2010) with a population of about 535,619 (NPC, 2006). The dominant ethnic group is the Ijebus with other minority ethnics like the Aworis and the

migrant fishermen from Benin Republic. The major sources of water supply include borehole, hand dug well, piped borne and the vendor provided water among others. Due to the topography of the area, depth to water table is very high in the area and consequently results in high cost of drilling or digging to access groundwater .This has implications on quantity of water consumption in the area. The major human activities that thrives in the area includes; industrial production, farming, fishing, trading among others (Balogun *et al.,* 1999).

The Lagos Water Corporation (LWC) is responsible for the public water supply provision in the state. An effort to provide potable water in the state through surface water sources at Iju, Adiyan, Ishasi, and Agbowa (River Aye) has yielded remarkable results. However, sources have suffered from pollution, increased in the cost of treatment and consequently increased water tariff, which the consumers are not willing to pay always. The water supply coverage in Lagos state comprised of 29 zonal areas. About 72.4% are located within the urban area, 20.7% are distributed around the peri-urban and 6.9% in rural areas (LWC, 2003).

Materials and methods

The data used for this research were carried out through social surveys in September 2012. A face-to-face administration of questionnaire was employed to interview household members on access to water supply in sub-urban settlements in parts of Lagos State, Nigeria. The social survey covered four sub-urban settlements each from Badagry and Ikorodu LGA's of Lagos State, Nigeria. The settlements were chosen based on their distinct geographical characteristics and the level of physical development in the area (Balogun *et al.,* 1999). Ethical approval was obtained from the ethics committee of the University. The researcher informed respondents that participation in the survey was entirely voluntary and that they were free to deny me information at any time without providing justification. Consent for data collection was obtained before questionnaire administration.

One hundred structured questionnaires were administered in each LGA totaling two hundred questionnaires in all to household's members to collect information on access to water supply in the study area using random sampling techniques. A pilot survey was conducted to ensure that the questions raised were relevant based on the objectives of the study. The survey questionnaire comprised of four sections: socio-demographic variables of households, sources of water, access to water sources and attributes of water access (i.e. distance to water source, time taken to obtain water, number of trips to the water source and quantity of water consumed per person per day). Two field assistants were trained to administer the questionnaires in the study areas while the researcher cross-checked for errors or inadequacy in the administered questionnaires after each field survey in order to ensure that the quality of data generated from the questionnaires is reliable. Data obtained from the survey were coded and imported into the Statistical Package for Social Sciences (SPSS) 17.0 version for analysis. Both descriptive and bivariate statistical analysis was employed for the data analysis. The study area map, household access to water sources and the quantity consumed/person /day was plotted using bar and pie charts with the aid of ArcMap 10 software. The results were presented in charts, maps and table format.

Results and discussion

Socio-demographic characteristics of respondents

Table 1 presents the socio-demographic attributes of the households in the study area. The proportion of the gender shows that 56.5% of the households are males while the remaining 43.5% accounts for the females. The result shows that the majority of the households members interviewed are male. The low proportion of the female compared to the male can be attributed to their occupation i.e. trading/business activities and in most cases they often leave their homes very early in the morning and come back very

late in the evening. Therefore, quite a substantial number of them could not be interviewed. In terms of marital status, 59% are married while 39.5%, 1.0% and 0.5% represents single, divorced and others respectively. In terms of age, approximately 35.5% are between 31 and 35 years, while 27.0%, 24.0% and 13.5% falls within 26 to 30, 20 to 25 and above 35 years age group. The educational status of the households shows that secondary education holders account about 63.5%, tertiary, 27.0% and primary 7.5%. The findings revealed that, the households interviewed have the requisite knowledge about access to water supply. Thus, the information obtained is more reliable (Table 1). According to the occupation of the households, it reveals that, 33.0% are engaged in trading/business. Other types of occupation accounts for 24.0%, while artisan/craftsmen, civil servant and technicians/engineers represent 23.0%, 12.5% and 7.5% respectively. About the income level of the households, about 35.0% of the households declined to declare their income while 24.0%, 21.0%, 11.0% and 9.0% earned above N30, 000, between N20, 000 to

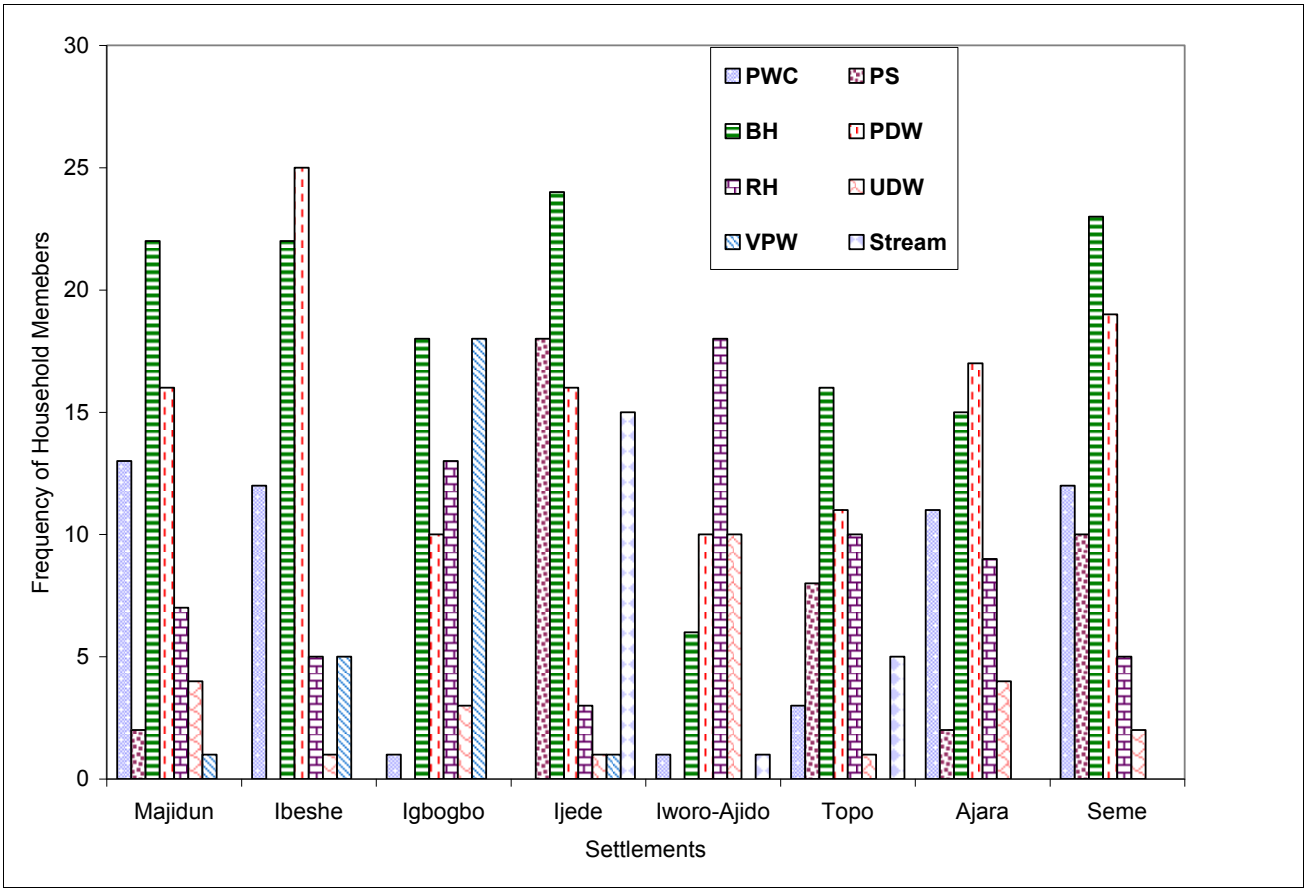
Table 1. Socio-demographic characteristics of households

Variables		Frequency	Percentage
Sex	male	113	56.5
	female	87	43.5
Marital Status	single	79	39.5
	married	118	59.0
	divorced	2	1.0
	others	1	0.5
Age	20-25years	48	24.0
	26-30years	54	27.0
	31-35years	71	35.5
	>35years	27	13.5
Education	primary	15	7.5
	secondary	127	63.5
	tertiary	58	29.0
Occupation	artisan/craftmen	46	23.0
	Civil servant	25	12.5
	Trading/business	66	33.0
	technical enginer	15	7.5
	others	48	24.0
Income	N10,000	18	9.0
	N10,000-N20,000	22	11.0
	N20,000-N30,000	42	21.0
	> N30,000	48	24.0
	no response	70	35.0
Household size	4-5	137	68.5
	6-10	56	28.0
	11-15	3	1.5
	> 15	1	0.5
	no response	3	1.5

N30, 000, N10, 000 to N20, 000 and N10, 000 per month respectively (Table 1). The household size revealed that about majority falls between 1-5 people while 28.0% houses between 6-10 people. Household size between 11-15/no response and above 15 accounts for 1.5% and 0.5% respectively.

Sources of water supply

The various sources of water supply available for households in the study area are shown in Figure 2. Across the settlements, borehole is the major source of water supply at Majidun, Ijede, Topo and Seme. At Ibeshe and Ajara the dominant water supply is protected dug well while borehole and vendor provided are the major water sources at Igbogbo. The major source of water supply at Iworo-Ajido is rainwater harvesting.



Note: PWC-Piped Water Connection, BH- Borehole, RH- Rainwater harvesting, VPW-Vendor-provided water, PS-Public standpipe, PDW-Protected dug well, UDW-Unprotected dug well

Figure 2. *Sources of water supply in the study area*

Access to improved water source

Access to improved water source in the study area shows that households from Igbogbo had the highest access with about 16.1%, followed by Iworo-Ajido (16.0%) while Seme recorded the least with 6.5% (Table 2). In terms of specific sources, rainwater harvesting recorded the highest with about 29.6%, while borehole and protected dug well had 26.7% and 22.0% respectively. In terms of household access to safe water supply (i.e. PWC and PS) in the study area, about 21.7% of the households had access to safe water supply (Table 2).

Table 2. Access to improved water source in the study area

Sources	Majidun	Ibeshe	Igbogbo	Ijede	Iworo-Ajido	Topo	Ajara	Seme	Total (%)
PWC	1.5	22.4	14.9	-	16.4	13.4	29.9	1.5	10.7
PS	-	2.9	29.0	5.8	34.8	27.5	-	-	11.0
BH	10.8	15.0	13.8	13.2	15.0	13.8	15.0	3.6	26.7
PDW	8.7	18.1	18.1	10.9	10.9	8.0	18.1	7.2	22.0
RH	12.4	10.8	12.4	11.9	13.5	13.0	13.0	13.0	29.6
Total	8.6	13.9	16.1	10.1	16.0	13.7	15.0	6.5	100.0

The bivariate analysis of the relationship between the locations and household access to safe water supply showed a dependent relationship for PWC ($\chi 2 = 66.053$) and PS ($\chi 2 = 134.860$) at p<. .000 (Table 3). The result indicates that, households from Ajara recorded the highest percentage followed by Ibeshe with respect to piped water connection. Access to public standpipe indicates that about 96%, 80% and 76% of the households from Topo, Ijede and Ajara had access respectively. It was observed that, apart from Ijede, settlements from Badagry LGA have a relatively higher access to public standpipe compared to those from Ikorodu LGA. As noted earlier, the relatively high access to safe water supply in Iworo-Ajido, Topo and Igbogbo could be attributed to the nearness of these settlements to the urban centre or major town in the study area. At Majidun, Seme and Ijede low coverage of access to safe water supply were recorded. These settlements share similar characteristics in the sense that, they are located around coastal environment. Thus, it could be inferred that, the nature of the terrain contributed to the poor coverage of piped water supply network in the area. The result was in agreement with the findings of Olajuyigbe (2010), who argued that, the city core areas had the highest rate of access to safe water with a gradual decline towards the urban periphery. This situation could make the settlements vulnerable to water borne diseases.

Table 3. Bivariate analysis of household access to safe water supply across the settlements

Location	Access to PWC			Access to PS		
	Yes	No	Chi-square	Yes	No	Chi-square
Majidun	1(4.0)	24(96.0)		0(0.0)	25(100.0)	
Ibeshe	15(60.0)	10(40.0)		0(0.0)	25(100.0)	
Igbogbo	10(40.0)	15(60.0)	X^2=66.053, p< 0.000	2(8.0)	23(92.0)	X^2=134.860, p< 0.000
Ijede	-	25(100.0)		20(80.0)	5(20.0)	
Iworo -Ajido	11(44.0)	14(56.0)		4(16.0)	21(84.0)	
Topo	9(36.0)	16(64.0)		24(96.0)	1(4.0)	
Ajara	20(80.0)	5(20.0)		19(76.0)	6(24.0)	
Seme	1(4.0)	24(96.0)		0(0.0)	25(100.0)	

The patterns of household access to improved water source in Badagry and Ikorodu LGAs are presented in Figures 3 and 4. The patterns of household access to improved water source in Badagry LGA revealed that, Iworo-Ajido recorded the highest access to the available improved source followed by Topo whereas at Ajara, access to PS is low. At Seme, access to improved water source revealed that RH and PDW are the most prominent sources. The observed low access to improved water sources at Seme, a border town between Nigeria and the Republic of Benin is a clear indication of the lack of basic amenities in most developing countries especially along the borders of West African countries (Fig. 3).

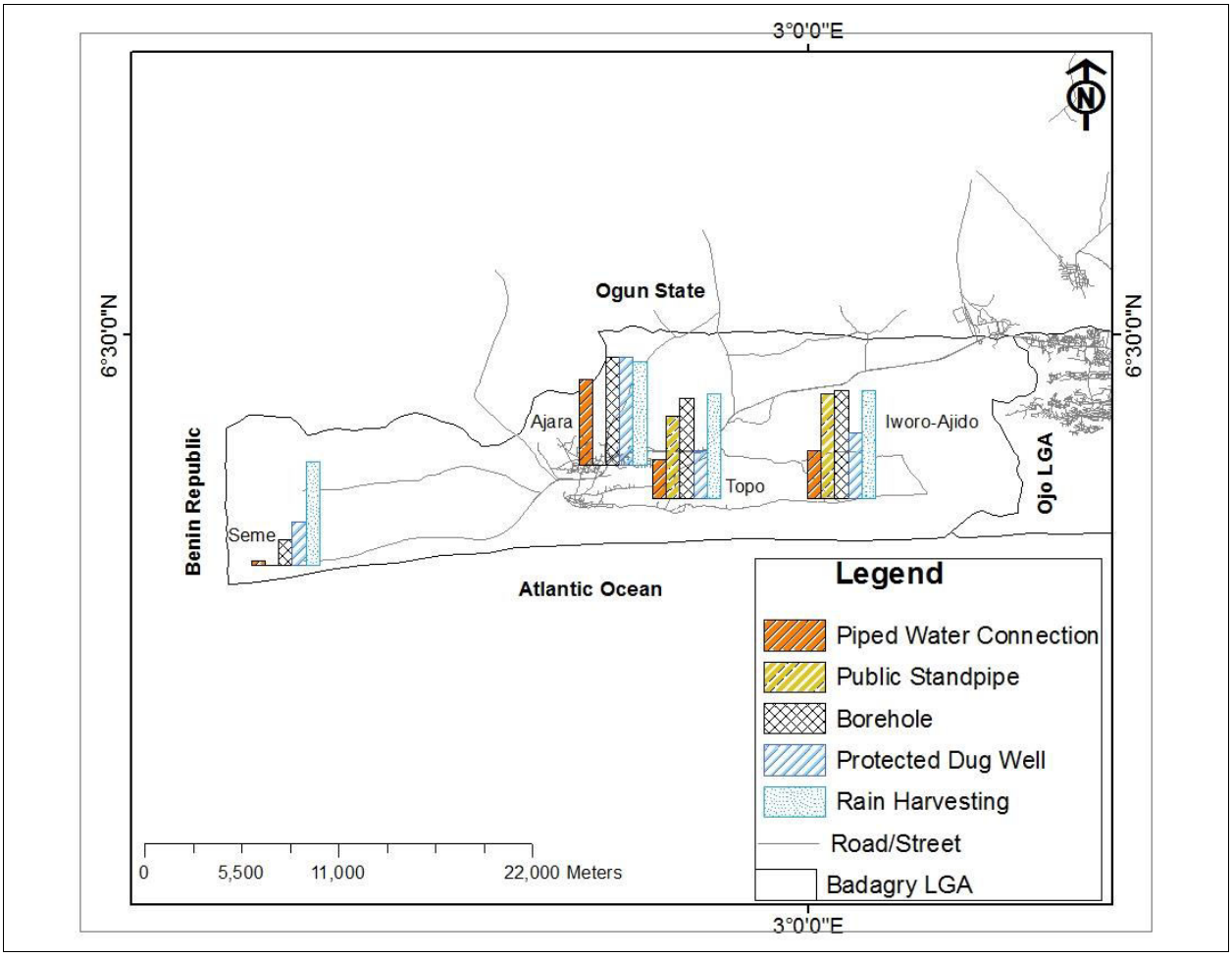


Figure 3. *Patterns of household access to improved water source in Badagry LGA*

The patterns of household's access to improved sources in Ikorodu LGA (Fig.4) revealed that, Igbogbo has the highest access to all the improved sources followed by Ibeshe. However, it was noted that, Ibeshe has poor access to PS. The remaining two settlements, Ijede and Majidun which incidentally share similar geographical characteristics indicate that, BH, PDW and RH are the prominent improved sources household has access to in the areas.

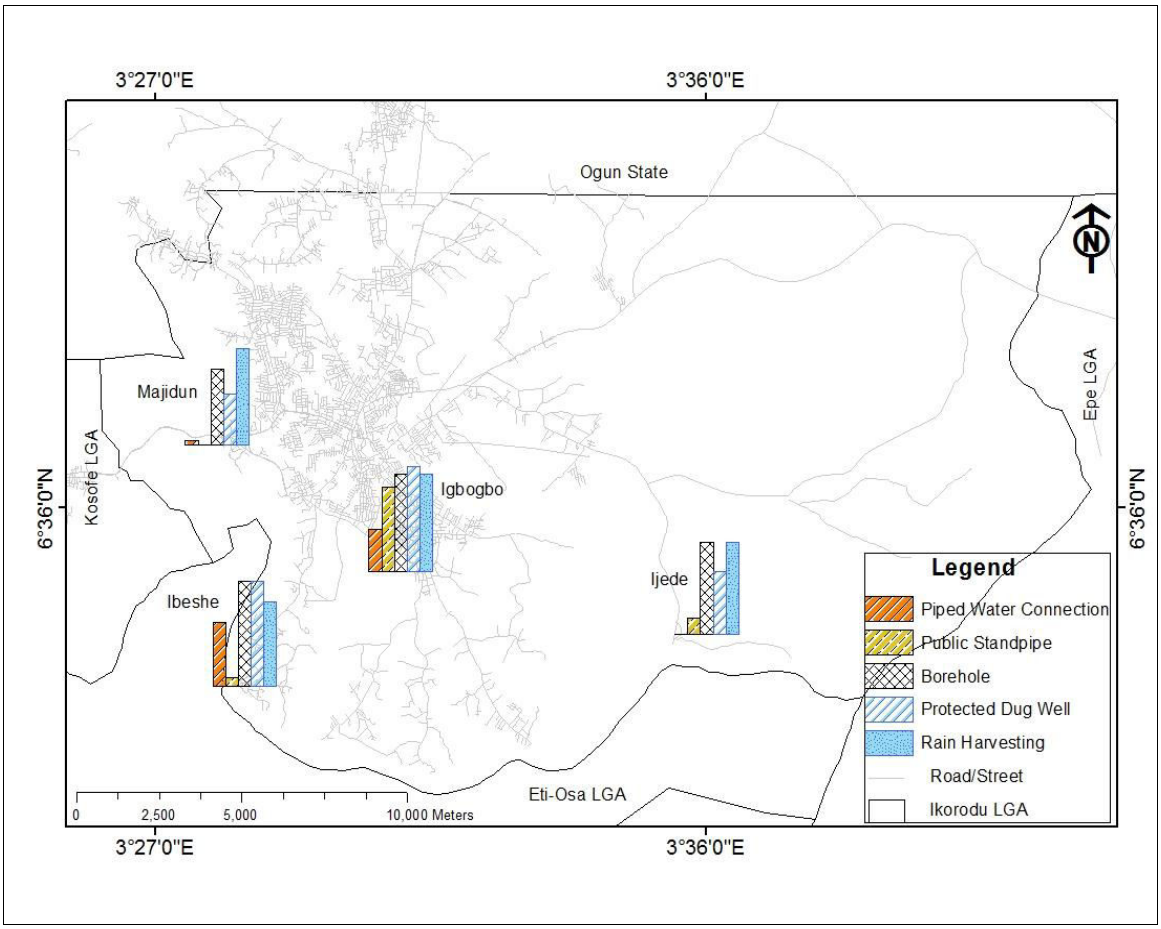


Figure 4. *Patterns of household access to improved water source in Ikorodu LGA*

Distance to sources of water

Access to sources of water according to distance revealed that approximately 60% of the households have access to water within household in the study area (Table 4). In terms of distance to a specific source, 23.2%, 21.4% and 17.2 % of the households in the study area have access to rainwater harvesting, borehole and protected dug well respectively (Table 4). The implication of this is that, water supply sources are within the minimum distance established by the WHO/UNICEF (2004) in the area. Longer distance to water source might affect the quantity of water available for household use and consequently loss of productive hours.

Table 4. Average distance to sources of water in the study area

Distance	PWC	PS	BH	PDW	RH	UDW	VPW	Stream	Total (%)
WH	89.7	1.4	35.9	79.4	98.9	5.7	75.9	1.9	60.0
<100m	10.3	59.4	31.8	15.4	1.1	2.9	19.0	38.5	20.3
200-300m	-	36.2	31.8	5.1	-	65.7	3.8	59.6	18.0
1-1.5km	-	2.9	0.6	-	-	25.7	1.3	-	1.6
Total	8.6	8.7	21.4	17.2	23.2	4.4	10.0	6.6	100.0

WH-within household

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Average time spent

Household access to water based on the time taken show that about 79.8% of the households spend less than 10 minutes to obtain water in the study area (Table 5). According to a specific water source, rainwater harvesting, borehole and protected dug well recorded relatively high access with corresponding percentage of 22.8%, 20.8% and 17.8% respectively. According to WHO/UNICEF (2004) maximum benchmark of 30 minutes, it could be inferred that greater proportions of the households have access to water supply sources in this wise.

Table 5. Average time spent fetching from water sources in the study area

Time (minutes)	PWC	PS	BH	PDW	RH	UDW	VPW	Stream	Total (%)
<10	98.5	73.6	74.5	92.2	99.4	92.4	12.8	6.1	79.8
10-20	1.5	26.4	24.8	6.4	0.6	7.6	61.5	57.1	16.2
21-30	-	-	0.6	1.4	-	-	25.6	36.7	3.9
Total	8.6	9.1	20.8	17.8	22.8	9.9	4.9	6.2	100

Average number of trips

The number trips to collect water by households are presented in Table 6. The result shows that only 42.7% of the household have access according to the number of trips in the study area. More than 50% of the households do not have access in this wise. The situation can be explained based on the premise that the majority of the household members usually embark on several trips to fetch water simply because they are not sure of regular supply. These households are likely to be those without a water source within their households.

Table 6. Average number of trips to sources of water

No of trips	PWC	PS	BH	PDW	RH	UDW	VPW	Stream	Total (%)
1 trip	-	16.9	7.7	1.9	14.5	3.3	19.4	26.7	10.1
2 trips	47.8	15.4	14.7	6.5	32.9	1.6	13.9	26.7	16.4
3 trips	8.7	15.4	14.7	18.5	30.3	16.4	2.8	6.7	16.2
		7.7							
			WHO maximum benchmark = 3trips						
4 trips	43.5		9.1	13.9	10.5	14.8	33.3	2.2	13.1
5 trips	-	44.6	53.8	59.3	11.8	63.9	30.6	37.8	44.2
Total	4.1	11.7	25.7	19.4	13.6	11.0	6.5	8.1	100.0

Quantity of water consumed per/person/day

The patterns of household access to the quantity of water consumed per capita per day in Badagry and Ikorodu LGAs is shown in Figures 6 and 7. According to WHO benchmark put at 20 litres show that about 62.1% of the households have adequate access to water supply for various uses. It was observed that about half proportion of the households representing 52.6% have access to at least 30-40 litres of water per capita per day (Figs.6 and 7). Though 50% of the households gained access to adequate water supply, there is a need for improvement in water supply in these settlements by the concerned agencies especially the Lagos Water Corporation (LWC) by extending water supply coverage to the suburb within the state. Similarly, it was observed that approximately 37.9% of the households in the study area

consumed below the minimum benchmark for water consumption by WHO for various purposes. This situation is very prominent at Seme, Ibeshe, Ajido/Topo/Ajara with about 17.5%, 15% and 13.8% respectively (Figs. 6 and 7). Access to adequate water consumption is vital to improve the sanitation and hygiene status of the households and consequently reduce the incidence of water borne diseases.

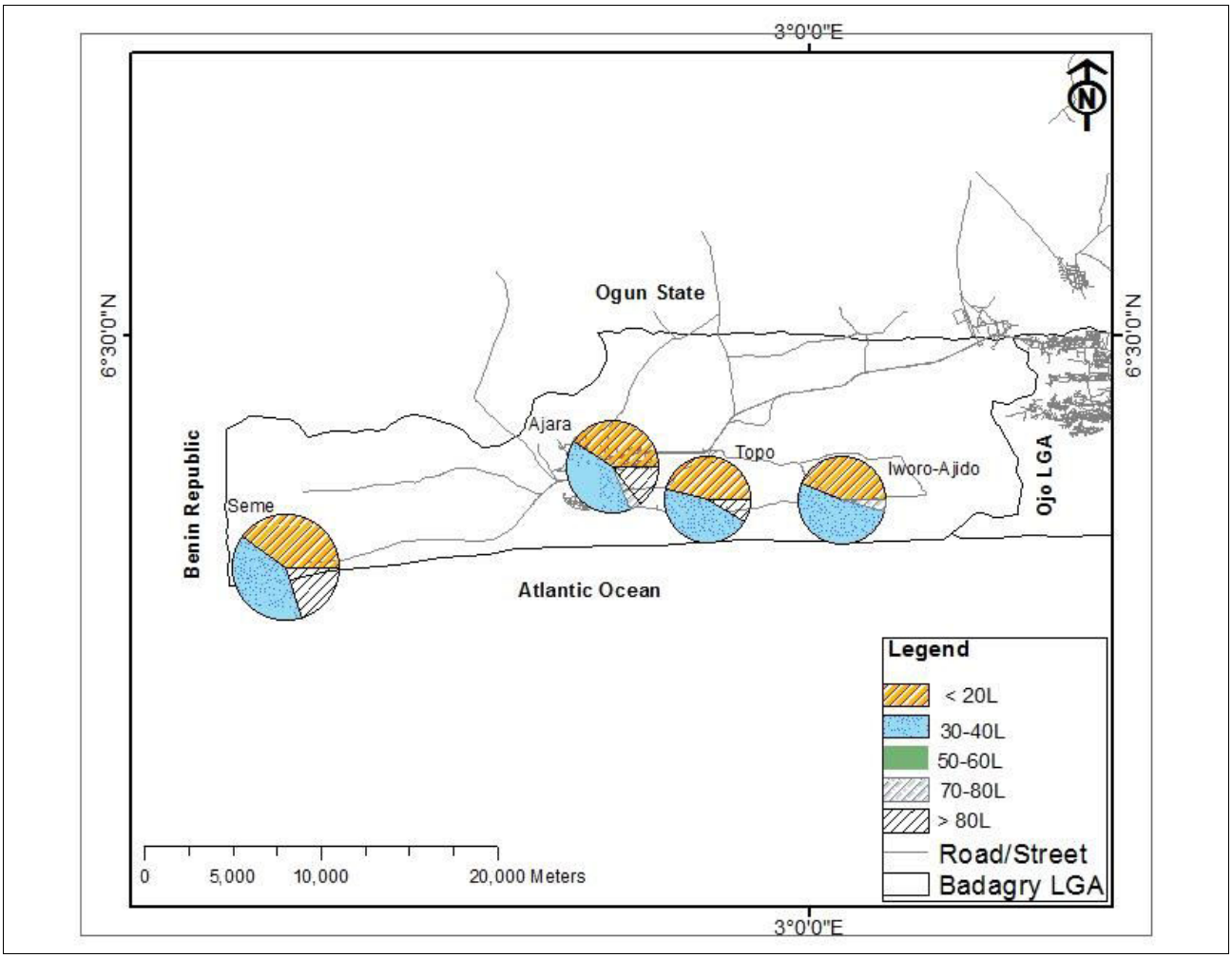

Figure 6. *Household water consumption pattern/ person/day in Badagry LGA*

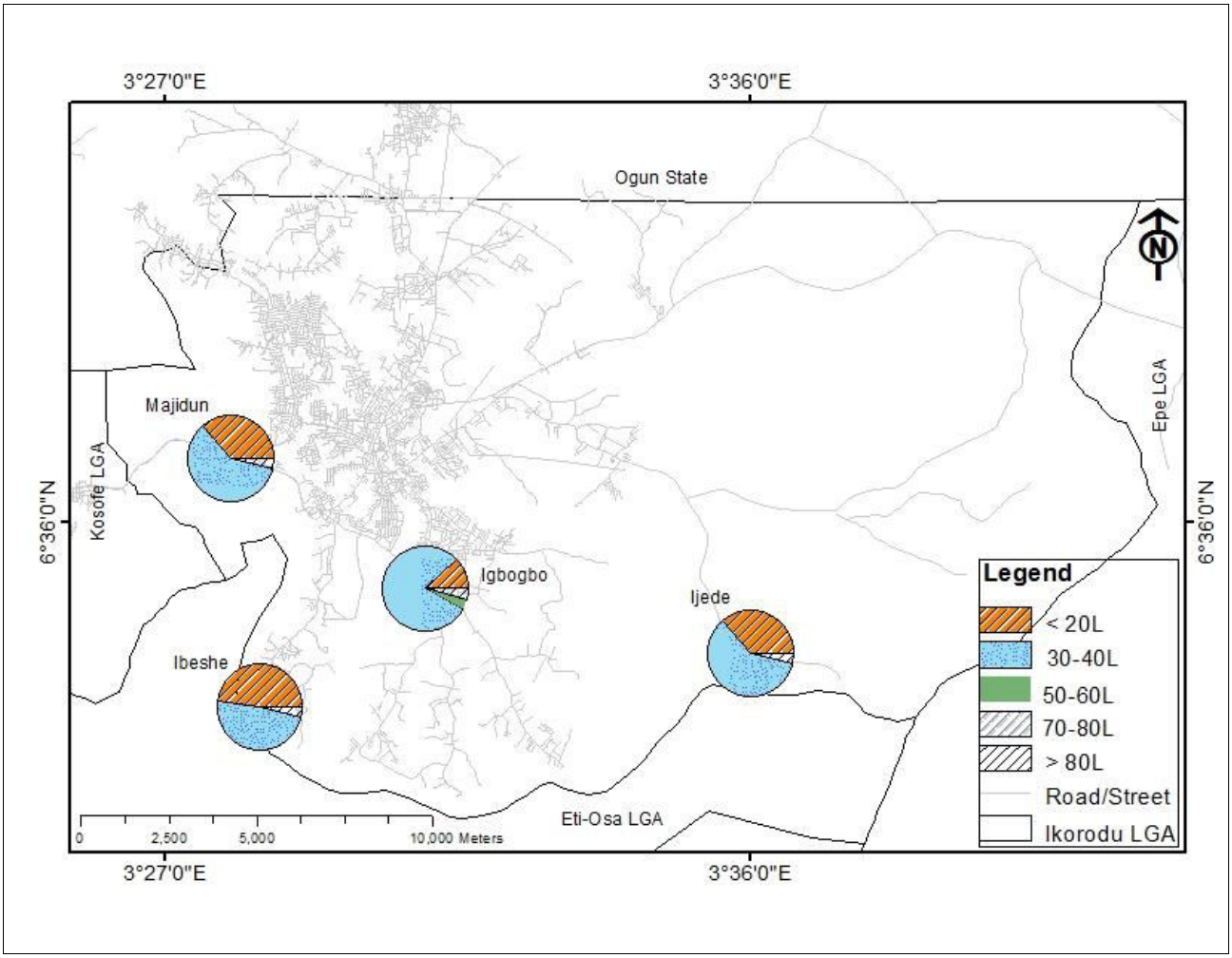

Figure 7. *Household water consumption pattern/ person/day in Ikorodu LGA*

As indicated in Table 7, household water consumption (Lpcd) in the study area is significantly influenced by the cost incurred on the purchase of water (X^2=32. 203 p< 0.000). The breakdown of water consumption indicates that, half of the households consume below the minimum benchmark of 20L stipulated by WHO. About three-quarter of the household spend between N300–N500 per day on water consumption within the range of about 30-40 litres (Table 7).

Table 7. Analysis of costs incurred on water and consumption (Lpcd)

Cost in Naira	< 20L	30-40L	50-60L	70-80L	>80L	Chi-square
<N200	73(50.0)	58(39.7)	0	2(1.4)	13(8.9)	
N300-500	7(17.5)	29(72.5)	1(2.5)	0	3(7.5)	X^2=32.203
N600-800	0	10(100.0)	0	0	0	p< 0.000
>N1,100	0	1(50.0)	0	0	1(50.0)	

Conclusion

Borehole is the main source of water at Majidun, Ijede (Ikorodu LGA), Topo and Seme (Badagry LGA). At Igbogbo in Ikorodu LGA, borehole and vendor provided are the major sources. Protected dug well constitute the main source at Ibeshe (Ikorodu LGA) and Ajara (Badagry LGA) while rainwater harvesting is the major source at Iworo-Ajido (Badagry LGA). Access to improved sources of water in the study area revealed that, Igbogbo recorded the highest access with about 16.1%, followed by Iworo-Ajido (16.0%) while Seme had the least with 6.5%. In terms of specific sources, rainwater harvesting recorded the highest with about 29.6%, while borehole and protected dug well had 26.7% and 22.0% respectively.
Household access to safe water supply in the study area, indicate that about 21.7% of the households had access to safe water supply. The relationship between the locations and household access to safe water supply revealed that access to safe water supply was influenced by the location with households from Ajara having the highest proportion of piped water connection while household from Topo recorded the highest with respect to public standpipe. The patterns of household access to improved water source in Badagry LGA revealed that, Iworo-Ajido has the highest access, whereas in Ikorodu LGA, Igbogbo recorded the highest access.

Access to water according to distance revealed that 60% of the households have access while, in terms of distance to a specific source, about 23.2%, 21.4% and 17.2 % of the households have access to rainwater harvesting, borehole and protected dug well respectively. Household access to water based on the time taken show that about 79.8% of the households spend less than 10 minutes to obtain water in the study area. Household's access to water based on the number trips to collect water indicates that only 42.7% of the household have access. On the patterns of household access to the quantity of water consumed per capita per day, about 62.1% of the households gained adequate access in the study area with the majority of the households using at least 30-40 litres of water per capita per day. A greater proportion of households from Seme, Ibeshe, Ajido /Topo/Ajara consume below the WHO benchmark of 20L/day. The relationship of household water consumption was found to be significant and is influenced by the cost incurred on the purchase of water. The study concluded that access to safe water supply is low in the area. Rainwater harvesting technology, extension of piped water connections and public standpipe for safe water supply provision to the suburb settlements so as to reduce man-hour loss in sourcing for water and consequently reduce the incidence of water borne diseases was recommended.

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