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Households Socio-Economic Characteristics And The Level Of Accessibility To Water In The Low-Income Areas Of Lagos Metropolis

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ABSTRACT

The paper assessed socio-economic characteristics of households in the low income area of Lagos Metropolis and the effects on potable water accessibility. Hence, water is central in maintaining good living condition and maintenance of residential building facilities. Such demographic variables that were examined include gender, occupation, education, household size, marital status, income, water facility assets and location. The essence was to establish whether there is relationship between these variables and, quantity and quality used by different households for their domestic activities, such as cooking, drinking, washing, bathing, toileting and general environmental sanitation. Using multistage sampling method, 1,532 households were successfully investigated. Both descriptive and inferential statistical analyses were used, where ANOVA, chi-square and Pearson Correlation Coefficient were employed to test the relationships and effects of some households' variables on the quantity and quality of water used. The paper discovered that there are relationships between some demographic variables and quantity of water used by households. Both water facilities used and household's residential location have significant effect on the households' perceptions on the quality of water they used. It was based on these findings the paper suggested improvement in the socio-economic status, particularly education and income on the need to use adequate quantity and good quality of water. Hence, income status was identified having a significant effect on water consumption capacity to meet the water quantity to be consumed, recommended by WHO and Lagos State, for healthy living and good environmental sanitation. In order to change the perception of households on water quality from the available sources, there is need for the government to ensure water quality control.

INTRODUCTION

Water is central to life, as it is very important to all human activities; may it be social or economic. It is very important in maintaining good hygiene and maintaining facilities in any residential building, such as kitchen, laundry and toilet facilities. In order to keep housing environment clean, specifically the drainage system, there is need to have adequate access to water. Due to this broad importance of water to human life WHO (2004) recommends minimum use of 50 litres of water per capita per day (Reed, 2014), while Lagos State Policy on water (2010) recommends 60 litres for peri-urban dwellers, 100-120 litres for urban dwellers. This global and regional attention explains further the importance of water to mankind.

Equitable access to safe drinking water is also essential for achieving gender equity, sustainable development, poverty alleviation and fighting against child labour, thereby helps to

remove different types of vulnerability that are associated to limited access to water facilities. In most cultures, women and their younger children are primarily responsible for the use and management of household water resources, obliged to walk many hours every day fetching water for household use (Akpabio, 2012). However, in the plight to provide water to serve the need of people, users' satisfaction must be considered very important.

However, water satisfaction needs to meet certain criteria, in the area of quality, quantity, water facilities location, cost of procurement, distance and time required to gain access (Liangxin et al, 2014). It is when these criteria are favourable, water services can be said to have met users' satisfaction. The WHO (2004) has come up with some criteria or what may be regarded as standards to govern water provision. This helps to assess the extent is the water provision within a geographical location met the water needs of the users, within the global framework.

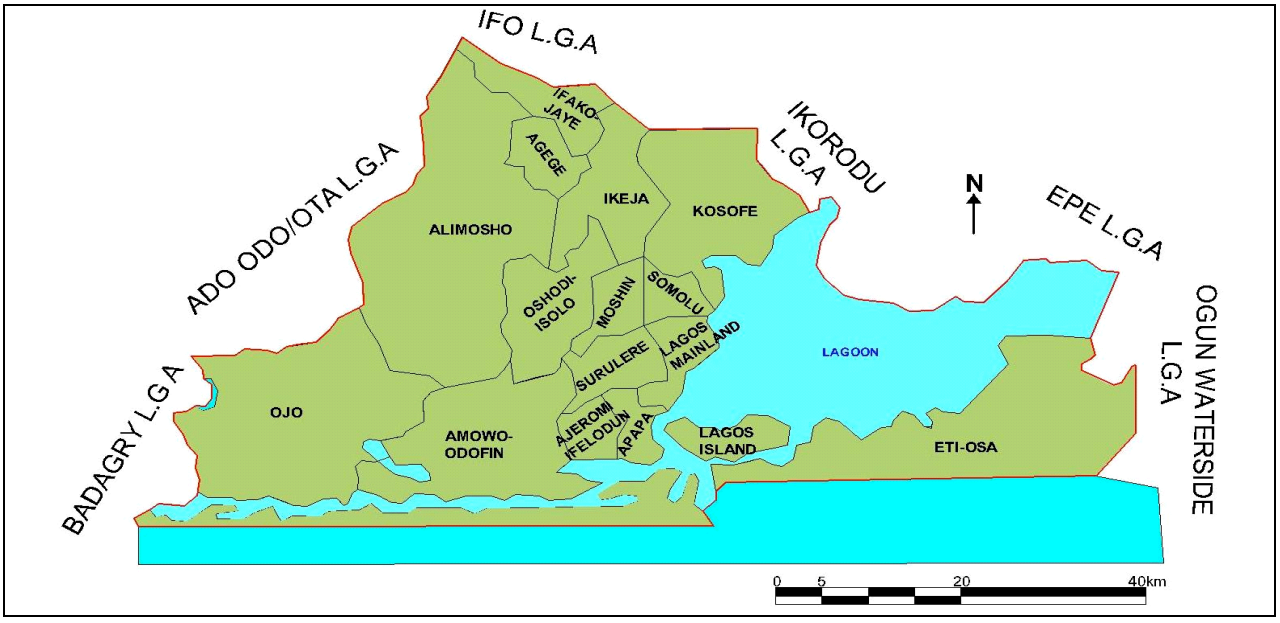
Water accessibility has become a great challenge; the extent varies from urban area to another and from rural to urban. Globally, it has been discovered that 884 million people were without access to improved source of drinking water, out of which 348 million were from Africa (WHO & UNICEF, 2010). In the developing countries, within a single urban area, there has been a wide disparity in the level and quality of water provision. This implies that in these countries, disparity in water provision is as a result of disparity in spatial location. It is a situation, where the rich who reside in a planned area enjoy adequate supply of pipe borne water; their counterparts in the unplanned area got the water from unprotected source (Akpabio, 2012; Oyegoke et al, 2012).

Due to limited accessibility to safe drinking water, as explained here, it was realised that a concerted effort has to be made to address this challenge. According to Singh (2008), concern about water-related problems has long existed but it came to the forefront only in 1977 when the UN brought water issues to the global arena. Hence, provision of qualitative and quantitative water became global agenda, and became part of Millennium Development Goals (MDG) target in 2000. This has been reinforced by the formulation of Sustainable Development Goals (SDGs) in 2015, where water became goal 6. Although, some countries have made a good move toward achieving the MDG target on water, some countries are still lagging behind.

This paper highlights some socio-economic characteristics households in the low income area of Lagos Metropolis, assessed the effects on the quantity and quality of water used by these households. However, water facilities available to the households were assessed in order to determine the challenges faced in accessing water to carry out house choirs.

THE STUDY AREA

Lagos Metropolitan Area is located in the core of Lagos State, comprises a group of islands endowed with creeks and lagoons. As at 2006, the Metropolitan area has expanded to cover 16 local governments (National Bureau of Statistics, 2007). It shares boundaries with Epe and Ikorodu local governments in the south-east and north-east respectively. In the west, it shares boundaries with Ado-Odo/Ota and Badagry Local Governments, and Ifo in the north and Atlantic Ocean in the south. See Fig 1.



Source: Field Work (2014) Using www.lagosstate.gov.ng
Fig 1: Map of Lagos Metropolitan Area

The population of Lagos Metropolis grew from ….. in 1973 to 7,937,932 in 2996, with a population density of 7,938 persons per km^2 (National Bureau of Statistics, 2007). The rapid increase in the Lagos population has a significant impact in the rise in water demand. Hence, the challenge of water accessibility is becoming alarming, because of the population growth and its dynamic characteristics. Lagos State Government (2017) averred that the state required 720 million gallons of water per day, against 201 million presently supply per day by the government. This implies that there is shortfall of 500 million gallons per day in water supply, which have been left in the hand of individual households, who might have relied in water from unprotected sources.

LITERATURE REVIEW

According to UN-Habitat (2003), water sources fall into three main categories; these include rainwater, surface water and groundwater. Hence, UN-Habitat (2006) identified three main methods through which a household can get access to public water service, these include standpipes or public tap, yard and house connections. Other common methods in developing countries include dispensing by water tanker, vendor using small container like bucket and keg, and water provision through digging of borehole and deep well (WHO, 2011; AFRODAD, 2013; Okwere et al, 2015).

Oyegoke et al (2012) noted that water supply to different households in Lagos metropolis is dominated by water vendors, because of their socio-economic status. It was on this basis Mughogho and Kosamu (2012) argued that most of the urban population, especially in the unplanned areas relies on small scale informal service providers, where such arrangement poses such challenges as poor quality, unreliable and intermittent water supply. Similarly, Akpan (2005) discovered that households in Apapa/Iganmu, Alimosho, Shomolu, Ajeromi Ifelodun areas primarily depend on vendor to access potable water. Drinking water from this source is very risky, because of the unhygienic way in which the water is handled.

Different studies have shown that low income household size in Lagos is very large, ranges between 3-10, mostly live in cramped and congested houses (Fagbohun, 2007; Lagos Bureau of Statistics, 2010), where demand for water for consumption and sanitation is in the increase, without correspondent increase in supply. This makes the residents to rely on alternative

water provision, such as vending, self-help approach, such as digging of borehole, well, and the use of rainwater.

In accessing potable water facilities, residential location of the vulnerable people becomes determinant factor of how long they must travel and how much they will pay to get water (UN-Habitat, 2011). The daily time spent to travel to get water, because of poor access to public water is a form of social alienation from public water. Due to unsatisfactory provision and distribution of water facilities, UN Water (2013) noted that sub-Saharan Africa women and girls spend 40 billion hours in a year collecting water (up to 6 hours every day).these waste hours have been identified to be equivalent of a year's worth of labour by the entire workforce in France. From this social viewpoint, urban vulnerability to public water facilities is a situation of inequality and lack of opportunities to overcome problem of accessibility (Berthe, 2014). In the case of low income area of the city, it is a situation where residents are excluded from having access to drinking water, unlike their counterpart in the well paved area.

Potable water services that would meet the need of the low income are expected to have some social attributes that would enable this water to be provided at short long distance and low cost in a continuous manner, thereby increase the consumption capacity (Amori et al, 2012). Bourque (2010) averred that central to the debate on water as a good its position as a public good cannot be overemphasised. Bourque (2010) defined public good as: non-rivalrous; i.e. others are not deprived from its use by another person; non-excludable; i.e. it is impossible to restrict others' consumption of this good if one person consumes it; and non-rejectable – one is unable not to use this good.

According to Osei-Asare (2004), water quality perception may contribute to household health problem. It was based on this a water of good quality, according to UN-Habitat (2011) is expected to be uncontaminated and should be water from improved sources from the following: piped water into dwelling yard, plot, public tap, standpipe, tube well, borehole, protected well, protected spring and rain water collection. Hence, majority of households in the low-income areas lack this type of eater because of the nature of their socio-economic characteristics (WHO&UNICEF, 2010). Succinctly put, water that will satisfy the need of households should meet some quantitative criteria. The WHO (2004) recommended 50 litres per capita per day (Mbuvi, 2012). Lagos State in its 2010 policy on water recommended 30-120 per capita per day: 30litres for rural, 60litres for peri-urban and 100-120litres for urban. But only few number of households were able to meet up with this recommended quantity

RESEARCH METHODOLOGY

Multistage sampling method was adopted for this study. The study area was divided into 4 equal parts, comprising 4 local governments (LGAs) each. However, 4 LGAs were sampled, 1from each division. The sampled LGAs include Lagos Mainland, Ajeromi-Ifelodun, Shomolu and Agege. In order to ensure the target population was actually studied, low income areas of Lagos Metropolis were identified using the existing political wards, created by Independent Electoral Commission in 1998. These were of three categories, based on their densities, such as low, medium and high. High density wards that are commonly occupied by the low-income were identified from the 4 selected LGAs. This accounted for 21 in number. It was from this, 12 were proportionally sampled from each LGA. However, 1,542 households were systematically sampled from these 12 sampled wards for questionnaire survey. Inspection survey was conducted on the water facilities of the sampled households. Descriptive and inferential analyses such statistical tests, as Kruskal Wallis median, Chi-square, Pearson Correlation and ANOVA tests were conducted. Tables and maps were used to summarize the data.

DATA ANALYSIS AND DISCUSSION

This section is divided into three parts. The first part assesses socio-economic characteristics of the study area households, section two assesses challenges of households' accessibility to water, while the last part analyses relationship between the socio-economic variables assessed in the first section with the water quantity and quality variables, as in second section.

Socio-Conomic Characteristics Of Households

The study assessed 7 major households' socio-economic characteristics, which include gender, occupation, educational qualification, marital status, income, household size, households' occupancy per building and type of water facility used. It was discovered that there were 50.5% males and 49.5% females, with little variation among the 12 sampled wards.

The study found, as in Table 1 that 62.9% of the respondents were married, 30.7% were single, while 4.2% were either divorced or separated. The study further discovered that 2.2% were either widows, or widowers. Hence, there was variation in the marital status among the 12 sampled political wards, where Fadeyi, (77%) has the highest proportion; Oniwaya (46.3%) has the lowest.

The study discovered, as shown in Table 1 that 5.4% of the respondents have no formal education, 11.8% and 47.8% have primary and secondary school education respectively. However, 34.7% of the respondents have tertiary education, such as university, polytechnic and college of education. In overall, 94.31% of the respondents from the 12 sampled political wards have minimum primary school education, with little variation among the sampled wards. For instance, Oniwaya has 2.3% and 12.2% of its respondents in no formal education and primary education respectively, its counterpart Papa Ashafa has 16.7% and 38.6% in the 2 respective education categories.

Table 1: Marital Status and Education Qualification

Marital Status										
Married		Single		Divorce		Separated		Widow/ Widowed		Total
Freq	%	Freq	%	Freq	%	Freq	%	Freq	%	Freq
964	62.9	471	30.7	39	2.6	24	1.6	36	1.2	1532
Education Qualification										
Informal Education		Primary		Secondary		Tertiary		Total		
Freq	%	Freq	%	Freq	%	Freq	%	Freq		
82	5.4	181	11.8	737	47.8	532	34.7	1532		

Source: Field Survey (2015)

Occupation of the population of the study area was grouped into 7, based on their relevance to this study. As it can be deduced from Table 2, the study revealed that 28.1% of the respondents were in to teaching and other salary jobs, 25.5% were artesian, while 14.3% were traders in food stuff and other farm products. It was further discovered that 10.9% were traders in manufactured or finished goods, 2.4% were sanitary and laundry service providers, while 5.0% were into catering. It was identified by the study that 15.1% were into different other occupations, such as driving, house help, apprenticeship and study, with variation among the 12 sampled wards. Bariga has 41.1% of its respondents into teaching and other salary occupation, while Alaba Amukoko has the least, 9.35%.

Analysis on household income indicates that 20.8% of the respondents' households earned ₦ (10,000-17,000), while 47.5%, 17.8% and 7.1% earned ₦ (18,000-50,000), ₦ (51,000-100,000) and ₦ (101,000-150,000) respectively. On the other hand, 4.3% of the respondents'

households earned ₦ (151,000-200,000). The analysis further shows that the same percentage, 1.3% of the households earned ₦(201,000-250,000) and ₦(251,000-300,000) per month. However, 0.6% earned more than ₦ 300,000 per month. This implies that not all the households living in the low income area of the Metropolis are low income earners.

Table 2: Occupation of Respondents and Household Monthly Income

Occupation	Freq.	%	Income in Naira	Freq.	%
Teaching & Office Works	413	28.1	10,000-17,000	318	20.8
Artesian	390	25.5	18,000-50,000	728	47.5
Trading in Food Stuff	219	14.3	51,000-100,000	273	17.8
Trading in Finished Goods	167	10.9	101,000-150,000	108	7.1
Sanitary & Laundry	036	2.4	151,000-200,000	66	4.3
Catering	076	5.0	201,000-250,000	20	1.3
Others	231	15.1	251,000-300,000	20	1.3
Total	1532	100	>300,000	9	0.6
			Total	1532	100

Source: Field Survey (2015)

However, Table 3 shows the average monthly income of the sampled household heads for each of the 12 sampled political wards and the study area. Tolu Ajegunle has the least household average monthly income of (N32, 220), followed by Oniwaya (N32,300), Alaba Amukoko (N33,560), Iddo-Otto (N55,100), while Orile Agege, Okekoto and Olodi Apapa has N52,040, N55,600 and N56,120 respectively. It was Fadeyi (N98, 960) that has the highest household head average monthly income, while the study area has N63, 470. Using Kruskal-Wallis Median test by ranking, the study found that there is significant difference in household monthly income distribution among the 12 sampled wards, with value (189.398) at 11 degree of freedom,$(0.000< \alpha=0.05)$significant test. Since this value is $<\alpha=0.05$, it can therefore be concluded that at least one household head income median of one political ward is different from the household head income median of at least one other political ward. This implies that there is significant difference in the households' heads monthly income distribution among the 12 sampled wards ($\alpha=0.05$).

Table 3: Average Household Head Monthly Income, Household Size and Household Occupancy

Wards	Household Head Monthly Income		Household Occupancy per Building		Household Size	
	MA Score	Income (₦)	MA Score	Occupancy	MA Score	Size
Oniwaya	1.85	32,300	4.15	10	2.74	6
Papa Ashafa	2.69	85,190	3.16	8	2.78	6
Okekoto	2.11	55,610	3.57	8	2.69	6
Orile Agege	2.04	52,040	4.05	10	2.73	6
Bariga	2.80	90,800	3.54	8	2.89	6
Bajulaiye	2.32	66,320	3.26	8	2.62	6
Fadeyi	2.96	98,960	2.98	6	2.73	6
Makoko	2.76	88,766	3.32	8	2.86	6
Iddo/Otto	2.10	55,100	3.79	8	2.97	6
Tolu Ajegunle	1.79	31,220	4.65	10	3.11	7
Alaba Amukoko	1.92	33,560	4.74	10	2.92	6
Olodi Apapa	2.12	56,120	4.50	10	2.90	6
Study Area	2.31	63,470	3.80	9	2.85	7

Source: Field Work (2015)

Household Occupancy per Building

The study revealed the number of households that were residing in each of the residential buildings of the sampled households. From Table 7, it can be deduced that 4.9% of the residential buildings were occupied by (1-2) households, while 20.3% were occupied by (3-4) households. However, 21.0% were occupied by (5-6) households, while 16.9% were occupied by (7-8) households. On the other hand, 15.8% were occupied by (9-10), while 21.2% were occupied by 11 and above.

Table4: Household Occupancy per Building

Occupancy/Building	1-2	**3-4**	**5-6**	**7-8**	**9-10**	≥11	Study Area
Frequency	**79**	**311**	**321**	**259**	**242**	**324**	**1532**
Percentage	**4.9**	**20.3**	**21.0**	**16.9**	**15.8**	**21.2**	**100.00**

Source: Field Survey (2015)

Table 3 shows variation in the average household occupancy per building among the 12 sampled political wards. In a situation, where 5 wards, such as Oniwaya, Orile Agege, Tolu Ajegunle, among others have the same average household of 10 persons per building, 6 wards, including Papa Ashafa, Okekoto, Bariga, Bajulaiye, Makoko and Iddo-Otto have 8. Fadeyi, on the other hand has 6. Using Kruskal-Willis Median test by ranking, the study discovered that there is statistical significance difference among the 12 political wards in the number of household occupancy per building (α=0.05): (203.62) at 11 degree of freedom, (0.000< α=0.05) significant test.

Household Size

Table 5 shows that 10.1% of the sampled households have 1-2 as their household size, while 29.3%, 35.7% and 18.35 have 3-4 and 5-6 respectively. It was also found further that 34% have 9-10, while it was only 3.2% that have 10 members as their household size. The average household size, as shown in Table 3, indicates that all the sampled political wards have the same size of 6 members, except Tolu Ajegunle that have 7. A statistical test using Kruskal-Willis Median test by ranking shows that there is significant difference in the household size distribution among the 12 sampled wards: (33.864), at 11 degrees of freedom (0.000<0.05) significant test. Therefore, there is significant difference in the household size among the 12 sampled wards of the study area (α=0.05).

Table 5: Household Size

Household Size	1-2	3-4	5-6	7-8	9-10	≥11	Study Area
Frequency	154	499	547	281	521	49	1532
Percentage	10.1	29.3	35.7	18.3	34.0	3.2	100.00

Source: Field Survey (2015)

Challenges In Accessibility To Water Based On Variations In Socio-Economic Characteristics

Types of Water Facilities and Level of Coverage

As shown in Table 6, the study identified 3 main types of water facilities, which include pipe water; other public water and alternative to public water facilities were identified. Both other public and alternative to public water facilities are similar, which include boreholes and wells. The only difference is the provider, such as the government, philanthropists, the NGO and religious organisations. Others include the landlords, households or property owners. There

was alternative drinking water, provided by the organised private sector, such as sachet nylon pure water, plastic bottled water and dispenser machine bottled water.

The study discovered, as shown in Table 6 that out of 1,532 sampled households, 412, which accounted for 26.9% of the sampled size have access to pipe water, while 454, which accounted for 29.64% have access to water from other public water facilities. Ironically, all the sampled households have access to water from alternative to public water facilities. There was variation in the level of coverage of each of the available water facilities among the 12 sampled wards. Using Kruskal Wallis test by ranking, inferential analysis shows that there is significant statistical difference in the median value of the level of households' accessibility to water from the available water facilities among the 12 sampled wards: (258.818) for pipe borne water; (297.772) for other water; (396.77) for alternative to public water, with a significant test ($0.000<\alpha$ 0.05), all at 11degree of freedom. The level of variation confirms inequality among the sampled wards in the level of households' accessibility to water from the available water facilities.

Table 6: Water Facilities and the Level of Accessibility

Type of Water Facility		Oniwaya	Papa Ashafa	Okekoto	Orile Agege	Bariga	Bajulaiye	Fadeyi	Makoko	Iddo Otto	Tolu Ajegunle	Alaba Amukoko	Olodi Apapa	Study Area
Pipe water	Freq	11	23	29	36	11	42	22	72	126	19	6	15	412
	%	8.9	17.4	18.5	31.0	11.6	37.5	18.0	47.1	83.4	15.3	5.1	11.7	26.9
Other Public Water Facilities														
Other Public	Freq	18	95	23	9	74	55	76	52	20	12	4	16	454
Water	%	1.18	6.20	1.50	0.59	4.83	3.59	4.96	3.39	1.31	0.78	0.26	1.04	29.64
Alternative to Public Water Facilities														
Alternative to	Freq	123	132	157	116	95	112	122	154	151	124	118	128	1532
Public Water	%	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Field Survey (2015)

Location of Water Facilities

As shown in Table 7, the study discovered 3 main places where water facilities in the study area could be found, which include inside compound, nearby house and outside the neighbourhood. For the pipe water facilities, 29.1% of the households that have access to these water facilities have them within their compound, 52.9% have their own nearby their house, while 18.0% have these facilities located outside their neighbourhood. In the case of other public water, 13.0% of those who have access these water facilities have them within their compound, 54.9%have them nearby their house, while 32.2% have these facilities outside the neighbourhood. For alternative water facilities, 42.3% of the sampled households for this study have the facilities within their compound, 38.1% have them nearby their house, while 20.3% have their own located outside their neighbourhood. There is variation among the 12 sampled wards in the locational pattern; it has impact on the comfort derived from accessing these water facilities.

Table 7: Location of Water Facilities

Type of Location	Pipe		Other Public		Alternative	
	Freq.	%	Freq.	%	Freq.	%
In compound	120	29.1	59	13.0	648	42.3
Nearby house	218	52.9	249	54.9	583	38.1
Outside Neighbourhood	74	18.0	146	32.2	301	19.7
Study Area	412	26.9	454	29.6	1532	100

Source: Field Survey (2015)

Quantity of Water Used Per Day

As shown in Table 8, the estimate quantity of water used per day by each household was given for home choir purposes. However, this estimated quantity did not include drinking water, based on the fact that taking of drinking water is flexible, because it is not only at home a household member could drink water. There was inequality in the quantity of water used per day among the 12 sampled political wards, as shown in Table 8. Oniwaya has 153litres average quantity of water used per household per day, while Papa Ashafa, Okekoto and Orile Agege have 156litres, 140litres and 160litres. Among the 12 sampled wards, Orile Agege has the highest of 26.0litres per capita per day, while Makoko/Ebute Meta has the lowest, 20.3litres. In overall, the study area has 21.4litres per capita per day.

Table 8: Average Quantity of Water in Litre Used per Capita per Day

Political Wards	Household Size	Per Household/Day	Per Capita/Day
Oniwaya	6	153	25.5
Papa Ashafa	6	156	26.0
Okekoto	6	140	23.3
Orile Agege	6	160	26.7
Bariga	6	159	26.5
Bajulaiye	6	138	23.0
Fadeyi	6	130	21.7
Makoko	6	122	20.3
Iddo-Otto	6	154	25.7
Tolu Ajegunle	7	160	22.9
Alaba Amukoko	6	148	24.7
Olodi-Apapa	6	150	25.0
Study Area	7	160	21.4

Source: Field Survey (2015)

Quality of Water Used by Households

The study identified 3 main qualities of water that were very important to the households, which include good taste, fine odour and good colour quality. Any water that failed to meet these qualities was regarded as unhygienic water by the sampled households. However, Table 9 shows that 16.6% of the sampled households perceived that the water they used have excellent quality, while 53.7% and 22.5% rated their water to be good and fair in quality respectively. It was only 4.2% and 3.1% of the sampled households that observed that their water was bad and very bad in quality respectively.

Table 9: Households' Perceptions on Water Quality

Variables		Agege			Shomolu			Lagos Mainland			Ajeromi Ifelodun			Study Area
		Oniwaya	Papa Ashafa	Okekoto	Orile Agege	Bariga	Bajulaiye	Fadeyi	Makoko	Iddo-Otto	Tolu Ajegunle	Alaba Amukoko	Olodi Apapa	
Excellent	Freq	7	12	16	11	7	11	3	20	10	56	100	1	254
	%	5.7	9.1	10.2	9.5	7.4	9.8	2.5	13.0	6.6	45.2	84.7	0.8	16.6
Good	Freq	84	43	107	92	58	68	66	90	89	56	11	58	822
	%	63.3	32.6	68.2	79.3	61.1	60.7	54.1	58.4	58.9	45.2	9.3	45.3	53.7
Fair	Freq	26	20	29	12	28	30	49	37	45	11	4	53	344
	%	21.1	15.2	18.5	10.3	29.5	26.8	40.2	24.0	29.8	8.9	3.4	41.4	22.5
Bad	Freq	5	21	5	1	2	2	3	7	3	1	2	13	65
	%	4.1	15.9	3.2	0.9	2.2	1.8	2.5	4.5	2.0	0.8	1.7	10.2	4.2
Very Bad	Freq	1	36	0	0	0	1	1	0	4	0	1	3	47
	%	0.8	27.3	0.0	0.0	0.0	0.9	0.8	0.0	2.7	0.0	0.8	2.4	3.1
Total	Freq	123	132	157	116	95	112	122	154	151	124	118	128	1532
	%	100	100	100	100	100	100	100	100	100	100	100	100	100

Source: Field Study (2015)

Relationship Between Demographic Variables And Quantity And Quality Of Water Used Per Day

i) Effect of Gender and Quantity of Water Used

In order to establish the significant effect of gender on the quantity of water used by each of the sampled households per day, excluding drinking water, one-way ANOVA test was conducted to compare the effect of gender of the sampled household members on the quantity of water consumed by each household. The result of the test, as in Table10 shows that the effect of gender on the quantity of water use is not significant, $F(1, 1502) = 0.015$, $P > 0.05$. This also implies that there is no significant difference in the quantity of water consumed by males and females within the 12 sampled wards.

ii) Effect of Occupation on the Quantity of Water Consumed

One-way ANOVA test was conducted to compare the effect of occupation of the sampled household members on the quantity of water use per day by each household. The result as Table 10 shows that the effect of occupation on the quantity of water use is significant, $F\{(6, 1461) = 3.081, P < 0.05\}$. This implies that there is a significant difference in the quantity of water use by the sampled household members based on occupation.

iii) Effect of Education on the Quantity of Water Consumed

For education relationship, one-way ANOVA was conducted to compare the effect of education of the sampled household members on the quantity of water use by each household. As indicated by Table 10, the result of the analysis of variance shows that the effect of education on the quantity of water use is significant, $F\{(3, 1482) = 2.711, P < 0.05\}$. This implies that education has effect on the households' quantity of water use per day.

Table 10: ANOVA Tests on Relationship between Some Demographic Variables and Quantity and Quality of Water Used Per Day

Effect of Gender and Quantity of Water Use Per Day					
	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.021	1	.021	.015	.902
Within Groups	2074.595	1501	1.382		
Total	2074.616	1502			
Effect of Occupation on the Quantity of Water Use Per Day					
Between Groups	25.096	6	4.183	3.081	.005
Within Groups	1983.331	1461	1.358		
Total	2008.428	1467			
Effect of Education on the Quantity of Water Use Per Day					
Between Groups	11.336	3	3.779	2.711	.044
Within Groups	2065.549	1482	1.394		
Total	2076.886	1485			
Effect of Household Size on the Quantity of Water Use Per Day					
Between Groups	53.430	5	10.686	7.877	.000
Within Groups	2032.261	1498	1.357		
Total	2085.691	1503			
Effect of Marital Status on the Quantity of Water Use Per Day					
Between Groups	16.067	5	3.213	2.333	.040
Within Groups	2063.164	1498	1.377		
Total	2079.231	1503			
Effect of Local Government (LGA) Location on Factors Influencing Water Availability					
Between Groups	1.145	3	.382	2.056	.104
Within Groups	283.444	1527	.186		
Total	284.589	1530			
Effect of the Type of Water Facility on Households' Perception on Water Quality					
Between Groups	9.852	2	4.926	10.891	.000
Within Groups	648.580	1434	.452		
Total	658.432	1436			

Source: Field Work (2015)

iv) Effect of Household Size on the Quantity of Water Use

One-way ANOVA was conducted to compare the effect of household size of the sampled household members on the quantity of water use by each household. The result of the analysis shows that the effect of household size on the quantity of water use is significant, F {(5, 1498) = 7.877, P < 0.001}. This is as shown in Table 10. This implies that household size has effect on the quantity of water use..

v) Effect of Marital Status on the Quantity of Water Use

One-way ANOVA was conducted to compare the effect of marital status of the sampled household members on the quantity of water consumed by each household. The result of the analysis, as indicated in Table 10 shows that the effect of marital status on the quantity of water use is significant, F {(5, 1503) = 2.333, P < 0.05}. This implies that marital status has influence on the quantity of water use.

Looking at the statistical analysis, as in (i-v) above, it can be concluded that apart from gender, which was tested negative, there is significant relationship between other demographic variables and the quantity of water used per day by households of the study area. Hence, there

is a significant relationship between the quantity of water use by households and some demographic variables.

vi) Effect of Household Location on Water Availability

One-way ANOVA was conducted to compare the effect of the LGAs within which the 12 sampled wards are located on factors influencing availability of water. The result of the analysis, as shown in Table 10 shows that the effect of the LGAs within which the 12 sampled wards are located on factors influencing availability of water is not significant, F{(3,1527)=2.056, P > 0.05}. This also implies that factors influencing water availability among the 12 sampled wards within the LGAs are similar.

vii) Effect of the Type of Water Facility on Households' Perception on Water Quality

One-way ANOVA was conducted to compare the effect of the types of water facilities in the 12 sampled wards on the sampled households' perception on water quality. The result of analysis shows that the effect of the type of water facility on the households' impression on water quality is significant, F {(2, 1436) =10.89, P < 0.001}, as demonstrated in Table 10. This also implies that impression on water quality varies among the different facility users in the 12 sampled wards. It can be concluded that there is significant effect of the type of water facility in the 12 sampled wards on the households' perception on water quality.

viii)Correlation between Household Income and Quantity of Water Used

Using Pearson Correlation Coefficient, as shown in Table 11, there is relationship between household head monthly income and the quantity of water used by the household per day, because Pearson Correlation value for both variables are the same (r =0.143). Table 11 shows the relationship is positive, as both household income and household quantity of water demanded per day have sig {(2-tailed) = 0.143)}, which is their correlation coefficient value. This implies that an increase in household head monthly income will increase the household quantity of water use.

ix)Correlation between Household Size and Quantity of Water Used

as in Table 11, Pearson Correlation Coefficient test shows positive relationship between the size of household and the quantity of water use per day (r = 0.126). The relationship is positive, as both size of household and the quantity of water used per day have sig {(2-tailed) = 0.126}, which is their correlation coefficient value. This implies that increase in the household size will definitely lead to a correspondence increase in the quantity of water used per day, but not vice versa.

Table 11: Correlation Test for Relationship between Quantity of Water Used and Household Head Monthly Income, and Household Size

Tested variables	Pearson Correlation	Sig. (2-tailed)	Samples Taken
Household Head Monthly Income and Household Quantity of Water Used Per Day			
Household head monthly income	0.143	0.000	1468
Household quantity of water used per day	0.143	0.000	1468
Household Size and Household Quantity of Water Used Per Day			
Household size	0.126	0.000	1304
Household quantity of water used per day	0.126	0.000	1504

Source: Field Survey (2016)

x) Association between the Quantity of Water Used By Household and the Type of Available Water Facilities

Chi-square (χ^2) analysis was carried out to examine the association between the quantity of water use per day per household and the type of water facility in the sampled wards. The result of the analysis shows that there is no significant association between the quantity of water use per day per household and the type of water facility in the sampled wards:{χ^2(10, N = 1421) = 53.68), P > 0.05}. In other words, type of water facility does not affect the quantity of water used per day per household.

xi) Effect of the Household Location and the Type of Water Facilities Used on Households' Perception on Water Quality

Two-way ANOVA analysis was conducted to determine 3 cases: whether the LGA location of the sampled wards has effect on the perception of the households on water quality; whether the type of water facility use has effect on the perception of the households on the quality of water; and whether both the location and type of water facility have interaction on the household perception on water quality. There were 2 independent variables germane to the test, which include the 4 sampled LGAs and 3 identified water facility types. As shown in Table 12, the test revealed that all effects of both variables and their interaction are statistically significant at 0.05- significance level, except the LGA factor. The main effect for water facility types yielded an F-ratio of F {(2, 1425) = 13.245, P < 0.001}, indicating a significant difference between pipe-borne water (M= 2.13, SD = 0.67), other public water (M= 2.24, SD= 0.66) and alternative water (M= 2.38, SD= 0.69). The main effect of LGA yielded an F-ratio of F {(3, 1425) = 2.399, P > 0.05}, indicating that the effect of LGA is not significant on Agege (M= 2.23, SD= 0.85), Shomolu (M= 2.27, SD= 0.59), Lagos Mainland (M= 2.28, SD= 0.54) and Ajeromi (M= 2.36, SD= 0.53). The interaction effect of the 2 independent variables on the impression on the water quality is also significant, F {(6, 1425) = 2.523, P < 0.05}.

Table 12: Two-way ANOVA Tests of Between-Subjects Effects

Dependent Variable: Impression on Water Quality					
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	20.781[a]	11	1.889	4.222	.000
Intercept	2528.575	1	2528.575	5650.771	.000
Types of W.F.	11.854	2	5.927	13.245	.000
LGA	3.221	3	1.074	2.399	.066
Types of W.F. * LGA	6.774	6	1.129	2.523	.020
Error	637.651	1425	.447		
Total	8104.111	1437			
Corrected Total	658.432	1436			

a.R Squared = .032 (Adjusted R Squared = .024); LGA=Local Government Area; WF=Water Facilities

SUMMARY OF FINDINGS

It can be summarized from the study that households in the low income areas of Lagos Metropolis face a number of water challenges, described by the types of water facilities, coverage, distance and time required to access water, frequencies of water availability, water quality and quantity. Some households' socio-economic characteristics have a significant impact, not only on the quantity of water use per day, but on their perception on the quality of water assessed from the available water facilities. Apart from gender, which its impact was negative, all other socio-economic variables, such as occupation, education, household size, residence location, income, and marital status have a significant effect on the quantity of water use per day.

The study also discovered that the LGA within which the 12 sampled wards is located have a significant effect on the sampled wards water availability. This implies that water availability in the 12 sampled wards varied; according to their location. On the other hand, the type of water facility used by households within the residential buildings of the study area has a significant impact on their perception on water quality. Thus, households' perception on water quality varied, according to the type of water facility they used. Hence, there was existence of inequality in water accessibility problem among these households.

The study also found that there was positive relationship between household's head monthly income and the quantity of water use per day. Similarly, there was positive relationship between household size and the quantity of water use per day. Hence, an increase in household's head monthly income or household size will lead to a correspondent increase in the quantity of water used by the household per day. Significant association was also established between the quantity of water used per day by the households and the type of available water facility.

CONCLUSION AND RECOMMENDATIONS

It can be concluded that socio-economic characteristics of water users have impact on the quantity of water they use, and also on the perception they have on the quality of water accessed from the available water facilities. Apart from these characteristics, water provision related assets available to the water users equally have effect on their water availability and challenges the households face.

Based on the findings of this study, it is recommended that socio-economic characteristics of households of a building, or of a residential area must be understudied and understood before a solution can be successfully found to address their water accessibility challenge. This is necessary in order to ensure that quantity and quality of water provided meet the need of the consumers, based on their socio-economic attributes.

Also, concerted effort should be made to ensure that water facilities and other water provision assets are provided and kept in good condition. This will increase the quantity of water provided by these facilities, since water facilities and other assets have a significant impact on water availability. Apart from quality in provision, the number of these facilities should be increased and evenly located among different political units. This is necessary in order to overcome challenges posed by the effect of residential location on water availability and price, and interaction effect of water facility and households' location on perception on water quality.

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