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# Assessment of the Drivers of Domestic Water Consumption Pattern in Idahlga, Kogi State

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**Abstract:** *This study assessed the drivers of domestic water consumption pattern in Idah LGA, Kogi State. It focuses on the analysis of the sources of water, the magnitude of household water demand, consumption pattern of water, factors influencing consumption pattern of household water, and the relationship between domestic water supply and consumption pattern in Idah. The methodology involves the use of questionnaires, oral interview, and personal observation to gather necessary information. The sample size of four hundred (400) was selected using simple random technique. The results from the study revealed that boreholes (48.6%) and rivers (47.5%) are the major sources of water to households. The study further revealed that consumption and supply of water are 105.1 liters and 110.4 liters respectively per person per day. It was also revealed that the household activity that consumed more water is cloth washing. The study also revealed that household size (33.6%) is the major determinant of water consumption pattern in the area under study. A large positive linear relationship between the household water consumed and water supplied was found. These factors should be considered in water supply planning in low and middle income countries with limited access to safe potable water, along with interventions which control water wastage.*

***Keywords**: Water Use, Household Consumption pattern, Water Supply and Drivers*

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**Introduction:** Water supply, consumption and spatial distribution are closely associated with economic growth and development of the society. Apart from air, water is indispensable to life; it is a foundation for human prosperity because adequate and high quality water supplies provide a basis for the growth and development of human social, economic and culture of people (Young, 2006). The World Health Organization (WHO) defined domestic water as

water used for all domestic purposes including drinking, bathing and food preparation. Domestic water consumption is a significant component of the total water use and it varies according to living standards of the consumers in urban and rural areas (Mohammed and Sanaullah, 2017) causing the variation of water consumption between households. These are the size of family, distance, income level, education, cultural heritage, character of water supply, cost of obtaining water as measured by energy or cash expenditure, climate and terrain.

In Africa today, water scarcity is a serious threat, and it has been estimated that by 2030, 75 to 250 million people will be living in water stressed areas (World Bank, 2006). In Nigeria, about 57 million people do not have access to safe water, the scarcity of water in Nigeria is taking a new dimension as residents of many urban and semi-urban areas do not have access to a readily available source of domestic water (Ojo, 2014). Nigeria is experiencing an increase in the rate of changes in her population coupled with urbanization and living standards.

Safe and clean water is important for socio-economic development and the ecosystem services. However, this resource is gradually diminishing in most part of the country including Idah. The current population growth rate of about 3.6% coupled with growth in development and urbanization may raise water demand and consumption pattern in the study area and may lead to deficit in the nearest future

Several literatures abound in water study all over the world. For instance, Schleich and Hillenbrand (2007) carried out a study on the impact of economic, environmental and social determinants for the average per capita demand for water and sewage in about 600 water supply areas in Germany using econometric analyzes prices, income, household size, the effects of population age, the share of wells and rainfall and temperature during the summer months on water demand. The result suggests that the response of residential water demand in Germany is rather inelastic, and also found out that household size, the share of wells and summer rainfall have a negative impact on water demand. According to the study conducted by Ahmed and Smith (2007) in Bangladesh, water consumption per person per day for drinking, kitchen (cooking and utensil washing), bathing (bathing and washing clothes), sanitary and other purposes were 2litre, 9litre, 20litre and 8litre respectively. Solley (2000) found out in his study "Global Water Quantity Supply And Demand Implication" For Mega Cities that structural changes affected supply and demand for domestic water due to federal laws controlling water pollution, technological changes in processes that use water as an

input (including cooling towers and a movement away from once through cooling) and increase recycling of water.

Mulwafu (2002) examines the status of water demand management in Malawi in Genta and in the Lake Chilva catchment in particular, the finding indicates that, while water demand management is highly advocated in the urban and semi-urban areas, very few aspects of water demand management are practiced in the rural areas. Ajadi (2003) carried out a study of water consumption pattern in Ilorin metropolis with aid of questionnaire and interview method, the study finds out that increased in urbanization, rapid growth of population coupled with ineffective management of water resources have led to water crisis. Ijaiya (2000) investigated the impact of water shortage and depletion on the productive time of women in Ilorin, the study made use of structured questionnaire, informal interview and participant observation. The result of the study revealed that inadequate supply of water is due to inefficiency by delivery agent and contamination of water due to poor sanitation.

To summarize, the extant research has either carried out a study on consumption pattern or water supply pattern. There is therefore a salient point on assessing the factors of domestic water consumption pattern such as household size and composition, water accessibility, weather variability, cost and price of water among others it is on this premise that this present study intend to fill the gap. Therefore, this study seeks to assess the drivers of domestic water consumption pattern in Idah LGA of Kogi State.

**Study Area:** Idah lies between latitude 7º05ˈN to 7º83ˈN and longitude 6º45ˈE to 6º75ˈE of the Greenwich meridian. Idah is a Local Government Area, a town in Kogi State, on the eastern bank of the Niger River in the North Central Region of Nigeria. It is one of the oldest local governments in Igala-land created in 1979 alongside Dekina and Ankpa LGA. Idah has two main rock types, namely, basement complex rocks of the Precambrian age in the western half of the town and extending slightly eastwards beyond the lower Niger valley and the older sedimentary rocks in the eastern half. The various sedimentary rock groups extend along the banks of Rivers Niger and south-eastwards through Enugu and Anambra states, to join the Udi Plateau. The drainage pattern in the area is dendritic. The area is well drained with major rivers such as Ocheche, Inachalo, Ofu, Emachi and Ega among others and streams occupying rather wide valleys. The rivers eventually drain into the River Niger. The tributaries are mostly seasonal having their sources mainly within the area. This drainage configuration is

thought to be the result of substantial degree of evolution from the primeval setting, i.e. the paleo drainage (Nwajide, 2014).

Idah like every other town in Kogi state experiences a typical tropical climate with two distinct seasons- the wet/rainy season and the dry/summer season. The rainy season lasts from April to October and is accompanied by heavy humidity and strong rainfalls with annual rainfall in the range of 200-250mm; the heaviest rainfall occurs between June and July, reduces and gets heavy again in September (Iloeje, 2001).

The rain forest belt (selva type) covers Dekina, Ofu, Ankpa, Olamaboro, Idah and Bassa local government areas with rich deciduous and occasional stunted trees including Palms, Iroko, Mahogany, Akee, apple, and other towering trees. Other Local Government Areas (LGA) are in the Guinea Savannah or Parkland Savannah belt with tall grasses and some trees (Nwajide 2014).

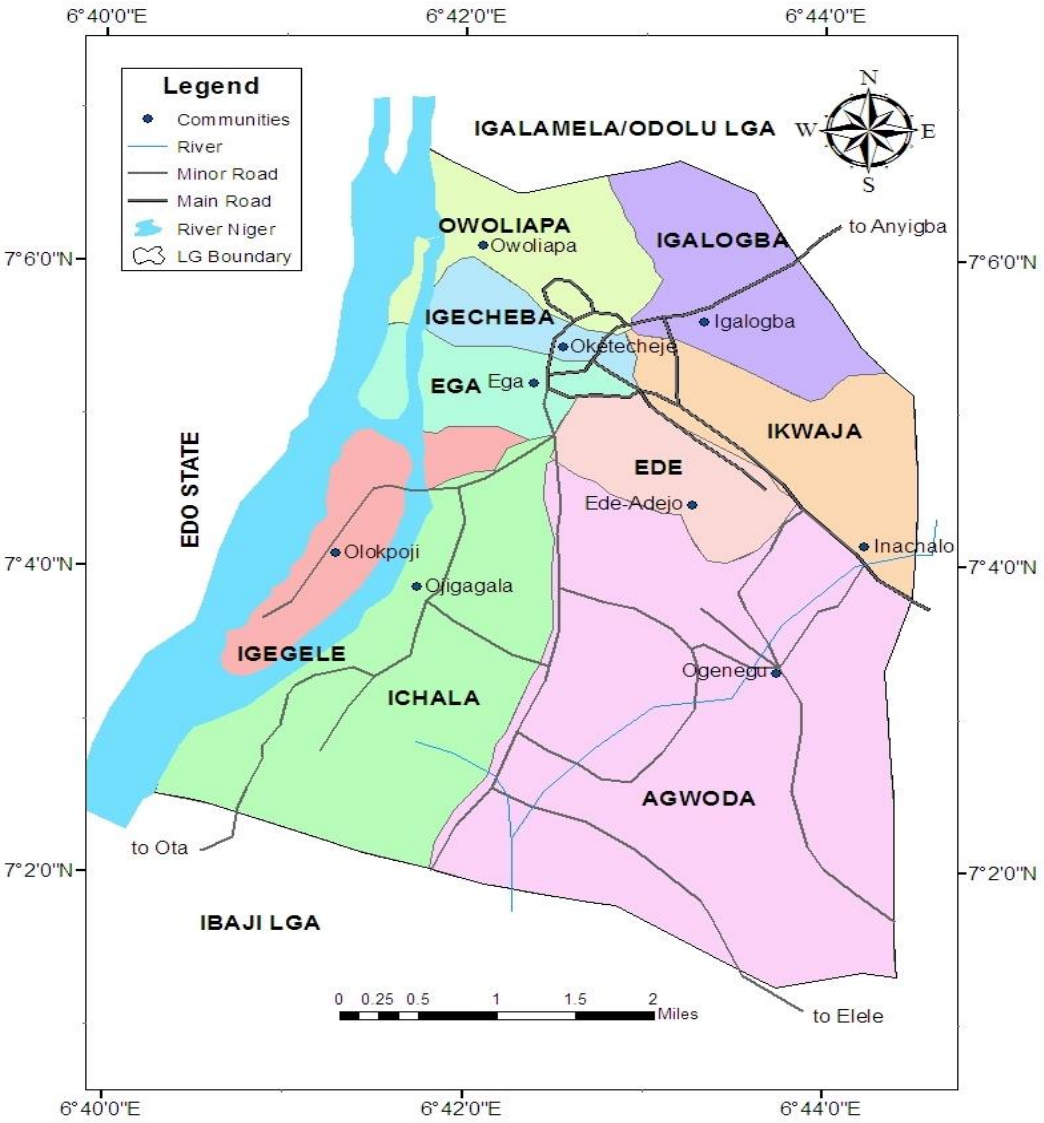

***Figure 1:*** *Study Area*

***Source:*** *Department of Geography K.S.U, Anyigba (2019)*

**Methodology:** The descriptive survey method of data collection was employed in the study. The survey method involves using a survey instrument – 'questionnaire' to collect the required data.

**Sampling:** Nine communities were purposively selected forming the area of coverage for the purpose of this study. Idah was stratified into nine wards and one community was randomly selected from each of the ward. The communities selected are;Igalogba, Ede-Adejo, Inachalo, Ogenegu, Owoliapa, Oketecheje, Ega, Ojigagala and Ofokpoju. 400 copies of questionnaires were administered in the study area. 44 copies of questionnaires were purposively administered selected household in each of the community, and 48 questionnaires were administered in Igalogba because it is the major town in the local government and it comprises of people from different parts of Idah.

Subjects

The respondents were targeted to be the women of the house, because the women are primarily responsible for collection of water in the household, and where the women are not around, the husbands are been selected to answer to complete the questionnaire. Descriptive and inferential statistics was used in the analysis of generated field data The descriptive statistics employed in this study include frequency and percentage. The inferential test 'correlation analysis' was employed to examine the extent of water consumption and water supply in the study area.

**Result and Discussion**

**Demographic Characteristics of Respondents**

Table 1 revealed that 24% of the respondents were male while 76% were female. The investigation focused on heads of households especially women by virtue of their traditional role in water provision for home use, consistent with Ogunbode and Ifabiyi (2005) who states that women are primarily responsible for collection of household's water. However, the proportion of males in the study was only when the woman of the house was not available.

On the distribution of respondents based on age, the study revealed there is uneven distribution of ages across the age groups with a majority 33.6% within the age range of 15-25 years, followed by 32.3% within the age range of 26-35 years. About 21.7% within the

age range of 36-45 years, 7.8% were less than 15 years about 4.7% of the respondents were above 45 years. The implication of the result is that, majority of the respondents are in their youthful age and they tend to use more water than the children and the aged. This is also in line with OgunbodeandIfabiyi (2005) who states that age compositions also affect water consumption of a particular household. This component may be important especially where the respondent is within the age of working class. Such group of people is likely to use more water for various purposes which may not be relevant in homes with aged and teenager.

**Table 1**

**Socio-Economic Characteristics of Respondents**

| | Respondents Background | | | | | Total |
|---|---|---|---|---|---|---|
| Sex | **Male** | | | **Female** | | |
| Frequency | 93 | | | 294 | | **387** |
| Percentage (%) | 24.0 | | | 76.0 | | **100** |
| | | | | | | |
| Age | **Below 15** | **15 – 25** | **26 – 35** | **36 – 45** | **Above 45** | |
| Frequency | 30 | 130 | 125 | 84 | 18 | **387** |
| Percentage (%) | 7.8 | 33.6 | 32.3 | 21.7 | 4.7 | **100** |
| | | | | | | |
| Marital Status | **Married** | **Single** | **Divorced** | **Widow/Widower** | | |
| Frequency | 281 | 48 | 18 | 40 | | **387** |
| Percentage (%) | 72.6 | 12.4 | 4.7 | 10.3 | | **100** |
| | | | | | | |
| Household Size | **1 – 5** | **6 – 10** | **11 – 15** | **Above 16** | | |
| Frequency | 121 | 202 | 42 | 22 | | **387** |
| Percentage (%) | 31.3 | 52.2 | 10.9 | 5.7 | | **100** |
| | | | | | | |
| Income Level | **0-5,000** | **>5,000 – 10,000** | **>10,000 – 15,000** | **>15,000 – 20,000** | **> 20,000** | |
| Frequency | 93 | 130 | 51 | 61 | 52 | **387** |
| Percentage (%) | 24.0 | 33.6 | 13.2 | 61.0 | 13.4 | **100** |
| | | | | | | |
| Occupation | **Trading** | **Farming** | **Civil Service** | **House Wife** | **Others** | |
| Frequency | 188 | 64 | 37 | 40 | 58 | **387** |
| Percentage (%) | 40.6 | 16.5 | 9.6 | 10.3 | 15.0 | **100** |
| | | | | | | |
| Educational Qualification | **Tertiary** | **Secondary** | **Primary** | **No Formal Education** | | |
| Frequency | 34 | 100 | 140 | 113 | | **387** |
| Percentage (%) | 8.8 | 25.8 | 36.2 | 29.2 | | **100** |

**Source:** Field Work, 2020.

Also, the distribution of respondents based on marital status; 72.6% are married, 12.4% are single, 10.3% are either widow or widower, while 4.7% are divorced. With respect to household sizes, the majority 52.2% of the households comprises of 6-10 persons, followed by 31.3% which comprises of 1-5 persons, 10.9% comprises of 11-15 persons and 4.7%

comprises of 16 and more persons. This finding is in agreement with that of Ayanshola, Sule and Salami (2010) where household size was observed to be one of the determinants of domestic water demand. The higher the household size, the higher the water consumption.

Table 4.1 further revealed the distribution of respondents based on income level, majority 61% earn above N15,000 to N20,000 per month, followed by N5,000 to N10,000 per month (33.6%), below N5,000 per month (24%), above N20,000 per month (13.4%), and 13.2% of the respondents earn above N10,000 to N15,000 per month. Majority earn between N15,000 to N20,000. By implication, more water will be demanded for because majority of the household earn an average income. This is in line with the findings of Anthony (2019) where he finds out that majority of the respondents in Idah earn below N20,000 monthly.

Result presented in Table 2 further revealed that 40.6% were traders, 16.5% were farmers, 9.6% were civil servants, 10.3% were ordinary house wife and 15% had other occupation, they involved themselves in vocational job as means of their livelihood. This shows that majority of the respondents are businessmen and women. This is not unexpected as Idah town is a major commercial centre in Kogi East senatorial district. Due to the commercial activities in the town, there is influx movement from the rural to the town and also from the neighboring towns. This tends to increase the rate of water demand in the area. This is in agreement with World Bank (2003) whereby occupation of the family is one of the most dominant factors affecting water consumption at the micro level. Results presented in table 2 also show that 8.8% of the respondents had tertiary education, 25.8% had secondary education, 36.2% had primary education, while 29.2% had no formal education. This implies that majority of the respondents were educated and education rate of people has influence on water usage. This study conforms to the study of Ifabiyi (2011) where literacy level has been found to have influence on domestic water use.

**Sources of Water for Domestic Uses within the Study Area**

The sources of water to the people of Idah as revealed in table 2 was mainly through boreholes and river/streams. This study revealed that in Igalogba they mainly depend on borehole (100%); in Ede-Adejo they depends primarily on borehole (72.7%), river (18.2) and well (9.1%); in Ega they depends primarily on borehole (53.7%), river (39%) and well (7.3%), in Oketecheje they depends primarily on borehole (52.3%), river (38.6%) and well (9.1%); in Owoliapa they depends primarily on borehole (90.9%) and well (9.1%); in Ogenegu and Olokpoji they depend mainly on river (100%); in Inachalo they depends on

borehole (56.1%) and river (43.9%); and in Ojigagala they depends primarily on river (88.4%) and borehole (11.6%).

**Table 2**

**Sources of Water in the Study Area**

| S/N | Sample Location | Well | | Borehole | | Pipe-borne | | River | | Rainfall | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 0 | 0 | 43 | 100 | 0 | 0 | 0 | 0.0 | 0 | 0 |
| 2 | Ede-Adejo | 4 | 9.1 | 32 | 72.7 | 0 | 0 | 8 | 18.2 | 0 | 0 |
| 3 | Ega | 3 | 7.3 | 22 | 53.7 | 0 | 0 | 16 | 39.0 | 0 | 0 |
| 4 | Oketecheje | 4 | 9.1 | 23 | 52.3 | 0 | 0 | 17 | 38.6 | 0 | 0 |
| 5 | Owoliapa | 4 | 9.1 | 40 | 90.9 | 0 | 0 | 0 | 0.0 | 0 | 0 |
| 6 | Ogenegu | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 100 | 0 | 0 |
| 7 | Inachalo | 0 | 0 | 23 | 56.1 | 0 | 0 | 18 | 43.9 | 0 | 0 |
| 8 | Olokpoji | 0 | 0 | 0 | 0.0 | 0 | 0 | 44 | 100 | 0 | 0 |
| 9 | Ojigagala | 0 | 0 | 5 | 11.6 | 0 | 0 | 38 | 88.4 | 0 | 0 |
| **Total** | | **15** | | **188** | | **0** | | **184** | | **0** | |
| **Percentage (%)** | | **3.9** | | **48.6** | | **0.0** | | **47.5** | | **0** | |

**Source:** Field Work, 2020.

In all sampled locations, a total of 188 (48.6%) source their water from borehole, 184 (47.5%) sources their water from river or streams and while only 15 (3.9%) sources their water from wells. None of the respondent's sources water from pipe-borne due to the none functionality of water board in Idah and also none of the respondent's source water from rainfall as the research is been carried out during the dry season (December). However, some households still combined two or more water sources together. This finding is in line with the findings of Adediji and Ajibade (2005) where they conclude that groundwater (borehole) are the major sources of water among rural communities.

**Table 3**

**Distribution of Respondents on Ownership of Water Source**

| S/N | Sample Location | Government | | Private Individual | | Community | | Natural | |
|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 1 | 2.3 | 42 | 97.7 | 0 | 0 | 0 | 0 |
| 2 | Ede-Adejo | 0 | 0 | 36 | 81.8 | 0 | 0 | 8 | 18.2 |
| 3 | Ega | 2 | 4.9 | 23 | 56.1 | 0 | 0 | 16 | 39.0 |
| 4 | Oketecheje | 0 | 0 | 27 | 61.4 | 0 | 0 | 17 | 38.6 |
| 5 | Owoliapa | 0 | 0 | 44 | 100 | 0 | 0 | 0 | 0 |
| 6 | Ogenegu | 0 | 0 | 0 | 0 | 0 | 0 | 43 | 100 |
| 7 | Inachalo | 0 | 0 | 22 | 53.7 | 0 | 0 | 19 | 46.3 |
| 8 | Olokpoji | 0 | 0 | 0 | 0 | 0 | 0 | 44 | 100 |
| 9 | Ojigagala | 0 | 0 | 5 | 11.6 | 0 | 0 | 38 | 88.4 |
| **Total** | | **3** | | **199** | | **0** | | **185** | |
| **Percentage (%)** | | **0.8** | | **51.4** | | **0.0** | | **47.8** | |

**Source:** Field Work, 2020.

Data presented in table 3 revealed that 3 respondents representing 0.8 percent said the source is owned by government, 199 respondents representing 51.4 percent said it is been owned by an individual and 185 representing 47.8 percent is natural. It can be concluded that in Owoliapa community, the source is mainly owned by individual as the households depend mainly on boreholes and wells because the river in the community is not good for use due to some traditional reasons, and households water sources in Ogenegu and Olokpoji community is been owned by nature because they mainly depend on river as their water source. In general, majority of the sources are been owned privately by an individual because majority of them depends on borehole. This conforms to the findings of World Bank (2006) where in Pakistan, the major contribution to water supply within the home comes from private hand which boost domestic water supply.

**Table 4**

**Distribution of Respondents on Distance to Water Source(s)**

| S/N | Sample Location | Less than 51 meters | | 51-100 meters | | 101-150 meters | | 151-200 meters | | More than 200 meters | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 20 | 46.5 | 23 | 53.5 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Ede-Adejo | 25 | 56.8 | 9 | 20.5 | 0 | 0 | 0 | 0 | 10 | 22.7 |
| 3 | Ega | 8 | 19.5 | 13 | 31.7 | 8 | 19.5 | 2 | 4.9 | 10 | 24.4 |
| 4 | Oketecheje | 13 | 29.5 | 8 | 18.2 | 0 | 0 | 4 | 9.1 | 19 | 43.2 |
| 5 | Owoliapa | 14 | 31.8 | 15 | 34.1 | 15 | 34.1 | 0 | 0 | 0 | 0 |
| 6 | Ogenegu | 20 | 46.5 | 10 | 23.3 | 13 | 30.2 | 0 | 0 | 0 | 0 |
| 7 | Inachalo | 14 | 34.1 | 17 | 41.5 | 7 | 17.1 | 3 | 7.3 | 0 | 0 |
| 8 | Olokpoji | 1 | 2.3 | 2 | 4.5 | 8 | 18.2 | 8 | 18.2 | 25 | 56.8 |
| 9 | Ojigagala | 3 | 7.0 | 20 | 46.5 | 4 | 9.3 | 3 | 7.0 | 13 | 30.2 |
| **Total** | | **118** | | **117** | | **55** | | **20** | | **77** | |
| **Percentage (%)** | | **30.5** | | **30.2** | | **14.2** | | **5.2** | | **19.9** | |

**Source:** Field Work, 2020.

With respect to distance covered in all the sampled areas, table 4 revealed that 118 respondents representing 30.5 percent trek a distance less than 51 meters, 117 respondents representing 30.2 percent trek a distance between 51 meters to 100 meters, 55 respondents representing 14.2 percent trek a distance between 101 meters to 150 meters, 20 respondents representing 5.2 percent treks a distance between 151 meters to 200 meters, and 77 respondents representing 19.9 percent trek a distance above 200 meters. This shows that some people in some areas of the study (Olokpoji and Oketecheje) trekked long distance before they can get water because they primarily depend on river and streams which is far from their homes. Although, from the result, in the study area, majority (60.7%) trekked a

distance below 100 meters to their respective water sources, because, boreholes and wells are been dug in different places within the communities. This shows that majority trekked less than 50 metres to water sources. By implication, this reduces the stress of trekking a long distance in search of water. This finding is in line with the recommended distance by World Health Organization (WHO, 2000) which considered 200 metres as a convenient distance for fetching water.

**Table 5: Distribution of Respondents on Payment for Water**

| S/N | Sample Location | Yes | | No | |
|---|---|---|---|---|---|
| | | **Freq.** | **%** | **Freq.** | **%** |
| 1 | Igalogbo | 39 | 9.7 | 4 | 9.3 |
| 2 | Ede-Adejo | 30 | 68.2 | 14 | 31.8 |
| 3 | Ega | 25 | 61.0 | 16 | 39.0 |
| 4 | Oketecheje | 23 | 52.3 | 21 | 47.7 |
| 5 | Owoliapa | 38 | 86.4 | 6 | 13.6 |
| 6 | Ogenegu | 0 | 0.0 | 43 | 100 |
| 7 | Inachalo | 20 | 48.8 | 21 | 51.2 |
| 8 | Olokpoji | 0 | 0 | 44 | 100 |
| 9 | Ojigagala | 5 | 11.6 | 38 | 88.4 |
| **Total** | | **180** | | **207** | |
| **Percentage (%)** | | **46.5** | | **53.5** | |

**Source:** Field Work, 2020.

Data presented in table 5 revealed mode of payment for household water among some of the sampled communities. The result presented revealed that 180 of the respondents representing 46.5 percent pay for water, while 207 respondents representing 53.5 percent do not pay for water. Some communities in the study area such as Olokpoji, Ojigagala and Ogeneguprimarily depend on river which is a natural source therefore they do not pay for water at all. It can be concluded that majority (53.5%) do not pay for water. This is due to the reason that Idah is surrounded by water and inland streams and this saves their money. This study conforms to the study of Olajuyigba (2010) where a place with access to river pays no money to fetch water.

**Table 6:**

**Distribution of Respondents on amount (in Naira) paid per 20 litres**

| S/N | Sample Location | 5 ₦ | | 10 ₦ | | 15 ₦ | | 20 ₦ | |
|---|---|---|---|---|---|---|---|---|---|
| | | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** | **Freq.** | **%** |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Igalogbo | 0 | 0 | 37 | 94.9 | 2 | 5.1 | 0 | 0 |
| 2 | Ede-Adejo | 0 | 0 | 30 | 100 | 0 | 0 | 0 | 0 |
| 3 | Ega | 0 | 0 | 23 | 92.0 | 2 | 8.0 | 0 | 0 |
| 4 | Oketecheje | 0 | 0 | 23 | 100 | 0 | 0 | 0 | 0 |
| 5 | Owoliapa | 0 | 0 | 32 | 84.2 | 6 | 15.8 | 0 | 0 |
| 6 | Ogenegu | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | Inachalo | 0 | 0 | 20 | 100 | 0 | 0 | 0 | 0 |
| 8 | Olokpoji | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9 | Ojigagala | 0 | 0 | 5 | 100 | 0 | 0 | 0 | 0 |
| **Total** | | **0** | | **170** | | **10** | | **0** | |
| **Percentage (%)** | | **0** | | **94.4** | | **5.6** | | **0** | |

**Source:** Field Work, 2020.

On the amount paid for water, table 6 revealed that 170 respondents representing 94.4 percent paid the sum of ten Naira (₦10) per 20 litres of water fetched, and 10 respondents representing 5.6 percent paid fifteen Naira (₦15) per 20 litres of water fetched. The result revealed that majority paid the sum of ten Naira to fetch water. This implies that majority spent about N55 to fetch water daily, and N1, 650 monthly for water. The few who pays N15 to fetch water is as a result of the distance of water source. This is in line with Oghifo (2008) where he states, the farther away the source of water supplies, the higher the cost.

**Table 8:**

**Distribution of Respondents on How Long to Source(s) of Water**

| S/N | Sample Location | Less than 10 minute | | 11-30 minute | | 31 minute –1 hour | | More than 1 hour | |
|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 43 | 100 | 0 | 0 | 0 | 0 | 0 | 0 |
| 2 | Ede-Adejo | 27 | 61.4 | 7 | 15.9 | 10 | 22.7 | 0 | 0 |
| 3 | Ega | 11 | 26.8 | 10 | 24.4 | 20 | 48.8 | 0 | 0 |
| 4 | Oketecheje | 12 | 27.3 | 9 | 20.5 | 17 | 38.6 | 6 | 13.6 |
| 5 | Owoliapa | 30 | 68.2 | 14 | 31.8 | 0 | 0 | 0 | 0 |
| 6 | Ogenegu | 22 | 51.2 | 8 | 18.6 | 13 | 30.2 | 0 | 0 |
| 7 | Inachalo | 16 | 39.0 | 17 | 41.5 | 8 | 19.5 | 0 | 0 |
| 8 | Olokpoji | 2 | 4.5 | 10 | 22.7 | 22 | 50.0 | 10 | 22.7 |
| 9 | Ojigagala | 4 | 9.3 | 18 | 41.9 | 5 | 11.6 | 16 | 37.2 |
| **Total** | | **167** | | **93** | | **95** | | **32** | |
| **Percentage (%)** | | **43.2** | | **24.0** | | **24.5** | | **8.3** | |

**Source:** Field Work, 2020.

Table 7 revealed the time taken to fetch water from the different respective sources. The result revealed that 167 respondents representing 43.2 percent spend less than 10 minutes to get water, 93 respondents representing 24 percent spend between 11 minutes to 30 minutes to get water, 95 respondents representing 24.5 percent spend between 31 minutes to 1 hour to get water, and 32 respondents representing 8.3 percent spend above 1 hour to get water. This

shows that majority of the respondents spend less than 10 minutes to get water, by implication it means water sources is close to their respective homes. It was observed during the investigation that most homes have their own boreholes or wells. This reduces the stress of trekking a long distance in search of water. This conforms with the study of Minten (2002) where he indicated that in Madagascar, women spend an average of 12 minutes daily collecting water.

**Magnitude of Household Water Demand in the Study Area**

**Table 8:**

**Distribution of Respondents on Water Needed For Household Per-Day**

| S/N | Sample Location | Less than 50 litres | | 51-100 litres | | 101-150 litres | | 151-200 litres | | More than 200 litres | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 0 | 0 | 4 | 9.3 | 11 | 25.6 | 15 | 34.9 | 13 | 30.2 |
| 2 | Ede-Adejo | 1 | 2.3 | 4 | 9.1 | 31 | 70.5 | 3 | 6.8 | 5 | 11.4 |
| 3 | Ega | 0 | 0 | 3 | 7.3 | 28 | 68.3 | 8 | 19.5 | 2 | 4.9 |
| 4 | Oketecheje | 3 | 6.8 | 33 | 75.0 | 8 | 18.2 | 0 | 0 | 0 | 0 |
| 5 | Owoliapa | 0 | 0 | 15 | 34.9 | 24 | 54.5 | 5 | 11.4 | 0 | 0 |
| 6 | Ogenegu | 0 | 0 | 18 | 41.9 | 20 | 46.5 | 5 | 11.6 | 0 | 0 |
| 7 | Inachalo | 0 | 0 | 2 | 4.9 | 9 | 22.0 | 20 | 48.8 | 10 | 24.4 |
| 8 | Olokpoji | 3 | 6.8 | 20 | 45.5 | 18 | 40.9 | 3 | 6.8 | 0 | 0 |
| 9 | Ojigagala | 4 | 9.3 | 27 | 62.8 | 11 | 25.6 | 1 | 2.3 | 0 | 0 |
| **Total** | | **11** | | **126** | | **160** | | **60** | | **30** | |
| **Percentage (%)** | | **2.8** | | **32.6** | | **41.3** | | **15.5** | | **7.8** | |

**Source:** Field Work, 2020.

Data presented in table 8 above revealed the quantity of water required for households per day. It was revealed that 11 respondents representing 2.8 percent needs less than 50 litres per day, 126 respondents representing 32.6 percent needs between 51 to 100 litres per day, 160 respondents representing 41.3 percent needs between 101 to 150 litres per day, 60 respondents representing 15.5 percent needs between 151 to 200 litres per day, and 30 respondents representing 7.8 percent needs above 200 litres per day. This shows that majority of the respondents needs between 101 litres to 150 litres of water per day for domestic uses. According to WHO, between 50 and 100 litres of water per person per day are needed to ensure that most basic needs are met and few health concerns arise. This implies that more water is been required in the area, compare to the standard recommended by WHO, and this

will lead to water wastage which is against the sustainable development goal 6. This study disagrees with that of Olasumbo (2001), and Shaban and Sharma (2007) which recommended 80 litres per person per day and 100 litres per person per day as a basic quantity of water required for domestic use.

**Table 9:**

**Distribution of Respondents on How Often Do You Fetch Water**

| S/N | Sample Location | Daily | | Every 2 days | | Every 3 days | | Weekly | |
|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 20 | 46.5 | 19 | 44.2 | 3 | 7.0 | 1 | 2.3 |
| 2 | Ede-Adejo | 28 | 63.6 | 15 | 34.1 | 1 | 2.3 | 0 | 0 |
| 3 | Ega | 19 | 46.3 | 19 | 46.3 | 3 | 7.3 | 0 | 0 |
| 4 | Oketecheje | 30 | 68.2 | 9 | 20.5 | 5 | 11.4 | 0 | 0 |
| 5 | Owoliapa | 21 | 47.7 | 18 | 40.9 | 2 | 4.5 | 3 | 6.8 |
| 6 | Ogenegu | 33 | 76.7 | 5 | 11.6 | 5 | 11.6 | 0 | 0 |
| 7 | Inachalo | 23 | 56.1 | 9 | 22.0 | 5 | 12.2 | 4 | 9.8 |
| 8 | Olokpoji | 39 | 88.6 | 4 | 9.1 | 1 | 2.3 | 0 | 0 |
| 9 | Ojigagala | 22 | 51.2 | 19 | 44.2 | 2 | 4.7 | 0 | 0 |
| **Total** | | **235** | | **117** | | **27** | | **8** | |
| **Percentage (%)** | | **60.7** | | **30.2** | | **7.0** | | **2.1** | |

**Source:** Field Work, 2020.

Table 9 revealed how often water is been fetched in the study area. It was revealed that 235 respondents representing 60.7 percent fetch water daily, 117 respondents representing 30.2 percent fetch water every 2 days, 27 respondents representing 7.0 percent fetch water every 3 days, and 8 respondents representing 2.1 percent fetch water weekly. The result revealed that majority of the respondents fetch water on a daily basis. This implies that majority has to go in search of water daily and this affects their resourceful and relaxation time. This is in line with the findings of Minten (2002) in Madagascar, where women spend spend a lot of time collecting water on a daily basis.

**Table 10:**

**Distribution of Respondents on Who Is Responsible For Water Collection**

| S/N | Sample Location | Wife | | Children | | Men | | Others | |
|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 22 | 51.2 | 11 | 25.0 | 4 | 9.3 | 6 | 14.0 |
| 2 | Ede-Adejo | 25 | 56.8 | 10 | 22.7 | 2 | 4.5 | 7 | 15.9 |
| 3 | Ega | 23 | 56.1 | 11 | 26.8 | 2 | 4.9 | 5 | 12.2 |
| 4 | Oketecheje | 30 | 68.2 | 8 | 18.2 | 5 | 11.4 | 1 | 2.3 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 5 | Owoliapa | 27 | 61.4 | 9 | 20.5 | 4 | 9.1 | 4 | 9.1 |
| 6 | Ogenegu | 30 | 69.8 | 9 | 20.9 | 1 | 2.3 | 3 | 7.0 |
| 7 | Inachalo | 24 | 58.5 | 10 | 24.4 | 1 | 2.4 | 6 | 14.6 |
| 8 | Olokpoji | 25 | 56.8 | 11 | 25.0 | 2 | 4.5 | 6 | 13.6 |
| 9 | Ojigagala | 24 | 55.8 | 15 | 34.9 | 0 | 0 | 4 | 9.3 |
| **Total** | | **230** | | **94** | | **21** | | **42** | |
| **Percentage (%)** | | **59.4** | | **24.3** | | **5.4** | | **10.9** | |

**Source:** Field Work, 2020.

On the collection of water, table 10 revealed that 59.4 percent of water collectors were wives, 24.3 percent were children, 5.4 percent were men, and 10.9 percent was been collected by other people like water vendors. This indicates that women are primarily responsible for collection of water in the study area. By implication, women spend most of their time and energy collecting water in the area since high quantity of water is been required for domestic use. This is in line with the study of Anad (2007), where he reported that even though the water crisis is observed as a general problem for the rural population, women bare the greatest burden because of their social gendered roles, which involve looking for and collecting water for households.

**Table 11: Distribution of Respondents on How Many Litres of Water Fetched a Day**

| S/N | Sample Location | Less than 50 litres | | 51-100 litres | | 101-150 litres | | 151-200 litres | | More than 200 litres | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Freq. | % | Freq. | % | Freq. | % | Freq. | % | Freq. | % |
| 1 | Igalogbo | 0 | 0 | 4 | 9.3 | 21 | 48.8 | 15 | 34.9 | 3 | 7.0 |
| 2 | Ede-Adejo | 1 | 2.3 | 9 | 20.5 | 31 | 70.5 | 3 | 6.8 | 0 | 0 |
| 3 | Ega | 0 | 0 | 3 | 7.3 | 27 | 65.9 | 9 | 22.0 | 2 | 4.9 |
| 4 | Oketecheje | 3 | 6.8 | 33 | 75.0 | 8 | 18.2 | 0 | 0 | 0 | 0 |
| 5 | Owoliapa | 0 | 0 | 15 | 34.1 | 24 | 54.5 | 5 | 11.4 | 0 | 0 |
| 6 | Ogenegu | 0 | 0 | 23 | 53.5 | 15 | 34.9 | 5 | 11.6 | 0 | 0 |
| 7 | Inachalo | 0 | 0 | 6 | 14.6 | 21 | 51.2 | 10 | 24.4 | 4 | 9.8 |
| 8 | Olokpoji | 7 | 15.9 | 24 | 54.5 | 13 | 29.5 | 0 | 0 | 0 | 0 |
| 9 | Ojigagala | 8 | 18.6 | 29 | 65.9 | 5 | 11.6 | 1 | 2.3 | 0 | 0 |
| **Total** | | **19** | | **146** | | **165** | | **48** | | **9** | |
| **Percentage (%)** | | **4.9** | | **37.7** | | **42.6** | | **12.4** | | **2.3** | |

**Source:** Field Work, 2020

Table 11 revealed the litres of water fetched in a day in the study area. The result revealed that 19 respondents representing 4.9 percent fetch less than 50 litres per day, 146 respondents representing 37.7percent fetch between 51 to 100 litres per day, 165 respondents representing 42.6 percent fetch between 101 to 150 litres per day, 48 respondents representing 12.4 percent fetch between 151 to 200 litres per day, and 9 respondents representing 2.3 percent fetch above 200 litres per day. This indicates that majority fetch between 101 litres to 150 litres per day.

From the forgoing tables (8 and 111), it can be deduced that the majority of the respondents do not get the demanded quantity of water that they need per day. This is due to the inadequate distribution and the stress of having to go in search of water to buy every day, as well as the cost of getting water. This study is in conformity with that of Ojo (2014) where available sources of water is not enough to meet up with the demand of residents of many urban and semi-urban areas.

**Consumption Pattern of Water in the Study Area**

Table 12 revealed the average domestic water consumption pattern per day in the study area. For easy analysis, the various purposes for water consumption were classified into six as shown in the table 12. For kitchen, it involves washing plates and utensils, washing vegetables and cooking of foods, and for personal hygiene, it involves brushing of teeth, ablution, washing of hands, feet and shaving and others.

The daily household water use for drinking in all the nine sample areas as revealed in the table was 26.5 litres per day, household water use for bathing in all the sample areas stood at 308 litres per day, the daily household use for cloth washing was 448 litres per day, the daily household use for kitchen stood at 81.5 litres per day, the daily quantity used for personal hygiene was 32.5 litres, and the daily water use for toilet in all the sampled areas is 52 litres. This indicates that water use for washing clothes (448 litres) and bathing (308 litres) accounted for the lagest quantity of household water consumption per day in the study area.

Also in table 12, it revealed the per capita water consumption in each sampled area. It was discovered that household in Igalogba consume 147 litres of water per day. In Ede-Adejo, 102.5 litres was used per household. In Ega, 131 litres was used; in Oketecheje, 87.5 litres was used; in Owoliapa, 105.5 litres was used; in Ogenegu, 106.5 litres was used; in Inachalo; 110 litres was used; in Olokpoji, 73 litres was used; and in Ojigagala, 85.5 litres was used per household. From the result presented in table 12, the communities used high proportion of water for cloth washing and small quantity is used for drinking.

**Table 13:**

**Average Water Consumption Pattern**

| S/N | Sample Location | Micro Component Uses (litres) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Drinking | Bathing | Cloth washing | Kitchen | Personal hygiene | Toilet | **Total** |
| 1 | Igalogbo | 3 | 43 | 71 | 11 | 4 | 15 | **147.0** |
| 2 | Ede-Adejo | 2.5 | 30 | 50 | 8 | 3 | 9 | **102.0** |
| 3 | Ega | 4 | 41 | 60 | 12 | 10 | 4 | **131.0** |
| 4 | Oketecheje | 3 | 28 | 35 | 10 | 3.5 | 8 | **87.5** |
| 5 | Owoliapa | 3 | 40 | 42 | 8 | 3.5 | 9 | **105.5** |
| 6 | Ogenegu | 2.5 | 42 | 51 | 7 | 2 | 2 | **106.5** |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 7 | Inachalo | 3 | 33 | 61 | 8 | 3 | 2 | **110.0** |
| 8 | Olokpoji | 2.5 | 23 | 35 | 10 | 1.5 | 1 | **73.0** |
| 9 | Ojigagala | 3 | 28 | 43 | 7.5 | 2 | 2 | **85.5** |
| **Total** | | **26.5** | **308** | **448** | **81.5** | **32.5** | **52** | |

**Source:** Field Work, 2020.

The result of this study however revealed that residents of Igalogba, Ede-Adejo, Ega, Owliapa, Ogenegu and Inachalo consumed more water than the recommended minimum requirement. Residents in Oketecheje and Ojigagala who used 87.5 and 85.5 litres per capita per day, only about 7.5 and 5.5 was considered as waste. In Olokpoji, the residents use below the required quantity of water. These findings disagreed with UNDP (2008) which says the minimum absolute daily water need per person per day is 50 liter (13.2gallons) which include: 5litre for drinking, 20litres for sanitation and hygiene, 15litres for bathing and 10litres for preparing food. This finding also disagreed with Olasumbo (2001), which indicate that the minimum water required in Nigeria is 80 litres per capita per day. But this study conforms to the international consumption figures released by the 4$^{th}$ World Water Forum (2006) which indicates that a person living in an urban or semi-urban area uses an average of 250 litres per day.

**Factors Influencing Consumption Pattern of Household Water in the Study Area**

Table 13 revealed the factors influencing domestic water consumption in the study area. It revealed that household size has the highest proportion of 33.6 percent. The relevance of household size in domestic water use cannot be overlooked. It implies that the larger the household, the higher the domestic water use. This finding is similar to that of Ayanshola et al. (2010) where household size was observed to be one of the determinants of domestic water demand. Also, the quantity of water supplied by the supplier stood at 22.7 percent. This implies that the more the water supplied by the fetchers, the higher the household water use. This is similar with the findings of Olajuyigbe (2010) in the south western Nigeria. Also household preference for a particular water source also influences domestic water use in the study area with 10.9 percent of the respondents. This observation is the central focus of Vasques (2011). This factor is relevance where family prefers a particular source for a given home use.

**Table 13:**

**Distribution of Respondents on Main Determinants of Domestic Water Consumption**

| **Variables** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Household size | 130 | 33.6 |

| | | |
|---|---|---|
| Quantity supply by fetchers | 88 | 22.7 |
| Preference for a source | 42 | 10.9 |
| Religious use of water | 22 | 5.7 |
| Gender composition | 29 | 7.5 |
| Family income | 10 | 2.6 |
| Cost of water | 22 | 5.7 |
| Cultural influences | 16 | 4.1 |
| Others | 28 | 7.2 |
| **Total** | **387** | **100** |

**Source:** Field Work, 2020.

Another component is gender composition which stood at 7.5 percent, the more the females in a given household, the higher the domestic water use. Females have been found to use more water than their male counterparts. This observation is similar to that of Xinming et al. (2000). Another component is religious use of water which stood at 5.7 percent. This component also observed by Ruma and Sheikh (2010) becomes important because of the presence of Muslims in Idah that use water for ablution purposes. Cost of water and level of income are also a determinant affecting domestic water consumption in the study area. This is in line with the work of Oyesanmi (2018) who observed that level of income determines water consumption. Other factors include; age range of the supplier, closeness to water sources and age component. Households dominated by young adults are more likely to have more supply of water than those homes dominated by aged or little children. Also the closer the water source, the more water is been supplied for household uses. Similar observation was made by Environment Agency (2008). The age compositions also affect water consumption of a particular household. This component may be important especially where the respondent is within the age of working class. Such group of people is likely to use more water.

The study investigated the relationship between water supply and water consumption using the Pearson moment Correlation Analysis technique. The result is shown below in table 14.

**Table 14:**

**Correlation Analysis of Water Consumed and Water Supplied**

| S/N | Sample Location | Questionnaire Administered | Questionnaire Recovered | Total Water Consumed (X) | Total Water Supplied (Y) | $X^2$ | $Y^2$ | XY |
|---|---|---|---|---|---|---|---|---|
| 1 | Igalogbo | 48 | 43 | 4519.3 | 4747.2 | 20424072.49 | 22535907.84 | 21454020.96 |
| 2 | Ede-Adejo | 44 | 44 | 4624.4 | 4857.6 | 21385075.36 | 23596277.76 | 22463485.44 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 3 | Ega | 44 | 41 | 4309.1 | 4526.4 | 18568342.81 | 20488296.96 | 19504710.24 |
| 4 | Oketechej e | 44 | 44 | 4624.4 | 4857.6 | 21385075.36 | 23596277.76 | 22463485.44 |
| 5 | Owoliapa | 44 | 44 | 4624.4 | 4857.6 | 21385075.36 | 23596277.76 | 22463485.44 |
| 6 | Ogenegu | 44 | 43 | 4519.3 | 4747.2 | 20424072.49 | 22535907.84 | 21454020.96 |
| 7 | Inachalo | 44 | 41 | 4309.1 | 4526.4 | 18568342.81 | 20488296.96 | 19504710.24 |
| 8 | Olokpoji | 44 | 44 | 4624.4 | 4857.6 | 21385075.36 | 23596277.76 | 22463485.44 |
| 9 | Ojigagala | 44 | 43 | 4519.3 | 4747.2 | 20424072.49 | 22535907.84 | 21454020.96 |
| **Total** | | **400** | **387** | **40673.7** | **42724.8** | **183949204.5 3** | **202969428.4 8** | **193225425.1 2** |

**Source:** Field Work, 2020.

Water Consumed = $\frac{\text{Total water consumed}}{\text{Number of respondents}} = \frac{40672}{387}$ = 105.1 litres per person per day

Water Supplied = $\frac{\text{Total water supplied}}{\text{Number of household}} = \frac{42725}{387}$ = 110.4 litres per household

$$r_{xy} = \frac{n\sum xy - \sum y \sum x}{\sqrt{n\sum x^2 - (\sum x)^2 (n\sum y^2 - (\sum y)^2}}$$

Where - $r_{xy}$= Pearson r correlation coefficient between x and y
n = number of observations (9)
x = value of x (water consumed)
y = value of y (water supplied)]

$$r_{xy} = \frac{9(193225425.12) - (40673.7)(42724.8)}{\sqrt{(9(183949204.53)^2 - (40673.7)^2 (9(202969428.48)^2 - (42724.8)^2}}$$

$$r_{xy} = \frac{1739028825 - 1737775697.8}{\sqrt{1655542840.8 - (1654349871.7)(1826724856.3) - 1825408535}}$$

$$r_{xy} = \frac{1253127.2}{\sqrt{1192969.1)(1316321.3}}$$

$$r_{xy} = \frac{1253127.2}{\sqrt{(1192969.1)(1316321.3)}}$$

$$r_{xy} = \frac{1253127.2}{\sqrt{1570330650000}}$$

$$r_{xy} = \frac{1253127.2}{1253128.454}$$

$r_{xy}$ = 0.999999

From the result of the correlation coefficient (0.999999), there is high positive linear relationship between the household's water supply and water consumed in the study area.

**Hypothesis:**

**$H_O$** = There is no significant relationship between household water supply and consumption in the study area.

Level of significance = 0.05

Significance level = 2 degree of freedom

Statistics = $t_{cal} = \frac{r\sqrt{n-2}}{\sqrt{1-r}}$

Where - r = correlation coefficient (0.999999)

n = number of observation (9)

$$t_{cal} = \frac{0.999999\sqrt{9-2}}{\sqrt{1-0.999999}}$$

$$t_{cal} = \frac{0.999999(2.64575)}{\sqrt{0.000001}}$$

$$t_{cal} = \frac{2.6457}{0.001}$$

$t_{cal} = 2645.7$

$t_{tab} = 1.67$

The decision rule is that reject null hypothesis if calculated value is greater than critical value at 0.05 significance level. Since $t_{cal}$(2645.7) is greater than $t_{tab}$ (1.67), we reject null hypothesis ($H_O$) and accept alternative hypothesis ($H_1$). Therefore, it can be concluded that there is significant relationship between household water supply and consumption in the study area.

**Conclusion and Recommendations**

Findings from the study indicate that demand for domestic water varies in terms of household size which shows that the number of people found in a household determines the quantity of water needed for domestic purpose. This study has further shown that variation in domestic water use pattern in the study area could be attributed to the availability of water and economic status of residents. The high rate of domestic water wasting in the high income and middle-income groups like Igalogba, Ega, Inachalo and Ede-Adejpo in the study area was a function of their economic status as well as the easy access to domestic water. Although residents of the rural areas belonged to the low income group like Olokpoji and Ojogagala consumed less water because they are not able to afford water consuming appliances or engage in water guzzling activities. The study also revealed that the government played very

little role in the supply of water in the study area because majority of the water sources are owned by private individuals.

The study concluded that there is need for the intervention of Government in the provision of adequate water to every individual in the study area. If we are to meet the sustainable development goal six (6) set by the international bodies, there is need for enforcement of water legislation and policies related to water resource planning, development and management. Also, it is evidence from the study that domestic water use on daily basis in Idah is not static but rather under the influence of certain variables. In order for policy makers and water planners to effectively manage water resources, they must consider the factors influencing water demand, supply and consumption in the area.

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