

Spatial Distribution of Water Supply and Consumption in Ilorin West Local Government Area, Kwara State

Agaja, T. M. and Ajetunmbi, T. V.

Department of Geography and Environmental Management, Faculty of Business and Social Sciences, University of Ilorin, P.M.B. 1515, Ilorin, Nigeria.
specialgel@yahoo.com , agaja.tm@unilorin.edu.ng 07032329906

Abstract: The search for water and its resources have progressively increased over time. This is majorly attributed to the fact that the resources are faced with excessive extraction resulting from rapid population growth. The aim of the study is to assess the various challenges of water supply and consumption in Ilorin West Local Government Area (LGA), Kwara State. The specific objectives are to: i) assess the current water supply pattern in the study area; and ii) examine the relationship between socio-economic characteristics and pattern of water consumption in Ilorin west local government. Global Positioning System (GPS) was used to locate the available water facilities in the study area so as to analyse the pattern of distribution. Systematic sampling technique was used to administer 400 copies questionnaires were administered to ?? in the study area. Table, chart, bar graph and Chi-square were used to summarize and analyse the data gotten through the questionnaire. The result of the analysis show that there was a great significant relationship between the household size and the quantity of water consumed (calculated value 46.577 is greater than the table value 15.34); educational level of people did not have any impact on the quantity of water consumed (the calculated value 1.212 is less than the tabulated value 15.34) and also there was significant impact of distance taken to access the water on amount of water consumed (the calculated value 29.4544 is greater than the table value 15.34). The study recommends that maintenance culture should be imbibed by the residents to facilitate continuous supply of water and prolong the life cycle of these facilities and Government intervention through provision of water facilities within 2km radius for easy accessibility of water in the study area.

Keywords: Water, Water Supply, Consumption, Spatial Distribution

Introduction

For decades, water supply and distribution has been a challenge in most third world and developing nations. Water resources are becoming increasingly scarce in many parts of the world due to technological development, increased demand, climate change and resulting drought increased demand is as a result of explosive population growth. The availability of reliable and clean supply of water is one of the most important determinants of our health. Thus, water use (demand) is a function of availability (supply). Yazdani *et al.*, (2011) observed that lives are being endangered and economic growth restricted as a result of increasing water stress in

many developing countries. Also, Kala *et al.*, (2007) noted that disparity will likely hit additional areas as the population grows because many parts of the world experience water deficit. According to Ifabiyi and Ahmed (2011), one of the most important problems of urbanization across the world is that of water supply, because of its role in natural health and economic development. They reported that an important aspect of urban water supply is the understanding of household water demand; the household is a complex phenomenon which varies on the basis of socio-economic factors.

Access to safe drinking water is a pressing social policy issue globally (Spence and Walters 2012). Various international institutions continue to hold discussions

amongst themselves and producing progress reports on the various issues surrounding water. The World Water Development Report (WWDR), The Global Analysis and Assessment of Sanitation and Drinking Water (GLAAS) report and the progress report of the WHO/UNICEF Joint Monitoring Programme for Water and Sanitation (JMP), (WWDR 2014) are some of the reports produced periodically on water. The World Water Development Report (2014) emphasizes that 'water is a critical natural resource upon which all social and economic activities and ecosystem functions depend'. Despite the fact that water is a critical resource, access to it remains a daunting challenge to many people the world over.

Ilorin is the capital city of Kwara State but cannot boast of an effective and a reliable water distribution network to serve her inhabitants. The unavailability of an effective water distribution network in Ilorin in-turn results to the numerous problems of water such as water scarcity, water poverty, water contamination, and among others which has direct and indirect impacts on the livelihood of the inhabitants of Ilorin.

Presently, Ilorin metropolis is witnessing almost all the water distribution problems facing most cities in the developing countries of the world. These ranges from the inadequacy of water supply into the distribution system as well as inefficient distribution system, for instance; there are dilapidated and unevenly distributed storage tanks (reservoir) serving the entire metropolis, which was initially constructed to serve a very small population about 40 years ago (Ifabiyi and Ahmed, 2011). At that time, the water distribution network only covered the built-up areas when the population was small and the new areas of expansion due to an increase in population were left out. In addition, there is a total lack of database that will guide the operators to determine the number of consumers and the water demand within their area of operation. From the aforementioned analysis, water has a

distribution problems in Ilorin metropolis can be categorized thus; inadequacy of the existing water supply, with only one reservoir of 10,000m³ capacity supplying just about 30% of the daily water demand for Ilorin metropolis (Ajadi, 1996) Another problem is ineffective distribution network and inadequacy in the provision of reservoirs to serve the entire study area due to expansion caused by increase in population, as the existing water distribution network only covers about 60% of the study area. However, the few pipelines that were laid at inception for the effective distribution of water are now seriously corroded. The other sources of water in Ilorin metropolis are privately owned boreholes and dug well, this makes water unevenly distributed. In many instances, many of the shallow wells do dry up, particularly in dry season. This study assessed water supply and consumption in Ilorin West Local Government (LGA), Kwara State, Nigeria.

Study Area

Ilorin is the capital city of Kwara State in Nigeria. Ilorin is home to four (4) local government areas namely Asa, Ilorin-West, Ilorin-East and Ilorin-South LGAs. It located on latitude 8°30' and 8°50'N and longitude 4°20' and 4°35'E of the equator. Ilorin city occupies an area of about 468sqkm (Kwara State Government, 2017). It is situated in the transitional zone within the forest and the guinea savannah regions of Nigeria. The 2006 census put the population of Ilorin city to about 777,667 (Federal official Gazette 2006). The last known projected population in Ilorin computed using the population growth rate of +2.5 per cent as of 2015 is 973,872. This was 0.47% of the total Nigerian population. Therefore, since the population growth rate in Ilorin is +2.5% per year as at 2015, Ilorin population in 2017 would be approximately estimated to be 1,023,799 (projected population). Ilorin west local government

population of 364,666 at the 2006 census. With the help of population projection, the

population of Ilorin west in 2017 could be estimated to be 480,083.

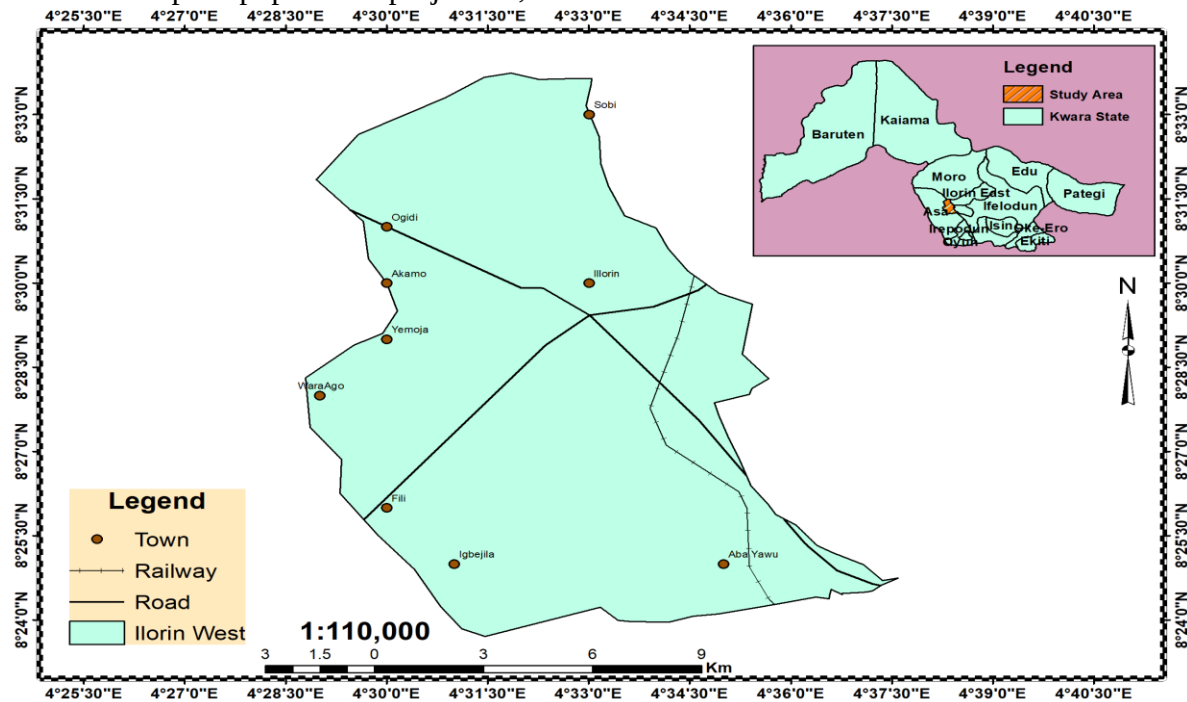


Figure 1: Ilorin West Local Government Area, Kwara state, Nigeria.

Source: Adapted from Google Map (2018)

Ilorin experiences humid tropical climate characterized by wet and dry seasons (Agaja, 2019). The wet season commences towards the ending of March and ends in October. The dry season starts November and spans to February. The dry season in Ilorin is characterized with dusty wind from the northern part of Nigeria referred to as the Harmattan and hot temperature which extend from November to March. The total annual rainfall in the area is about 1200mm (Olaniran 2002). The diurnal regime of moderate rain in the area shows clear night-time rainfall maximum (Olaniran, 1988). Relative humidity at Ilorin in the wet season is between 75 to 80% while in the dry season it is about 65% (Tinuoeye, 1990). The daytime is sunny. The sun shines brightly for about 6.5 to 7.7 hours daily from November to May (Agaja, 2019). The wet season is characterized with high humidity extending from April through November, extremely high temperatures is usually experienced between February and

April which usually exceed 30°C (Jacob et al., 2015 as cited by Agaja, 2019).

The derived Savannah dominates the vegetation of the area. The vegetation type comprises tall grass which is interspersed with scattered trees. Amongst the grasses in the area include spear grass, elephant grass, and goat weed of height of 3.5 meters. Trees in the area include shear butter, acacia and locust beans trees while cultivation of Yam, Cassava, Guinea-corn, sweet potato and they constitute the main staple food aside cereals (Ajadi, *et al.*, 2011).

Ilorin is majorly drained by Asa River which flows in a South-north direction (Oyegun, 1985, Ajibade and Ojelola, 2004). The drainage system of Ilorin is dendritic in nature and is dominated by the Asa River, which flows from south to north and divides the city into two parts, the western and eastern parts. The western part represents the indigenous area. The eastern part coincides with the modern layout. Major rivers draining the city are Asa, Agba, Alalubosa,

Okun, Osere, Aluko (Ifabiyi and Ashaolu, 2013)

The inhabitants of the local government are Yoruba, Fulani, Hausa and Nupe other nationalities include the Igbo, Urhobo, Itsekiri, Ijaw etc., although it is highly heterogeneous, accommodating people from various other tribes who either engage in commercial activity or work in the public service (Ilorin West Secretariat, 2018). Although, Ilorin developed as an administrative Centre, both economic and social activities have greatly influenced its growth in recent times. The major occupations of the indigenes are farming, pottery making, and weaving. There are greater percentages of the people who are traders, while others are self-employed in different fields such as mechanics, carpentry and at the same time, a large number of the population work as civil Servants, Banker, Teachers, etc.

Materials and Methods

The types of data required for this study include data on the pattern of water consumption, socio-economic characteristics of the respondents, quantity of water used in different household, challenges facing water supply for residents and problems of water supply among others.

Global Positioning System (GPS) was used to locate the nearest water storex/outlet provided by the state government so as to analyze the spatial pattern of water supply in the area. The primary data was gotten through questionnaire administration, field observations and oral interviews. Using Taro Yamane's (1973) formula with the sampling error of 0.05 at 95% confidence interval, four hundred (400) respondents were interacted with using questionnaire which were administered to households in the twelve wards of the local government area and their responses analysed. About 34 questionnaires was administered in each ward using systematic random sampling to select households on streets. The target population

in the households were women as in most communities, women are the ones that usually go in search of water. Four hundred (400) respondents as the sample size were derived from the 2017 projected population of Ilorin West LGA which is 480,083 using a growth rate of 2.5% from 2006 census. Both descriptive (table, chart, and bar graph) and inferential statistics(chi-square) of data analysis were applied to the analysis of the data

Result and Discussion

Assessment of Water Supply Pattern in the Study Area

The current water supply pattern in the study area varies from one location to another. Areas like Baboko, Ajikobi, Alananu, Oko erin have a clustered pattern. Most of the water supply facilities are mostly located around mosque due to the use of water for daily prayers. This is in line with Smith and Ali (2006) reporting that characteristic water use patterns were found principally among Muslim and Jewish communities. They also reported that water use change during the Ramadan Muslim month is by far the most significant and prominent because of the adherence to the religious requirement to pray five times a day is greatly increased. Some of the water facilities are also found along the roadside indicating a linear pattern. Areas like Adewole and Ebejila have few water supply outlets because most of the inhabitant of this area have a private water supply (Table 1 and Figure 3).

Table 1: GPS Coordinate of Water Supply Facilities in Ilorin West LGA

S/N	Longitude	Latitude	Location
1.	4.5575	8.501806	Ubandawaki 1
2.	4.557583	8.501944	Ubandawaki 2
3.	4.557306	8.500472	Ubandawaki 3
4.	4.556306	8.502111	Ubandawaki 4
5.	4.557	8.507639	Ubandawaki 5
6.	4.5565	8.506833	Ubandawaki 6
7.	4.555806	8.506611	Ubandawaki 7
8.	4.552306	8.504111	Ubandawaki 8
9.	4.552722	8.504167	Ajikobi 3
10.	4.535972	8.499583	Oju Ekun 2
11.	4.535778	8.499472	Ajikobi 4
12.	4.54225	8.500667	Ajikobi6
13.	4.533	8.501	Ajikobi 1
14.	4.533556	8.501306	Ajikobi 2
15.	4.538611	8.497278	Baboko 4
16.	4.539028	8.495667	Baboko1
17.	4.54225	8.492833	Baboko 2
18.	4.537667	8.481917	Baboko 3
19.	4.5365	8.481861	B. Alanamu 1
20.	4.545556	8.495167	B. Alanamu 3
21.	4.543639	8.496778	B. Alanamu 2
22.	4.541833	8.496056	B. Alanamu S
23.	4.542028	8.495917	B. Alanamu 4
24.	4.540361	8.496806	B. Alanamu 6
25.	4.541278	8.497278	B. Alanamu 7
26.	4.539611	8.497389	Ajikobi S
27.	4.539028	8.497306	Ajikobi 1
28.	4.53625	8.500472	Oloje 1
29.	4.536556	8.501472	NULL
30.	4.500806	8.504889	Ogidi 3
31.	4.546972	8.507083	Oloje 2
32.	4.537389	8.5095	Oloje 3
33.	4.515778	8.510528	Oloje 4
34.	4.507417	8.516222	Oloje 5
35.	4.503833	8.518361	Oloje 6
36.	4.501639	8.519556	Ogidi 1
37.	4.494583	8.525111	Ogidi 2
38.	4.517778	8.521389	Adewole 1
39.	4.517556	8.519944	Adewole 3
40.	4.513639	8.483028	Adewole 2
41.	4.509722	8.479889	Adewole 4
42.	4.512722	8.475194	Egbejila 2
43.	4.510833	8.457472	Egbejila 3
44.	4.497611	8.431694	Egbejila 4
45.	4.498361	8.430639	Egbejila 5
46.	4.501306	8.431222	Egbejila 1

47.	4.519139	8.415333	Oko Erin 1
48.	4.496806	8.434447	Oko Erin 2
49.	4.537	8.473917	Oko Erin 3
50.	4.537944	8.475472	Oko Erin 4
51.	4.538444	8.475528	Oko Erin 5
52.	4.5375	8.47625	Badari 2
53.	4.537361	8.476222	Badari 1
54.	4.545806	8.482917	Badari 3
55.	4.546861	8.483333	M.Ngeri 2
56.	4.547111	8.484167	M.Ngeri 1
57.	4.544667	8.487806	M.Ngeri 3

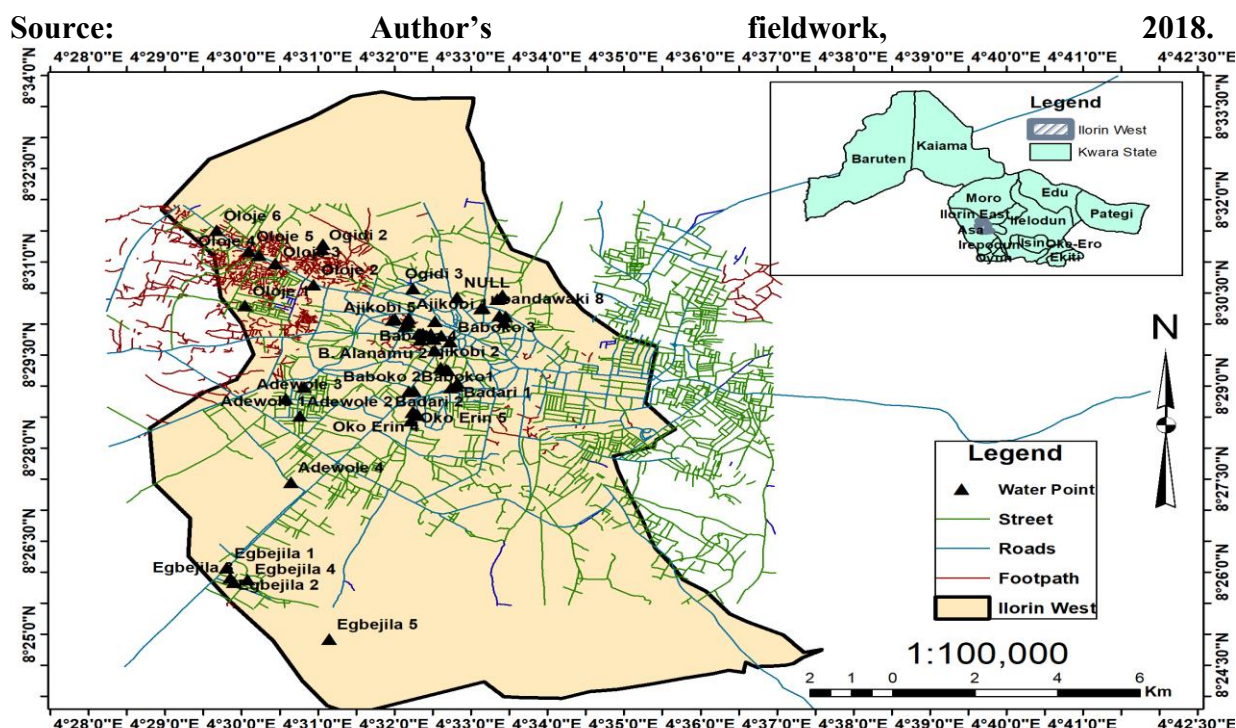


Figure 2: Water Supply Pattern in Ilorin West LGA of Kwara State.

Source: Authors fieldwork (2018)

Socio-Economic Characteristics of the Respondents

Table 2 reveal that majority of the respondents 166 (41.5%) are above 50 years of age, 151(37.8%) of the respondents are found between 41 to 50 years, 48(12%) of the respondents were found between age 31 to 50 years, people between age 21 to 30 years accounted for 20 (5%) while the remaining 15 (3.8%) are below 20years of age. This implies that majority of the people in the study area are aged. It was observed that 230(57.5%) of the respondents are male while 170(42.5%) are female. The

implication of this is that majority of the inhabitant are male. It also showed that 36(9%) are single, 317(79.2%) were married, 25(6.4%) of the respondents are divorced while the remaining 29(7.2%) are widowed. This revealed that majority of the inhabitants of the study area are married. Lastly, 45 (11.2%) of the respondents in the study area are civil servants, 75 (18.8%) of the respondents engaged in business activities, 198 (49.5%) of the respondents are trader while the remaining 82(20.5%) of the total respondents practices other occupational

activities such as farming, hunting, artisan etc (Table 2).

Furthermore, it was observed that 46 (11.5%) of the total respondents accounted for 3 people per household, 64(16%) of the respondents from a household of 4 people, 61(15.2%) of the respondents are from

household size of 5, 77(19.2%) accounted for with family size of 6 people while 152 (38%) are of family size of above 6 people (Figure 2).

Table 2: Socio-Economic Characteristics of the Respondents

Age	Frequency	Percent
Below 20yrs	15	3.8
21-30yrs	20	5.0
31-40yrs	48	12.0
41-50yrs	151	37.8
above 50yrs	166	41.5
Total	400	100.0
Sex	Frequency	Percent
Male	230	57.5
Female	170	42.5
Total	400	100.0
Marital status	Frequency	Percent
Single	36	9.0
Married	317	79.2
Divorced	25	6.4
Widowed	29	7.2
Total	400	100.0
Education Level	Frequency	Percent
None	45	11.2
Primary	49	12.3
Secondary	223	55.8
Tertiary	83	20.8
Total	400	100.0
Occupation	Frequency	Percent
Civil servant	45	11.2
Businessman	75	18.8
Trader	198	49.5
Others	82	20.5
Total	400	100.0

Source: Author's Fieldwork, 2018.

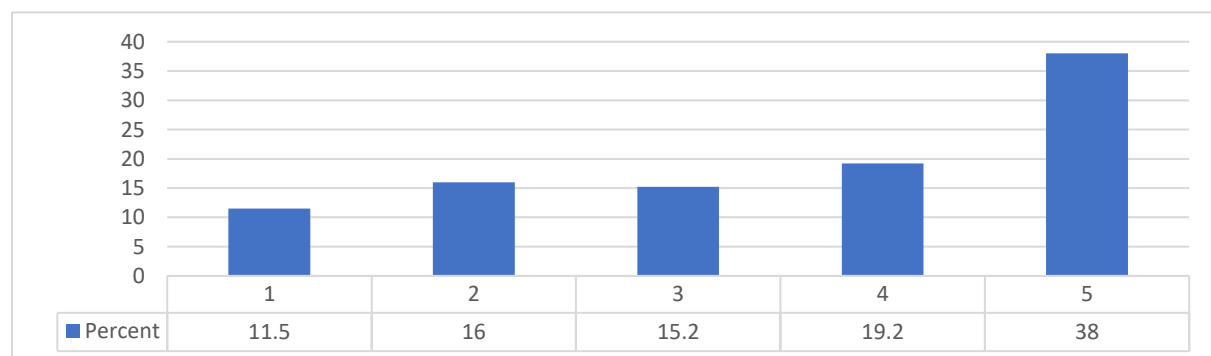


Figure 3: Household Size of the Respondents. Source: Author's Fieldwork, 2018.

Table 4 depicts household size and quantity of water consumed by the respondents in the study area. From the result revealed that there was significant difference in between the household size and the quantity of water consumed with the calculated value 46.577 greater than the table value 15.34. As a result, the null hypothesis is rejected. This implies that the larger the household size, the more the quantity of water consumed in the study area. The result is not far-fetched from the finding of Ifabiyi and Ogunbode (2014)

which state that the relevance of household size in domestic water use cannot be overlooked. In their study, it was revealed that household size is one of the main factors affecting water quantity usage. This implies that the larger the household is, the likely the higher the domestic water use. This finding is also similar to those of Keshavarsi *et al* (2006) and Ayansola *et al.*, (2010) where household size was observed to be one of the determinants of domestic water demand.

Table 3: Household Size and Quantity of Water Consumed

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	46.577 ^a	16	.000
Likelihood Ratio	53.597	16	.000
Linear-by-Linear Association	1.851	1	.174
N of Valid Cases	400		
a. 13 cells (52.0%) have expected count less than 5. The minimum expected count is 1.15.			

Table 5 and Figure 6

shows the educational level of the respondents in the study area. It was observed that the highest proportion of the respondents 223 (55.8%) attended secondary education, 83 (20.8%) of the respondents obtained tertiary education, 49 (12.3%) are primary school certificate holder while the remaining 45(11.3%) does not have any on domestic water use.

formal education. This implies that the majority of the people in this area are literate and as a result, more water would be used for basic activities such as washing, flushing, car wash etc. This is not farfetched from UNESCO (2012) and Ifabiyi (2011) reporting that the literacy level is equally high and it has been found to have influence

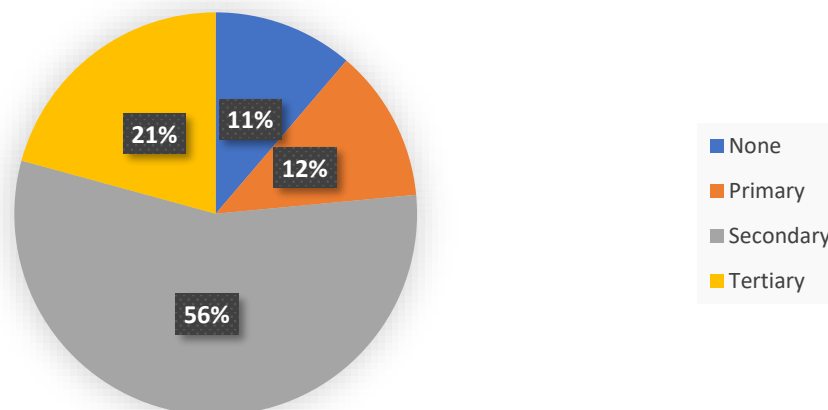


Figure 4: Educational Level of the Respondents

Source: Author's Fieldwork, 2018.

Table 4: Educational Level of People and the Quantity of Water Consumed

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	1.2612 ^a	16	.000
Likelihood Ratio	90.591	16	.000
Linear-by-Linear Association	8.978	1	.003
N of Valid Cases	400		
a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .18.			

Table 6 reveals that the value of the calculated value (1.212) is less than the tabulated value (15.34). Therefore, the null hypothesis is accepted. The implication of this is that the educational level of people did not have any impact on the quantity of water they consumed. On contrary, the findings of Keshavarzi *et al.*, (2006) suggest higher education of the family head leads to more concern to use water for hygiene in Iran. Also, Ifabiyi (2011) reported that the literacy level is equally high and it has been found to have influence on domestic water use.

The effect of distance on the amount of water consumed cannot be overemphasized. The result from the Table 7

reveals that the calculated value 29.4544 is greater than the table value 15.34. Therefore, there is a significant relationship between the distance to the source of water and the quantity of water consumed. This implies that distance has a significant effect on the amount of water consumed as the respondents will prefer to go shorter distances in search of water and the farther the distance the less the amount of water quantity consumed. This is in line with the study of Sandiford *et al.*, (1990) observed decrease in the distance to the water source from 1000 to 10 m drives water use will increase up to 20%.

Table 5: Distance Decay and Amount of Water Consumed

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	29.4544 ^a	16	.000
Likelihood Ratio	121.750	16	.000
Linear-by-Linear Association	4.081	1	.043
N of Valid Cases	400		
a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .15.			

Conclusion and Recommendations

In conclusion, the spatial distribution of water supply and consumption in the study area is clustered pattern while some parts of the study area indicated a linear pattern. Also, distance is a major factor contributing to the amount of water consumed per household in the study area as people are

not ready to go long distance to get water for home consumption. The study recommends government intervention through provision of more water facilities closer to households for easy accessibility of water as well as community participation in developmental activities through self-contribution to provide water facilities in the study area.

References

- Agaja, T.M. (2019). Deforestation and Micro-Climate of Ilorin and its Environs. *Analele Universității din Oradea, Seria Geografie*, 29(2), 77-85. <https://doi.org/10.30892/auog.292108-806>
- Ajadi, B.S., Adeniyi A., Afolabi M. T. (2011). Impact of Climate on Urban Agriculture: Case Study of Ilorin City, Nigeria. *Global Journal of Human Social Science* Volume 11 Issue 1, Type: Double Blind Peer Reviewed International Research Journal Publisher: Global Journals Inc. (USA).
- Ajibade, L.T. and Ojelola A.O (2004), Effects of Automobile Mechanics Activities on Soils in Ilorin Nigeria *Geo - Studies Forum an International Journal of Environmental and Policy Issues* 2 (1): 18-27.
- Ayansola A. M., Sule B. F., Salami A. W., (2010) Modelling of residential water demand at household level in Ilorin, Nigeria. *J Res. Information in Civil Engineering* 7(1).
- Ifabiyi, I.P, (2011). Willingness to Pay For Water at Household Level in Ilorin, Kwara State, Nigeria. *Global Journal of Human-Social Science Research*, [S.l.], v. 11, n. 2., ISSN 2249-460X
- Ifabiyi I.P, and Ashaolu E.D. (2013) Analysis of the Impacts of Rainfall Variability on Public Water Supply in Ilorin, Nigeria, *Journal of Meteorology & Climate Science* 11(1), 18-26.
- Ifabiyi, I.P. And Ahmed, A. (2011) Determinants Of Household Water Demand In Traditional City: Example From The Western Axis Of Ilorin, Nigeria. *Asia Africa Journal Of Economics And Econometrics* 2 (2): 335 – 408.
- Ifabiyi, I.P. and Ogunbode, T. (2014). Determinants of domestic water consumption in a growing urban centre in Osun State, Nigeria. *African Journal of Environmental Science and Technology*. 8. 247-255. [10.5897/AJEST2013.1627](https://doi.org/10.5897/AJEST2013.1627).
- Ilorin Atlas (1982) Geography Department University Press, Ilorin, Nigeria.
- Keshavarzi A. R., Sharifzadeh M., Kamzar H. A., Amin S., Keshtkar S. H., Bamda A. (2006). Rural domestic water consumption behaviour: A case study in Ramjerd area, Fars Province, Iran water resources. 40:1173-1178
- Kwara Water Corporation (2010) Water Supply in Kwara State: The Journey So far. A paper presented for members of Board of Directors, Kwara State Water Corporation.
- Olaniran OJ (2002). Rainfall anomalies in Nigeria: The Contemporary Understanding. An Inaugural Lecture delivered on April 25, 2002, University of Ilorin.
- Olaniran, O. J. (1988a). The distribution in space of rain days of rainfall of different daily amounts in the tropics: Nigeria as a case study, *Geoforum*. 19(4): 507 – 520
- Olaniran, O.J. *Arch. Met. Geoph. Biocl., Ser. B* (1982) 31: 287. <https://doi.org/10.1007/BF02278298>
- Oyegun, R.O. (1985), “The Use and Waste Water in a Third War World City”, *Geojournal*, Reidel Publishing Company, 10,2, 205-210.
- Smith, A. and Ali, M, (2006) Understanding the Impact of Cultural and Religious Water Use, *Water and Environment Journal* 20, 203–209. Print ISSN 1747-6585, doi:10.1111/j.1747-6593.2006.00037.x

