

DAILY WATER CONSUMPTION PATTERN AND TIME SPENT IN COLLECTING DRINKING WATER IN IJUMU LOCAL GOVERNMENT AREA KOGI STATE

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Abstract

This study examines the pattern of daily per capita domestic water consumption and time spent in collecting water in Ijumu Local Government Area of Kogi State. Data were collected from 437 households in the 15 wards of the local government area. The data required in this study were obtained through primary source, using questionnaire administration. 437 copies of questionnaire were statistically derived based on the 2006 population census of the study area. The 437 copies of questionnaire were administered using systematic random sampling approach. Data collected were interpreted with descriptive methods and the use of Pearson product moment correlation methods. The results of the analysis show the various sources of water from which households collect water; hand dug well 40%, bore hole 34%, river/stream 13%, 12% occasionally collects water from community pipe borne water while 1% respondents collect from other sources including water vendors. Due to the unreliability of the water supply from pipe borne water, households seek alternative water sources to augment their water needs. In addition, 72.6% of the respondents spend 30 minutes or less to collect water from various water sources. Majority of the respondents consume more than 20 litres/capita/day. The results of the correlation analysis ($r = -0.95$) show an inverse and significant relationship between quantity of water consumed and time spent in collecting water. The paper recommends provision of potable water within the reach of the people to prevent outbreak of water related diseases and for purposes of time management.

Keywords: Daily, Pattern, Water Consumption, Time Spent

Introduction

Water is an important natural resource that is essential for human survival, dignity and the ecosystems health in any society; yet this fundamental resource is unevenly distributed. Almost one-fifth of the world's population lives in regions where water is scarce and one-quarter suffer from severe water shortage (UNDP, 2006). The total volume of hydrosphere of the earth is distributed in the oceans (97.2 %); in glaciers, ice caps and ice sheets (1.8%), ground water (0.9%), fresh water in lakes, inland seas and rivers (0.02%) and atmospheric water vapour (0.001%) (Baboo, 2009). According to the United Nations concept of water use standard for basic need of human, all people, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and quality equal to their basic needs (United Nations 1977). Water is essential for proper functioning of the body, and its vitality is further reflected in the deleterious health effects it can cause when contaminated. Thus, the World Health Organization (2004), put people without access to an improved water supply in the world in year 2002 to be 1.1 billion, and 2.3 billion people contacted diseases caused by unhygienic water; each year 1.8 million people die due to diarrhoea diseases, and 90% of these deaths are of children under five years. In addition, the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation (2013), estimated that 768 million people still use unsafe

drinking water sources. Also, the UNDP (2006) report, half the hospital beds in developing countries are filled with people suffering from diseases caused by poor water, sanitation and hygiene.

Past literature such as Howe and Linaweaver (1967); Jones and Morris (1984); Arbués et al. (2004); and Garcia and Reynaud (2004) indicate the significant relationship that exist between domestic water consumption and price. Also, Agthe and Billings (1987); Arbués and Villanua (2006); Arbués et al. (2003); Baumann et al. (1998); Gaudin et al. (2001) and Hoffmann et al. (2006) demonstrated the influence of income on domestic water consumption. However, a review of some literature argues that apart from economic factors, domestic water consumption is also significantly influenced by factors such as population growth (Agthe and Billings (1980); Nieswiadomy (1992); weather and climate (Maidment and Miaou (1986)). In order to address the demand for water, there have also been calls to understand domestic water use behaviour and the factors that influence it (Russell and Fielding, 2010). In addition, the shortfall in water requirement is due to differences in availability and supply (UNICEF, 2009). Thus, any effort to manage water resources in rural areas through rural water supply programmes by policy makers must consider the factors influencing water consumption behaviour from a spatio-temporal perspective. Therefore in order to contribute to the growing body of literature on factors influencing water consumption, this paper examines the significance of time spent in collecting water as a factor influencing domestic water consumption in Ijumu Local Government Area of Kogi State.

Study Area

Ijumu Local Government Area is located in the western part of Kogi State. It has its headquarter in Iyara and it is located between latitude 7° 30` and 8° 10` North of the Equator and between longitude 5° 45` and 6° 15` East of the Greenwich Meridian (Ifabiyi, et al 2010.) Ijumu LGA has an area of 1,306 km². The climate of belongs to the humid tropical climate (Aw climatic region) with two distinct seasons. Wet season in the area occurs between the months of April and October; and this exhibits double maxima rainfall pattern with peak periods in June and September and a dry period in July. The mean annual total rainfall is about 1,500mm with relative humidity of about 75% (Ifabiyi et al 2010). The rate of evaporation is high, about 75mm per annum. The dry season is experienced between the months of November and March. Mean annual temperature is about 27.7°C and a relative humidity of 30% in dry season.

The relief of the Local Government Area is gently undulating with series of inselbergs and ridges. The relief is prominently dominated by Okoro- Agbo Mountain in Ogidi. A number of rock outcrops are also visible. The study area is drained mainly by the River Oyi which originates from the Yoruba highland and drains northeast into River Niger. The drainage pattern is dendritic in nature. Ijumu LGA is underlain by Basement Complex, and the depth of weathered regolith has been discovered to be between 15-25meters thick across the L.G.A. (Ifabiyi et al, 2010). These crystalline rocks indicate its potential as regolith aquifer. It has some hand dug wells and boreholes and it also has ferruginous tropical soil. The soil type has both sandy and clayey deposits lying on each other. The sandy deposit is characterised by low water holding capacity which encourages infiltration and the clayey deposits beneath results in water logging during rainy season, thereby encouraging run off generation.

The growth of Ijumu has been greatly influenced by its transportation development and the socio-economic activities of the people. According to 2006 population census, it has a population of 119,929. The dominant ethnic group is Yoruba. Major socioeconomic activities of the people are: farming,

hunting, lumbering, trading, artisans and civil servants. Farming activities is carried out by both men and women and it's majorly rain fed. The main economic trees are coffee, cocoa, and cashew nuts. Annual crops in the study area include: yam, maize, guinea corn, beans, cassava.

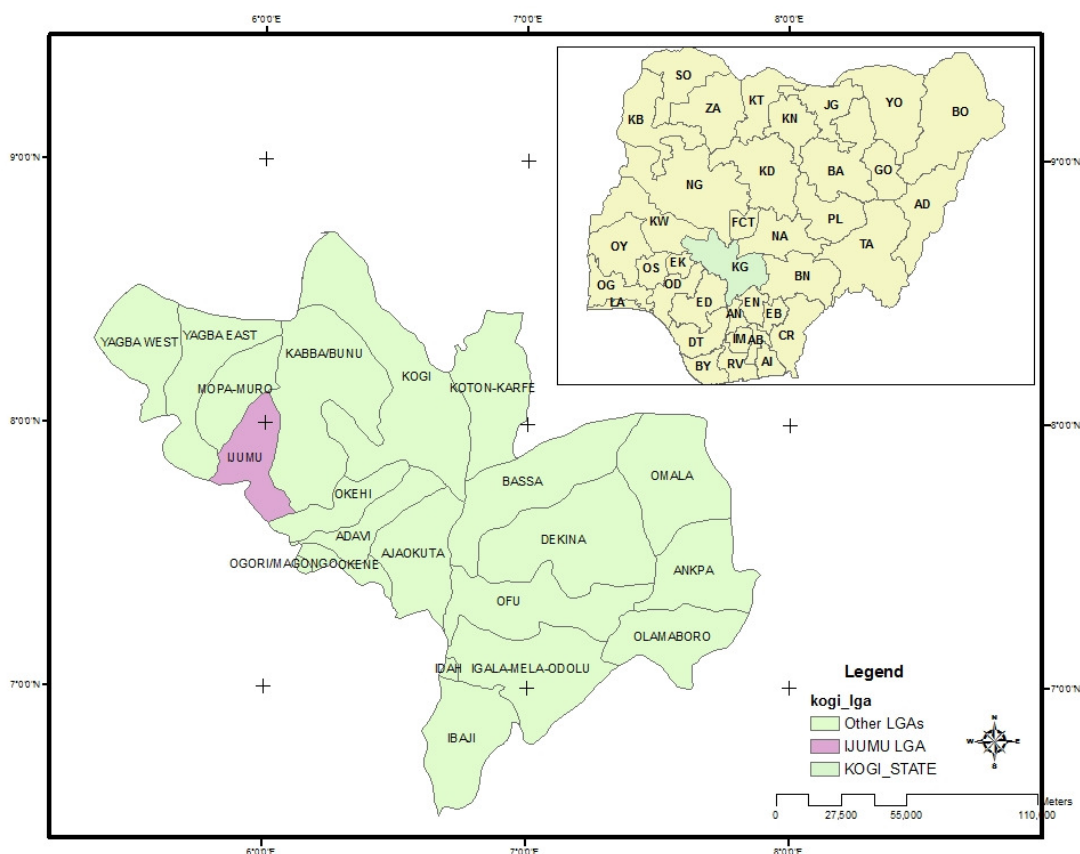


Fig 1: Map of Kogi State showing Ijumu Local Government Area with Nigeria as Inset

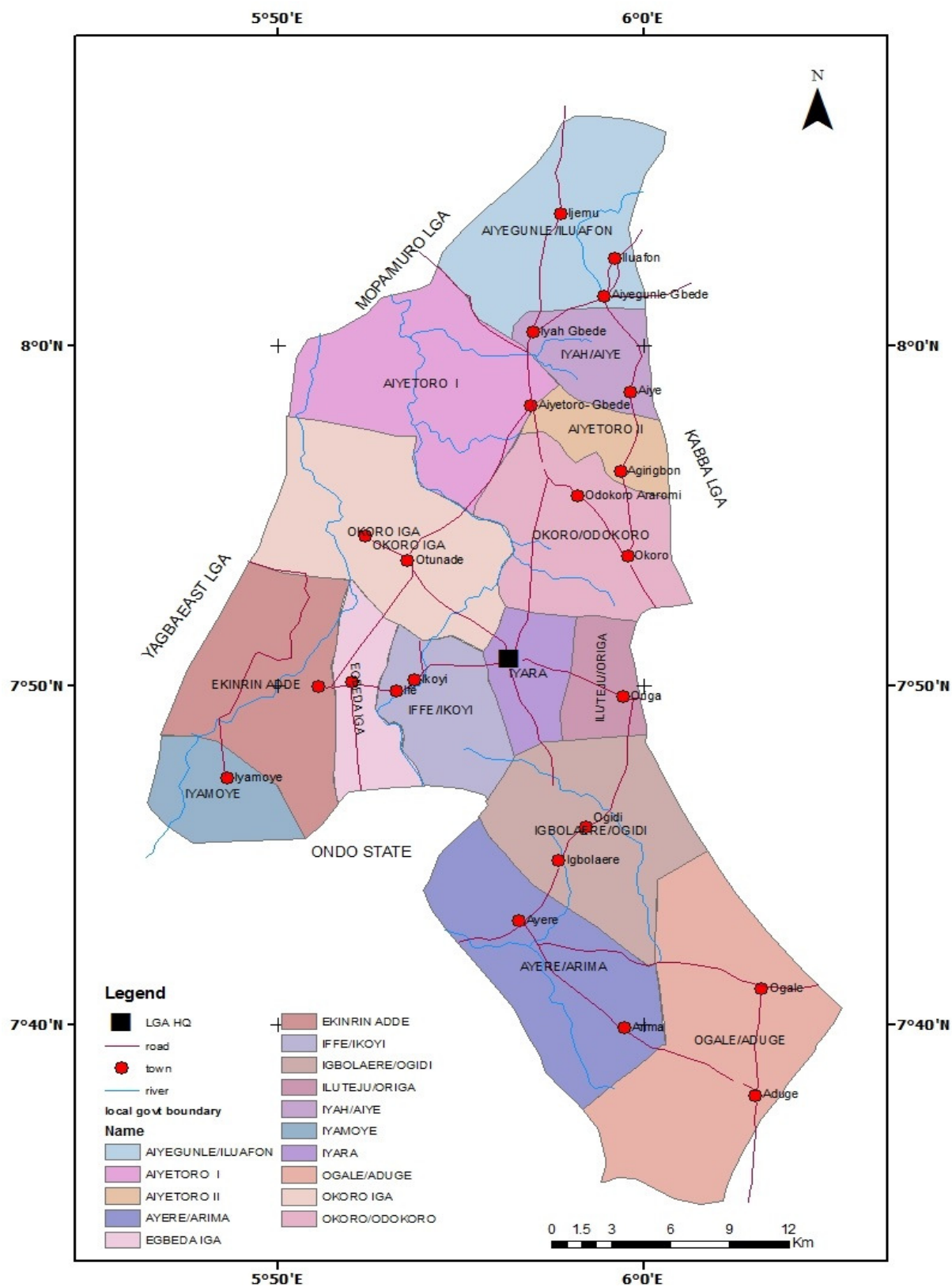


Fig 2: Ijumu Local Government Area and its Political Wards

Source: Office of the Surveyor-General Kogi State (digitised by the Authors).

Materials and Methods

Data were collected on sources of water supply from 437 heads of households using interviewer-administered questionnaire and personal observation. House hold units are identified as residential units under a common head. The head of households were either male or female, but females in a situation if the wife is a widow, or the eldest person in the house in situation where both couples are separated. Also, both gender were considered because water is an important resource needed by every one for survival. A structured interviewer-administered questionnaire using systematic random sampling techniques was used to collect information on daily water consumption pattern and time spent in collecting water within the study area. The first sampled house was picked from a ballot of 3 members to ensure an unbiased start by giving equal opportunity to all potential members. That is, the systematic random selection of every 3rd households on a major road within the villages of the LGA. Twenty copies of questionnaire were administered in each of the 26 villages in the study area making a total of 500 copies of questionnaire administered. The copies of questionnaire were analysed using statistical package for social sciences (SPSS) version 20.0. The data were subjected to multiple correlation analysis, bar chart and pie chart.

Results and Discussion

Socioeconomic Characteristics of Respondents

Age and Sex Distribution of Respondents

In Figure 3, out of the 437 household heads, 26.1% were above age 60; while, 48.2% were males and 48.2% were females. This age range has the highest number of respondents out of the household heads sampled; this is expected because the household heads falls within this age range.

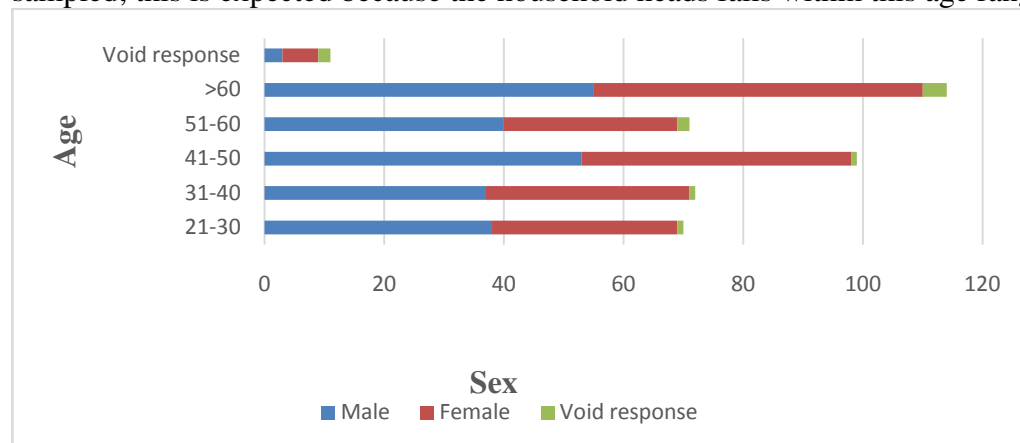


Figure 3: Distribution of Respondents according to their Sex and Age

Source: Authors field survey, 2014

Family Size and Education Status

Figure 4 revealed that majority (37.3%) of the respondents fall within the family size range of 4-6 category. On the educational qualification, people without no formal education are about 26.5%, those with primary 21.1%, quranic 12.8% secondary 19.9% and tertiary 16.7%. This shows that about 73.5% of the respondents attain formal educational qualification. The family size with the highest form of educational qualification are of the 7-9 category; as about 23% of this family size attended tertiary education. The family size category 13 and above have the lowest form of education, accounting for

about 33.3% of the total sample population. Large family size and low income seems to be the reasons for the low education qualification of this category of respondents.

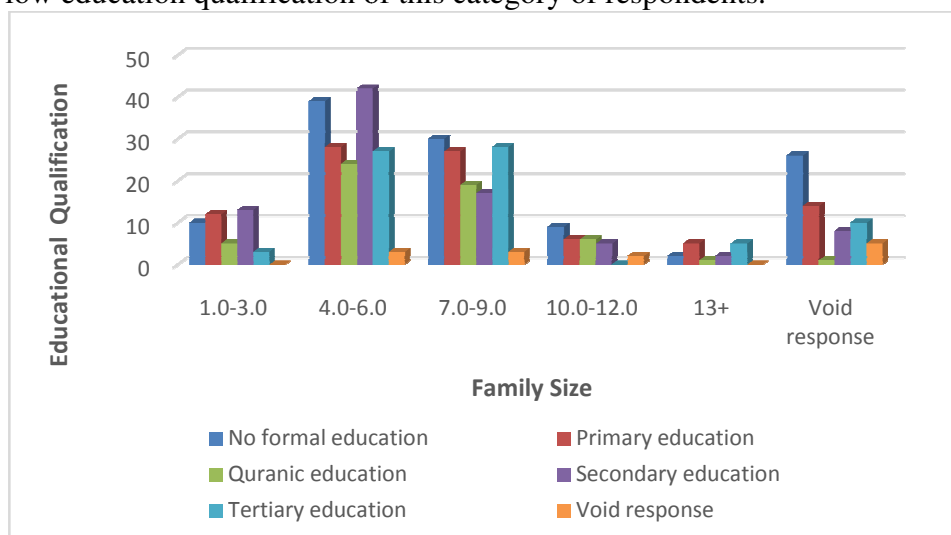


Figure 4: Distribution of Respondents according to their Family Sizes and Education Status
Source: Authors field survey, 2014

Occupation and Monthly Income

About 56.3% of the farmers have a monthly income which is below Nigerian minimum wage (N18, 000), 6.9% received a monthly income that is above N55, 000. Also, 78.4% of the traders earn a monthly income below N18, 000 and only 1% earn N55, 000 and more. In addition, about 52.2% of the household heads who were artisans reported earning monthly income of less than N 18,000 and no household head who worked as an artisan earn N55, 000 above. About 32.9% household heads who earned income below N18, 000 reported that they are civil servants and 18.8% have monthly income above N55, 000; 37.5% and 20% out of the household heads who mentioned ‘Others’ are hunter, traditional doctor, retirees, bankers and private professionals, and they earned monthly income below N18,000 and above N55,000 respectively . Almost 5.7% of the household did not respond to either their income or occupation. Generally, the first four groups made up of farmers, traders, artisans and civil servants accounts for about 84% of the respondents occupation in Ijumu LGA. About 51.9% of the respondents earned monthly income (less than 18,000) which is below the minimum wage in the country, while only 9.4% earns N55,000 and above monthly.

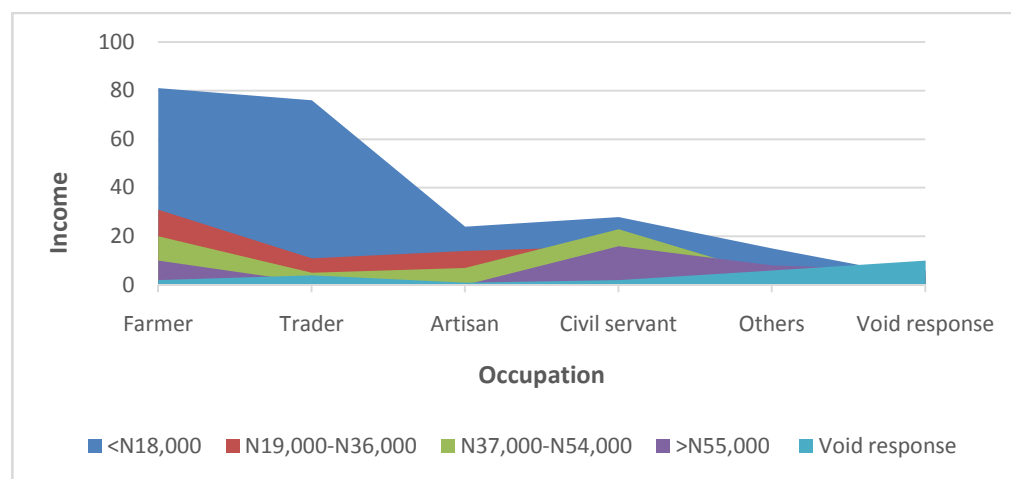


Figure 5: Distribution of Respondents according to their Occupation and Monthly Income
Source: Authorsfield survey, 2014.

Water Use Characteristics

Sources of Water Supply

This study identified the various types of water sources available in the study area to include pipe borne water, borehole, hand dug wells, stream/rivers and water vendors. Majority of the households collect water from hand dug wells (40%), bore hole (34%), a few from the river/stream (13%) and 12% occasionally collects water from community pipe borne water. About 1% of the respondents collect water from water vendors (Figure 6). Due to the unreliability of pipe borne water, households seek alternative water sources to augment their water needs. This explains the reason why hand dug wells are the most common water source. Also, Ifabiyi et al (2010) confirmed that hand dug wells are numerous and scattered across communities in Ijumu area. The major sources of water are at times inadequate, some parts of the study area have to depend also on water vendors. Since the water quality from streams cannot be guaranteed and the vendors also use unsafe storage to transport water.

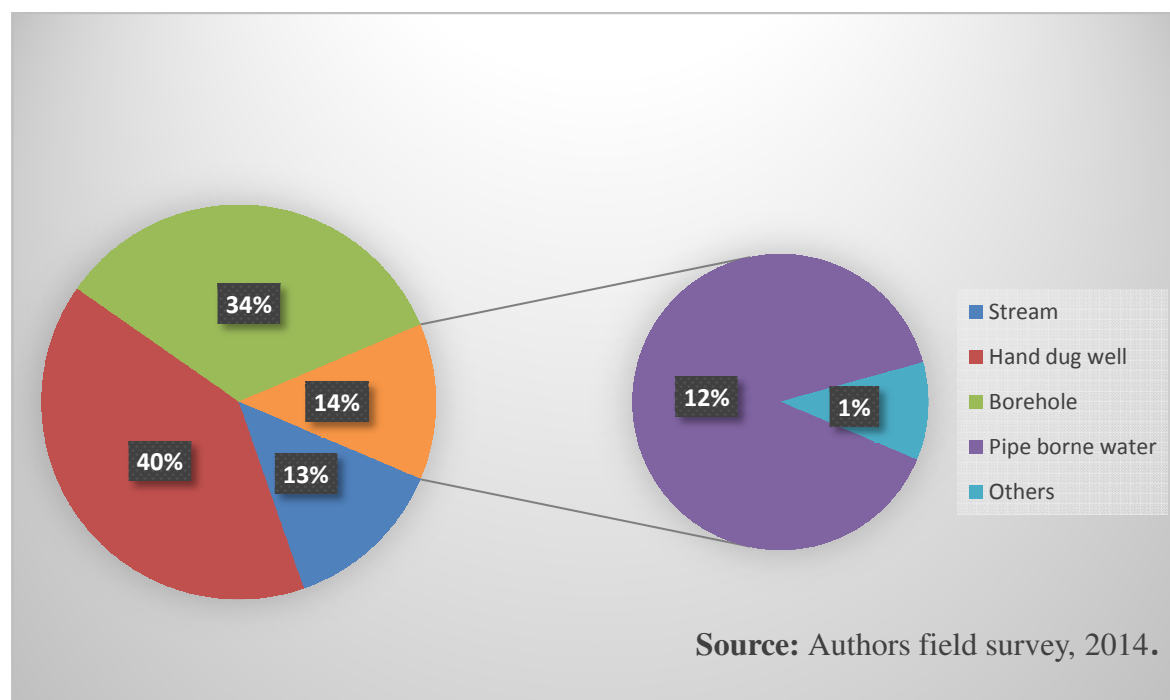


Figure 6: Distribution of respondents according to the various types of water sources in Ijumu LGA

Water Sources and Time Spent Collecting Water

On factors that influence the choices of water sources, these choices were due to habit, reliable access to the water source, taste preferences, cost, time and distances taken to collect water among other reasons. The results of the pearson moment correlation analysis ($r = 0.61$) gave an explanation for the differences in water source choices in Ijumu because households tend to use water sources that are close to them. The shorter the time spent for water collection from households to water sources, the more the use of that water source. Hence, the local communities in the study area are meeting their water needs more especially from hand dug wells which are scattered across the communities.

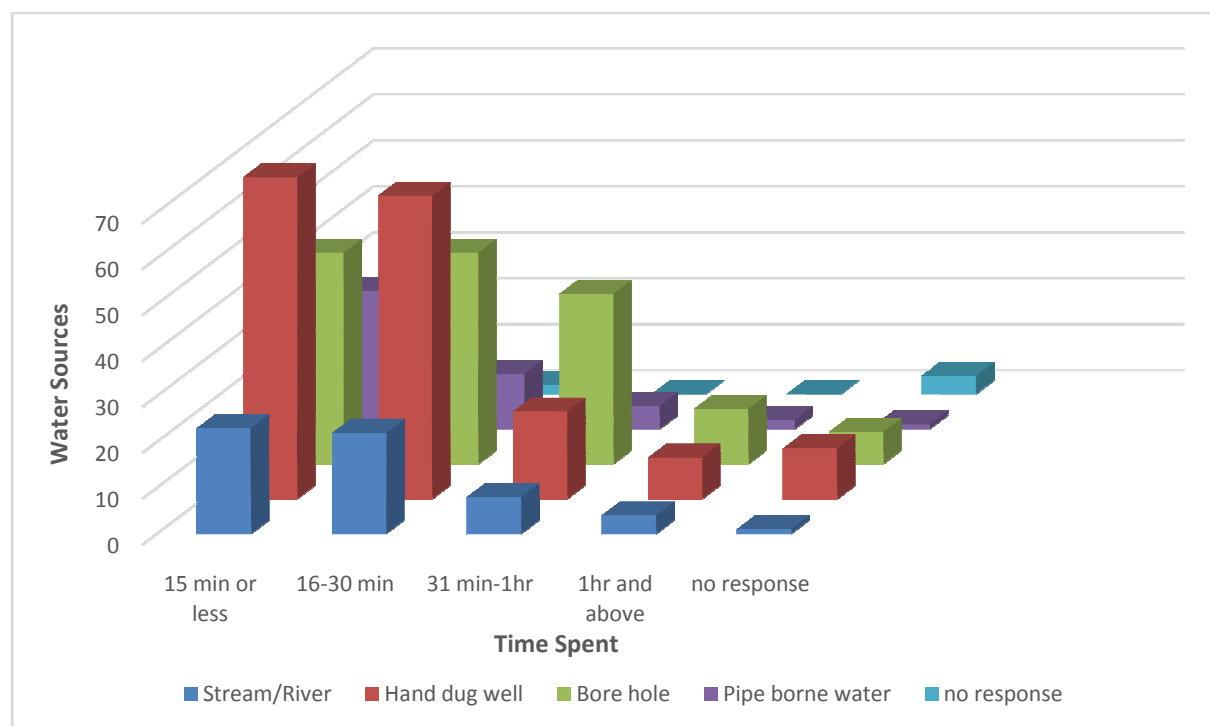


Figure 7: Respondents various types of water sources and time spent for water collection
Source: Authors field survey, 2014.

Patterns of Water Demand

The quantity of water consumed daily ranges from 20 litres or less to 80 litres and above per capita per day. The total daily water consumed by the respondents varies. For example, 21.5% of the respondents uses 20 lpcd or less, 17.2% uses 21-40 lpcd, 17.6% uses 41-60 lpcd, 20.8% consumed between 61 lpcd to 80 lpcd while 19.2% consumed more than 80 lpcd.

Correlates of Quantity of Water Consumed and Time Spent Collecting Water

The predictor that contributed significantly to the model was the time spent while collecting water ($r = -0.95$). Thus, the study indicates there is an inverse and significant relationship between quantity of water consumed and time spent in collecting water. The quantity of water consumed decreases with an increasing time spent for water collection. This agrees with the findings of Howard and Bartram (2003) who observed that a reduction from 5 hours to 15 minutes in collection time increased the quantity of water used for child hygiene by 30 times. According to Cairncross (1987), this confirms the thinking that a significant change in water use occurs with a significant change in collection time. Furthermore, majority of the respondents collect water within 30 minutes or less from sources such as bore holes and hand dug wells as these water supply sources are scattered across the communities. The few remaining respondents spend more than 30 minutes to collect water from streams. This is expected as the time spent in fetching water depends on the location of the sources of water supply. Some of the household heads observed that due to the dependence on water from the stream by the populace (13%), the quality of the river/stream may be affected and this may result in people waiting for stream to get settled and hence increase the time spent. In addition, few respondents reported that when collecting water from streams especially during dry season, the flow rate of some streams can be low and this may increase

the time spent collecting water. This agrees with Esrey (1996) study that there are only significant gains in health when water becomes available on-plot.

Majority of the respondents in Ijumu LGA consume more than 20 litre/capita/day, these quantities may be sufficient to maintain the daily lifestyles and health of the people as indicated by Chima, (1988); Aper, and Agbehi, (2010) that household water consumption equals household water availability. Also, 72.6% of the respondents spend 30 minutes or less to collect water from various water sources. Thus, when comparing the quantity of water consumed daily and time spent in collecting water in Ijumu LGA with WHO/SEARO (2005) submission, which reported that for medium term water allocation, an average of 15-20 lpcd is sustainable. WHO/SEARO (2005) further break down this quantity according to different uses such as drinking 3-4 lpcd, food production and cleaning 2-3 lpcd, personal hygiene 6-7 lpcd and laundry 4-6 lpcd. It also stressed that all people should have safe access to a sufficient quantity of water for drinking, cooking and personal and domestic hygiene within a time period of 30 minutes or less and that there should be at least 1 water point per 250 people. Thus, it can be said that in the study area, household water security is assured.

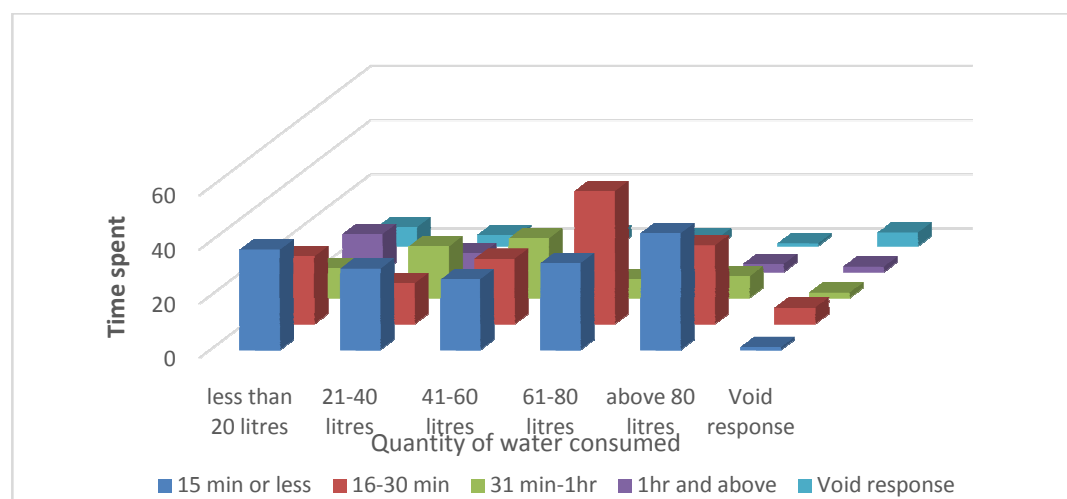


Figure 8: Respondents' Correlates of Quantity of Water Consumed and the Time Spent Collecting Water.

Source: Authors field survey, 2014

Table 1: Correlation Values between Quantity of Water Consumed, Water Sources and Time Spent Collecting Water

S/N	Water Use Variable	Quantity of Water Consumed	Time spent collecting water
1.	Time spent collecting water	-0.95	-
2.	Water Sources	—	0.61

Source: Authors field survey, 2014

Conclusion and Recommendations

The study concludes that though hand-dug well is the major source of water supply in the study area, it's not enough to cater for the need of the people because it dries up during the dry season. Therefore, the Government together with Non-Governmental agencies should come to the aid of the people to

provide improved water supply on plot. Moreover, the local resources that is, the community members should be part of the capital base (planning process and the implementation activities) of the community and not just users. This will help in allocating more time for other productive issues rather than spending more time in collecting water.

Reference

- Aper, J. A. and Agbehi, S. I. (2010) Pattern of Domestic Water Supply in Ugbokolo Community in Benue State, Nigeria. *International Journal of Water and Soil Resources Research*, Vol. 1 No 1 -3.
- Araoye, M.O. (2003) *Research Methodology with statistics for Health and Social Sciences*. Nathadex Publishers, Ilorin, Nigeria.
- Arbués, F., & Villanua, I. (2006). Potential for pricing policies in water resource management estimation of urban residential water demand in Zaragoza, Spain. *Urban Studies*, 43(13), 2421-2442.
- Arbués, F., Barberan R., & Villanua, I. (2004). Price impact on urban residential water demand: A dynamic panel data approach. *Water Resources Research*, 40, 1-9.
- Arbués, F., García-Valiñas, M. A., & Martínez-Españeira, R. (2003). Estimation of residential water demand: a state-of-the-art review. *The Journal of Socio-Economics*, 32, 81-102.
- Baumann, D. D., Boland, J., & Hanemann, W. M. (1998). *Urban water demand management and planning*. New York, McGraw-Hill.
- Baboo B (2009): "Politics of water: The case of the Hirakud Dam in Orissa, India". *International Journal of Sociology and Anthropology*, Vol. 1, Pp. 139-144, December 2009.
- Cairncross, S. (1987). The benefits of water supply. In Pickford J (ed). *Developing World Water*. London: Grosvenor Press.
- Ershow, A. G. & Cantor, K. P. 1989 Total water and tapwater intake in the United States: Population-based estimates of quantities and sources. Life Sciences Research Office, Federation of American Societies for Experimental Biology, Bethesda, Maryland.
- Esrey SA (1996) Water, waste, and well-being: a multicountry study. *American Journal of Epidemiology*, 143:608–623.
- Garcia, S., & Reynaud, A. (2004). Estimating the benefits of efficient water pricing in France. *Resource and Energy Economics*, 26, 1-25.
- Gaudin, S., Griffin, R. C., & Sickles, R. C. (2001). Demand specification for municipal water management: evaluation of the Stone–Geary form. *Land Economics*, 77, 399-422.
- Howard G, Bartram J (2003). *Domestic Water Quantity, Service Level and Health*. New York: World Health Organization.
- Hoffmann, M., Worthington, A., & Higgs, H. (2006). Urban water demand with fixed volumetric charging in a large municipality: the case of Brisbane, Australia. *The Australian Journal of Agricultural and Resource Economics*, 50, 347-359.
- Howe, C. W., & Linaweaver, F. P. (1967). The impact of price on residential water demand and its relation to system design and price structure. *Water Resources Research*, 3, 13-32.
- Ifabiyi IP, Usman, B.A. and Oire, I.O Aledare A (2010). Productive time of women and water supply in Ijumu, Local Government Area, Kogi state, Nigeria. *Global Journal of Human Social Sciences*. 10(5): 45-52.
- Jones, C. V., & Morris, J. (1984). Instrumental prices estimates of residential water demand. *Water Resources Research*, 20(2), 197-202.

- Okeke, I; Oyebande, L and Odunuga, S. (2011) The application of rural threshold water consumption model in water supply studies. Risk in Water Resources Management (Proceedings of Symposium in Melbourne) Australia,
- Russell, S., & Fielding, K. (2010). Water demand management research: A psychological perspective. Water Resources Research, 46.
- Thompson, J., Porras, I. T., Tumwine, J. K, Mujwahuzi, M. R., Katui-Katua, M., Johnstone, N., & Wood, L. (2001). Drawers of water II. 30 years of change in domestic water use and environmental health in East Africa. International Institute for Environment and Development. Nottingham: Russell Press.
- UNICEF. (2009). The one million water and sanitation (WASH) initiative-baseline survey report on Zimbabwe. Nairobi:
- World Health Organization (WHO). 2004. "Water, Sanitation and Hygiene Links to Health." Facts and Figures.
- WHO & UNICEF (2004). Joint Monitoring Programme for water supply and sanitation; meeting the MDG drinking water and sanitation target: A midterm assessment of progress. WHO, Geneva.
- WHO and UNICEF (World Health Organization and United Nations Children's Fund). (2000). *Global Water Supply and Sanitation Assessment 2000 Report*. Geneva: WHO with UNICEF.
- WHO/UNICEF (2013) Joint Monitoring Programme for Water Supply and Sanitation, a Comprehensive analysis of data for *Global Water Supply and Sanitation Assessment*. Geneva.