AN ANALYSIS OF HOUSEHOLD LOCATION AND WATER SUPPLY SOURCES IN UGEP COMMUNITY, YAKURR LGA, CROSS RIVER STATE, NIGERIA

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Abstract
The research identified the sources of water supply as well as examined the relationship between access to water supply sources and household location among residents of the five designated wards in Ugep Community. The research design combined empirical findings from various related and relevant studies. These empirical evidences and results are selected from published thesis, journal articles, annual reports from water agencies and establishments, relevant internet sources related to water and sanitation challenges etc. The design also utilized both quantitative and qualitative approaches. Data collection methods included primary and secondary sources with emphasis on the use of structured questionnaires. Sources of water data was collected from responses to the questionnaire sets. Results indicated that access to drinking water and domestic water sources do not significantly impact on household location in the study area. Amongst recommendations include, the need for awareness creation to further explain the complex nature of water supply and access.as this would enhance consensus in strategy and thus coordinated implementation of deliberate alternatives to the problem of inadequate and limited access to water. In conclusion, the state of water supply and access to users in the study very much failed to meet the expected levels as envisaged in 2030 target set of the Sustainable Development Goals and there is need for community action in collaboration with government, non-governmental organizations and international development partners.

Keywords: water supply, household location, population, resources, sustainable development goals, drinking water, domestic water.

Introduction

Given the importance of water in our lives and the health implications of an unclean sanitary environment, increasing populations, inadequate amenities and limited resources in the face of competing demands for development, accessibility to drinking water has become a major problem in most parts of the developing world. The failure of the public water supply system as prevalent in Ugep Community, a fast-developing rural settlement in transition into an urban setting, has subjected the inhabitants to huge challenges as it concerns access to and provision of safe drinking water.

The research intention is aimed at a reality check on the state of affairs in the water and basic sanitation sector as it relates to efforts at meeting the 2030 Sustainable Development Goals (SDGs) a little less than a decade from now. The specific objective of this research is to identify the sources of water supply across the community as well as examine the relationship between access to water supply sources and household location among residents of the five designated wards in Ugep Community.

The privatization of water, which exploits the view that water is a commodity rather than a public good, does not result in equitable access and confine the most vulnerable segment of the populace to the effects of lack of adequate water supply especially children, women and the aged or physically challenged. Nnodu (2008) in a research paper on the "assessment of the role of water and sanitation as indicators of rural poverty in Nkanu Local Government of Enugu State", sought to identify the extent to which inaccessibility to water sources and adequate sanitation exacerbates poverty level. Two hypotheses were tested. The main hypothesis is that there is no significant relationship between access to improved water and poverty level was accepted with a correlation coefficient (r) of 0.86. Similarly, the second hypothesis which states that there is no relationship between access to improved sanitation and poverty level also has its null hypothesis accepted with correlation coefficient of 0.79. The study recommended a comprehensive, sustainable and safe drinking water scheme for rural communities as a matter of urgent policy intervention.

According to Christine (2005) providing safe water and basic sanitation to meet community water needs will require substantial economic resources deployment, sustainable technological solutions, people participation and courageous political will. Five major challenges to providing for the majority of the world's population, safe drinking water and sanitation were identified, key issues highlighted include water contamination within the delivery system, scarcity of water prevalence, and absence of water management infrastructures such as recycling plants, implementation of low-cost sanitary system. More so, is the challenge of meeting the water demands of highly urbanized and populated cities, while ensuring that there is equity amongst all in having adequate access to good sanitary conditions as well as clean portable water, while also ensuring that it is cost friendly to every class of persons, for the majority of under-served people of the world.

Telmo (2002) in a research conducted in the village called Gouansolo in Mali asserted that, water supply and basic sanitation are two of the most important and key sectors in gauging development aspirations and attainment of nations. Accessibility to sanitation and water provision are both human rights and human basic needs of modern human settlements and efforts at achieving and ensuring easy access to these resources are very fundamental and appreciated. Worldwide, 71 percent of the rural population is noted to have access to improved means of water provision,

Study area

Ugep Community is a town and the administrative headquarters of Yakurr Local Government of Cross River State. It is located in the Western part of Cross River State, and lies between longitude $08^{0}03'40"$ and $08^{0}05'44"E$, and latitude $05^{0}47'30''$ and $05^{0}48'33''N$. According to Udo (1973), "Ugep Community is about 120km (75miles) from Calabar, the capital of Cross River State, Nigeria. Google indicated 98kilometers. Rephrase

Ugep Urban lies within the lowland and scarp lands of Cross River State. The relief is gentle aside from places where granite extrusions rise above the general level of the surface. The area rests on a height of 200 to 300 meters above sea level, thus limited incidence of flooding is observed. Ugep Community is located within the sub-equatorial region characterized by alternating dry and wet seasons (Udo, 1973). Water supply coverage connotes the proportion of the people with access to safe and improved water provisions that provide 20 liter per person per day, within a distance of one

kilometer from their place of residence. The National Population Commission census conducted in 1991 gave Ugep Community a population figure of 134,773 on an area of 670. 44 square kilometers and a density of 311. However, a projected figure of 208,237 was made based on the 2006 figures for the year 2008. For 2012, a total population projection of 218,567 has been made based on the 2006 figures and in 2018, projection is put at 264,466 at a 3.5% annual growth rate.

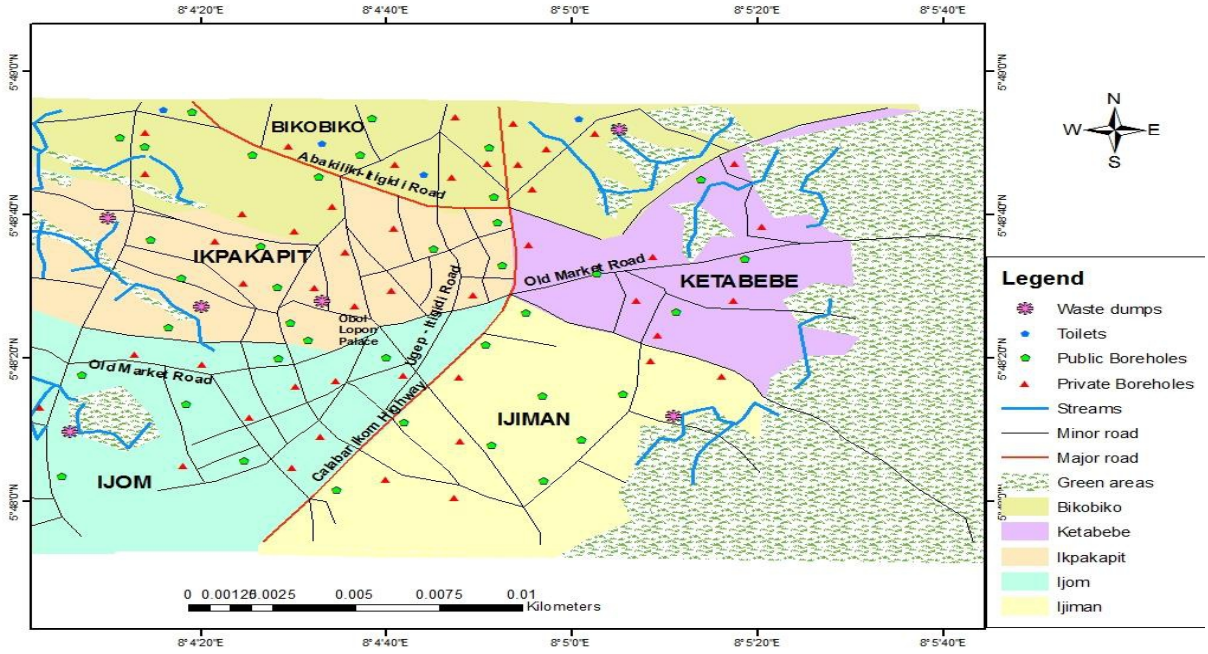

Figure 1: All the wards and location of boreholes and waste dumps
Source: Department of Geography and Environmental Sciences

Conceptual framework

Two major development concepts would be briefly highlighted for the purpose of the research namely, the Basic needs concept and the distance decay concept and this would provide the foundation for the types and nature of data collection and as well be linked with the hypothesis formulated and tested. The Basic needs concepts, views development objectives in terms of people and their needs as expressed by the people themselves rather than turn to secondary objectives like economic growth, industrialization, increased trade etcetera (Hopkins & Hoeven, 1983). Basic needs in Development Planning is the outcome of ideas which thrives on the dictum that development of certain basic amenities like access to water and quality sanitation are vital for the survival of a person or group of persons in any given society. It believes that if segments of society's population are too far from essential resources and services and the means (resources) like time and income are stretched to obtain them, the people tend to be vulnerable and impoverished. It is an anti-poverty approach to addressing development challenges in rural Africa (Hopkins & Hoeven, 1983). The Distance Decay concepts is a geographical term which examines the influence and relationship of distance on cultural or spatial interaction. It is one of the most widely known and used concept in spatial biodiversity studies which examines how similarities in species composition between two neighbouring communities varies with the geographical distance that separate them. The distance decay relationship model became increasingly

acknowledged after Nekola and White (1999) Nekola JC , White, PS The distance decay of similarity in biogeography and Ecology Journal of BIOGEOGRAPHY 26:(4) 867-878 JULY 1999formalized its ability to describe, compare and understand biodiversity patterns. The distance decay effect posits that the interaction between two locales decline as the distance between them increases. Once the distance is outside of the two locales activity space, their interactions and magnitude of relationship begin to decrease.

Accessibility to water by communities is affected by the location of pipe-borne water or boreholes. The distance between successive boreholes (functional) and communities shift interest by consumers making their interest or demand for such source to decline. They rather resort to rainwater or streams which are polluted by sulphur-dioxide ($S0_4$ i.e. acid rain) or underground water pollution by coliform (located closer to latrines). Because of the distance in location of these sources of water supply, people commute farther distances to search for quality water supply. Variations in distance decay rates are also attributable to landscape difference such as resistance to movement caused by size and isolation of habitats. The hills in the location can limit the accessibility of the people in moving a greater distance in search of water and could also hamper the sinking of boreholes because of the depth of the water table.

Materials and methods

The research design adopted for this study is the meta-analysis design. This design required the researcher to combine empirical findings from various related and relevant studies. These empirical evidences and results are selected from published thesis, journal articles, annual reports from water agencies and establishments, relevant internet sources related to water supply sources.

The purpose of using closed-ended questionnaires in this study was to: Quantify data and generalize results from a sample to the population of interest. Measure the incidence of various views and opinions in a chosen sample. Collect data from a large population and collect numerical data for data representation and analysis.

Model Specification

$$HHL = f(DMS, DWS, U) \quad \ldots\ldots(1.1)$$

Writing equations (1.1) in a linear form, we have;

$$HHL = \beta 0 + \beta_1 DMS + \beta_2 DWS + u_1 \quad \ldots\ldots(1.1b)$$

Where;

HHL = Household location.
DMS= drinking water sources.
DWS= Domestic Water Sources.

Where: HHL is the dependent variable; DMS, and DWS are the independent variables; U_1 is the error term; β_0 to β_2 are the parameters to be estimated. The a priori expectations are: $\beta_1 >_0$, $\beta_2 >_0$.

Procedure for data collection

The study area, Ugep Urban was visited and preliminary survey was conducted to get a feel of the perceived impressions as well as expectations of the inhabitants on the issue of access to drinking water in the designated geo-political wards that make up Ugep Urban. The major source of data collection for this research was through the administration of structured questionnaires. The questionnaire was drawn up by the researcher and reviewed for correctness to suit the objective of the research. The questions covered aspects of demographic information from respondents like age, sex, marital status, educational qualifications, occupation as well as income levels. Information on the state or level of water supply, sources of drinking water, duration and distance to and from drinking water sources, were also elicited from respondents.

Other sources of data also included secondary sources of data obtained from the National Population Census, Cross River Independent Electoral Commission, Ministry of Lands and surveys. In addition to these; conference proceedings, journals on water and sanitation, magazines, unpublished dissertations

and theses, textbooks, maps, photographs and gazettes from libraries and through the internet were also used to as data sources. Focus Group Discussions were also held in the course of the surveillance survey and civil servants, artisans as well as farmers were interviewed and relevant data also collected.

In order to select the sample of the study, the Taro Yamane (1967) in his book Yamane, Taro 1967, Statistics An introductory Analysis 2nd edition, New York: Harper and Row formula of sample size determination was employed to determine the sample size for the study.
The formula is given as

$$n = \frac{N}{1+N(e)^2}$$

Where n= sample size, N=total number of populations, e= level of significance at 0.05.
Given, the population of 116,092 our sample size becomes?
Then,

$$n = \frac{116,092}{1+ (116,092 \times 0.05^2)}$$

$$= \frac{116,092}{1+ (116,092 \times 0.0025)} = 400$$

This approximately gives a sample size of 400. The researcher decided to add 100 respondents giving a total of 500 respondents selected and used for the study.

Table 1
Population and sample distribution in the study area

S/N	Wards	Population	Sample
1	Bikobiko	20782	90
2	Ketabebe	24926	107
3	Ijiman	18672	80
4	Ijom	27893	120
5	Ikpakapit	23819	103
	Total	116092	500

Author's Field Work, 2023.

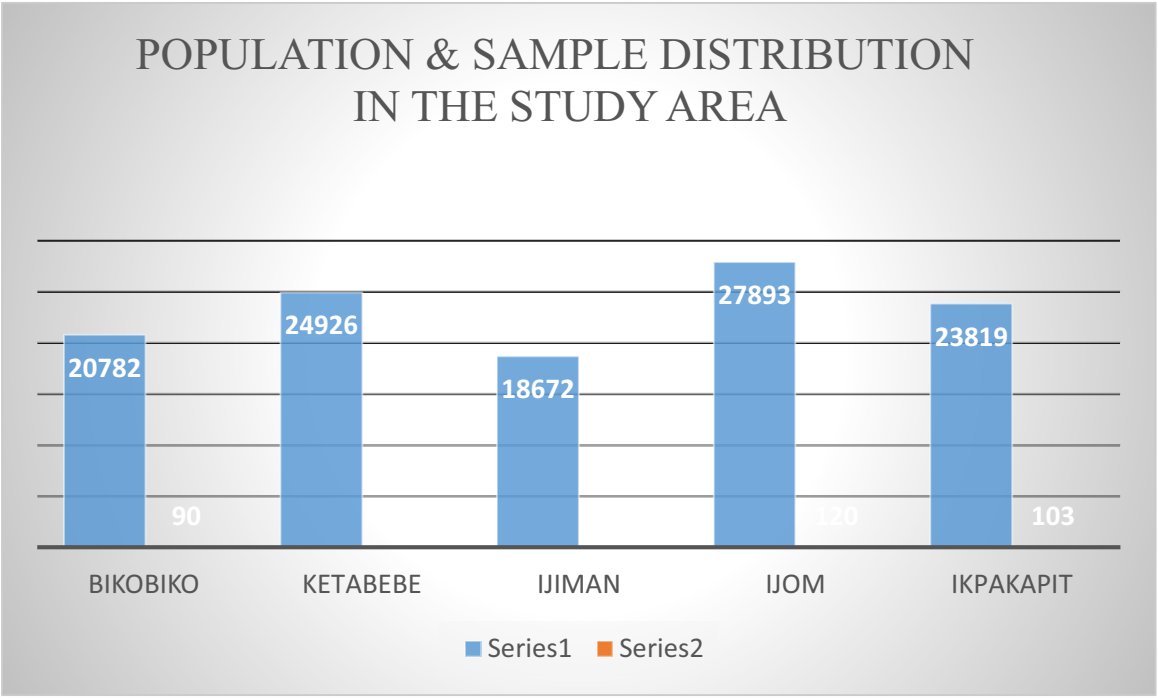

Fig.2. Sample Distribution by Study Area.

RESULTS

It was observed that the distance from residential areas to water sources in Ugep Urban is between less than 100 meters and 600 meters on the average across the five wards. For the 107 respondents in Ijom ward, 38 household heads representing 35.5% commute between 200-300 meters to a drinking water source. While Biko-biko with 68 respondents, has 21 household heads commuting between 400-500 meters to a water source. Ijiman with 63 respondents had 42 of the individuals that completed the questionnaire commuting between 200-300 meters to a water sources representing 66.7%. Overall, of the 420 questionnaires administered 142 of the respondents representing 33.8% commute between 200-300 meters to a water source in Ugep Urban while 26.7% made up of 112 respondents recorded a distance of between 100-200 meters to a water source. According to WHO access to water means that the source is less than one kilometer away from its place of use and that it is possible to reliably obtain at least 20 liters per member of a household per day. From the statistics generated what this scenario implies when related to the MDGs indicate that commuting between residents and a water source in Ugep Urban does not take up to 1000 meters which is within the WHO standard of less than one kilometer to a water source. This could be attributed to the prevalence of private boreholes on the sampled streets in the course of the researcher's survey. Concerning efforts towards the achievement of the sustainable development goals, the basic necessity of the people is not at their door post as an average Ugep youth or woman need not trek long distance in search of water which originally used to pose a problem to the community. There are only a few houses which are located in the newly developed sites that trek a longer distance (500-600 meters) for drinking water.

As it relates to duration to and from water sources in the study area, on the average residents spend between 10 and 35 minutes to get to a water source, fetch and return to the house in Ugep Urban. The time however varies per each ward. In Biko-Biko, of the 68 respondents 16 recorded spending about 15 minutes. For Ketabebe with 105 respondents 28 representing 26.7% responded that about 25 minutes is spent commuting between their homes and a water

source which is usually a private borehole, as most of the government public boreholes are non-functional. For Ijom with the highest respondents, 32 in all making up 29.9% of household heads of the total 107 respondents spend 25 minutes to get to and back from a water source.

In summary, a higher proportion of the residents of Ugep Urban spend less than one hour to get to and back from a water source. This is commendable especially in the light of the intentions of the MDGs and later SDGs which strive to reduce the amount of valuable time spent by women and children in search of drinking water for their use, as they represent the major segment of the society whose prime function is to source for water.

Table 2 shows the regression model summary with coefficients of multiple determination of R^2=0.184 or 18.4%.

Table 2: Model Summary [b]

MODEL	R	R SQUARE	ADJUSTED R SQUARE	STANDARD ERROR OF THEESTIMATE
DIMENSION 1	.429	.184	-049	52.23601

a. Predictors: (Constant), Domestic water, Drinking water)

b. . Dependent Variable: Distance

Table 3. ANOVA [b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4313.794	2	2156.897	.790	.490[a]
	Residual	19100.206	7	2728.601		
	Total	23414.000	9			

a. Predictors: (Constant), Domestic water, Drinking water)
b. Dependent Variable: Distance

Table 4 : Presentation and analysis of Household Location Results.

INDEPENDENT VAR.	DEPENDENT VAR. HHL.	(Prob)	F-statistic = (0.790)
CON.	28.116		Prob > F =(0.49)
DMS	1.995		R-squared =·184
DWS	– 1.664		Adj R-squared =-049

** = .05% significance, ( ) = Prob.

Source: C omputed by author from SPSS -output (2024).

The regression coefficients as presented shows the non-standardized and standardized coefficients for the independent variables (domestic and drinking water sources) and the constant (intercept) value. It further shows the t-value for the individual independent variables together with their corresponding significant levels.

On average, the estimated household location (HHL) equation indicates a positive intercept represented by the constant term. Implying that; holding all explanatory variables constant, there will still be an increase in household buildings in Ugep urban by 28.116 per cent.

The estimated regression line between domestic water sources (DWS) and household location is positive. This is in line with the a priori expectation, implying that a unit increase in domestic water sources while holding the effect of drinking water sources constant, will lead to an increase in the household access to water sources by 1.995 meters. On the contrary, the regression results show a negative intercept between drinking water sources and household locations in Ugep urban. This is not in line with the a priori expectation, implying that a meter increase in drinking water sources leads to a decrease in household locations in Ugep Urban by 1.664. From the standardized coefficients, it can be concluded that domestic water source with beta coefficient of 1.995, contributes more to total access by households than domestic water source with beta coefficients of -1.664.

Adjusted R-squared of -0.49 indicate that about 0.049% of the total variations in the dependent variable (HHL) has been explained by the independent variables. About 99.51% of the total variation is left unexplained and attributed to other variables not captured by the model but represented by the error term (μ). The model therefore has a poor fit and a low predictive power.

The F-statistics value of 0.79 shows the overall model is statistically insignificant. This is indicated by the F-statistics probability value of 0.49 being more than 0.05 (critical value) and thus implies that the explanatory variables were unable to explain changes in Household locations (HHL).

Discussion

The study on the distance from residential areas to water sources in Ugep Urban reveals significant insights into the water accessibility in the area, especially in the context of the Sustainable Development Goals (SDGs). The findings indicate that most residents do not need to travel far to access drinking water, with distances generally ranging between less than 100 meters to 600 meters. This is in line with the World Health Organization (WHO) standard, which states that water sources should be within one kilometer from the place of use, ensuring that residents can reliably obtain at least 20 liters of water per household member daily.

In Ijom Ward, the majority of respondents (35.5%) commute between 200-300 meters to access drinking water, while in Biko-Biko, a smaller percentage (21 respondents) commute between 400-500 meters. The situation in Ijiman is slightly better, with (66.7%) of respondents commuting between 200-300 meters to reach a water source. Across Ugep Urban, (33.8%) of respondents travel between 200-300 meters, and (26.7%) travel between 100-200 meters. The accessibility of water in Ugep Urban can be attributed to the prevalence of private boreholes in the area, which reduces the distance residents need to travel to obtain water. This is in line with the findings of Ishaku, Rafee, Ajayi, and Haruna (2011). This is a significant improvement, particularly when compared to previous times when fetching water was a major challenge for the community.

Regarding the time taken to fetch water, the study in conjunction with Alikah (1994), finds that most residents spend between 10 and 35 minutes to reach a water source, fetch water, and return home. The variation in time across different wards is notable, with residents in Biko-Biko spending about 15 minutes on average, while those in Ketabebe and Ijom spend about 25 minutes. This is a reasonable duration, especially in light of the SDGs, which aim to reduce the time women and children spend

fetching water, thereby allowing them to engage in other productive activities.

In summary, while the availability of water sources in Ugep Urban aligns with WHO standards and contributes to easier access for residents, it does not significantly influence household locations. The presence of private boreholes has improved water access, reducing the time and distance residents need to travel. However, other factors not captured in this study may have a more substantial impact on where households choose to locate within Ugep Urban.

Conclusion

In Ugep community, sustainable access to water supply and has not been achieved as it is still a very serious problem for concern. Water services are not within dwellings or yards. Inhabitants still have to move out of their homes to procure water for drinking and other domestic uses like washing and bathing. Government constructed boreholes are not functioning with respondents compelled to patronize privately owned wells and boreholes for their water needs and at a high cost. The low-income level among most inhabitants has denied majority of households the needed empowerment to invest in the effort at making water readily available within their living premises.

Thus, the objectives of the sustainable development goals as it concerns water availability and sanitation has not been achieved in the study area. It is recommended that efforts should be made by all stakeholders concerned to come up with strategies that could best address domestic water needs, at various levels Government, Non-governmental agencies and residents of the community should be involved in the water sector as part of participatory development to create a sustainable road-map. There should be synergy and collaboration and need for closer dialogue and participation of the various segments of the community in planning and execution as well as maintenance of facilities. There is need for standard setting, awareness creation on the health implications of the present situation and the need to put in place concise regulations in the area of sanitation as it obtains in the water, power and housing sectors.

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