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Evaluation of Water Poverty on Human and Economic Development in Auchi, Nigeria

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ABSTRACT

The study aims to evaluate the significant effects of water poverty on human and socio-economic development in Auchi and its environs. The result showed that 55% of the population in the study area has no access to safe drinking, while 45% of the dwellers have access through water vendors, public, and public boreholes. Hence, it further revealed that the economic period is spent to gather portable water at an expensive cost. For instance, it takes an average of 50 minutes to fetch 20litre of within a working distance of 1 km (to and fro) at a procurement cost of N50 per 20 litres. However, the outputs of the sensitivity analysis revealed that each household contains an average population of four (4) people per household with a total water demand of 340 litres at a cost of N850 daily. The water procurement cost is more than 12% of a monthly income of an average household. The complicated situation has further impoverished the standard of living in Auchi. Also, Auchi and its environs have experienced an increase in the incidences of the outbreak of water-related illnesses such as cholera, schistosomiasis, and others. Therefore, the study recommends renewed public commitment to investment in water resources through renovation and revamping of water infrastructures.

Key words: Safe drinking water, Water poverty, Household, socioeconomic, Investment, Auchi

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INTRODUCTION

The physical increasing size and populations of cities and towns by natural growth and migration from rural areas is a significant driver of environmental change and economic challenges, a trend that the government has been unable to resolve. Specifically, the urbanization trend has important overall implications for water use and management in an urban environment. Increasing access to water and other essential services is a remarkable history of many countries [1]. As urban areas and populations expand, demand for water, energy, and other resources also grow because more people use them. The increase in demand and water use and other resources within the environment continues to stress water resources and establish water security as key priority to achieve the Post-2015 development target (SDG 6) on household water (Centre for International Governance Innovation [2].

As a unique natural resource, water plays a vital role in human welfare and survival [7]. It constitutes an essential element of life. An adequate supply of safe and clean water is the crucial precondition for sustaining human life, maintaining an ecosystem that supports all life, and achieving sustainable development [3]. This inevitable resource is a great treasure for the socio-economic and political development of every region. It is the most sought-after social good and ranks very high in many communities' developmental preferences [4]. The crucial role of adequate water quantity for human welfare and health has been explained in several studies [3,4, 5,6,7]. Irrespective of its importance, a global paucity of adequate and safe drinking water has been established [3,4.7]. However, tremendous attention has not been directed towards water management issues globally, which adversely affects people's livelihood, mostly in developing

countries. This has inevitably aroused considerable interest globally, especially in developing countries, including Nigeria, as almost 1 billion people in developing countries lack access to such supply [8].

Water security is an increasing concern and an imperative critical need for sustainable development in Nigerian urban centres, particularly as Nigeria is already facing severe water scarcity due to conflict and drought [9]. Since 1990, there has been little change (29%) in access to water in Nigeria. Therefore, WHO and UNICEF (2015) suggest that increased access to safe water in rural areas by 23 percent (from 43% to 66%), and in urban areas by 10 percent from (81% to 91%) would help to achieve the Post-2015 Development targets of access to 50 litres per capita per day of safe drinking water. Against this projection, Nigeria still lags in the provision of safe water as more than 27% of the rural and 16% of the urban population use unimproved sources of drinking water for households [10].

The water utility investments have not kept pace with the growing population and further complicate the already stressed condition. People rely on other sources of supply, such as streams and rivers, water sachets, pools from vendors, among others that are often highly contaminated or, in most cases, inadequate to meet the hygiene requirements [11]. The social, economic, and political consequences of these are disturbing. However, expanding populations need a more secure and qualitative water supply for drinking, hygiene, dietary transitions, and other household uses. Hence, the close relationship between urban socio-economic development and the challenges of growing water scarcity is common knowledge among urban planners. Therefore, the study focuses on evaluating the effects of water poverty and stress on the human and economic balancing in Auchi and suggest some strategic measures of addressing the situation.

MATERIALS AND METHODS

The town experiences tropical weather conditions, characterized by high rainfall, high temperature, and high relative humidity. The topography of Auchi is dominated by a highly undulated landscape that forms a very elaborate drainage system. Auchi, the study area, is a typical settlement reflecting the third world urbanization processes. Its urban expansion is closely associated with a tremendous increase in demand for environmental resources, broad base economy, highly related population growth and movement. The significant change in demography in the Auchi region is reflected in the population boom due to migration from other neighboring settlements.

Similarly, the setting of new developments like higher institutions of learning, agricultural institutes, commercial and several quarries and cement industrial sites at the outskirts of the town have accelerated its outward growth in almost all directions. Its emergence as an industrial, economic, and administrative center influenced the urban process's dynamic, pattern, and problems. Therefore, the rapid population growth in Auchi and the increased standard of living and changes in the area's economic activities required a better understanding of the demand and supply of water services in the area. Fig.1 shows the map of the study area.

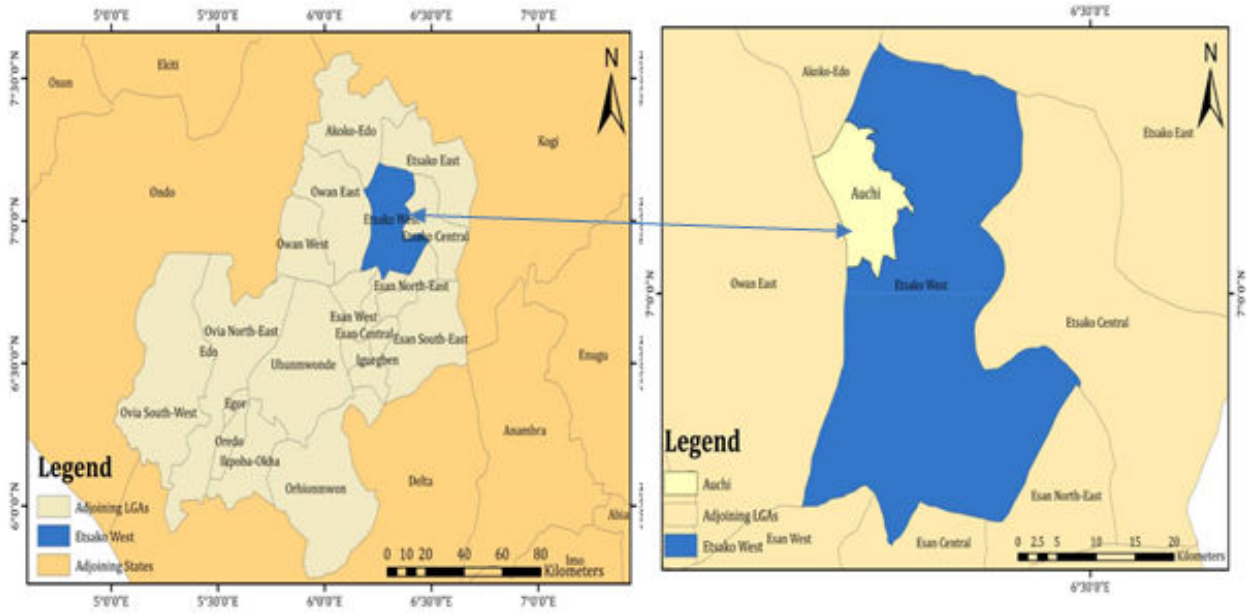

Figure 1: Map of Edo State showing the study area

Procedure for Data Collection

A structured questionnaire was employed to gather required (qualitative and quantitative) data for the study. Eighteen (18) field assistants drawn from the Post-HND classes of the Urban and Regional Planning department, Auchi Polytechnic, were employed to support the study's data collection. The assistants were able to facilitate communication with local stakeholders as translators for those who could not understand the contents of the questionnaire and fill in their responses. Also, they are familiar with the geographical and socio-cultural terrain of the area. For collecting satisfactory data for this research, the assistants were trained before and during questionnaire administration. The training includes studying the questionnaire and clarifying issues emanating from instruments, pilot survey, sample selection, interview techniques, and fieldwork.

The survey was carried out during evening hours on weekdays and weekends when respondents had returned from their daily engagements. The questionnaire administration was for six weeks and was administered to the household head in the study area. The head of families who could be either male or female were considered because of environmental factors; religious affiliation, reliability, and adequate personal information about their household. Information relating to accessibility, availability, demand, and supply of the water management system in a given family elicited the chosen method adequately. A household questionnaire was administered in the evenings when respondents had returned from their daily engagements. From the eighteen (18) assistants recruited for the fieldwork, fifteen (15) issued the households' questions. The other three (3) assistants were assigned to the water vendors union and government agencies.

The study also depends tremendously on additional observation and participant observation on water security in the area and inter-basin transfer bringing water from a place of water abundance to those of scarcity in the region (Ojirami dam water scheme Ojirami, Akoko-Edo to Auchi). The study also depended significantly on additional information from individuals (geologists, community leaders, and water merchants) with relative knowledge of water distribution in the area. Therefore, geologists and chemists were drawn from the Auchi Polytechnic. They provided clues to other relevant and sensitive information about water and geological environments to identify problems that may be related to water security.

Method of Data Analysis

The analysis of data from samples constitutes a significant proportion of contemporary research in the social sciences. Relevant data were collected from respondents to achieve the set objectives for the study. The set objectives and responses for this study are shown in Table 1.

Table 1: Research Objectives, Data Type, Source and Method of Analysis

S/N	Research Objectives	Method of Data Collection	Method of Analysis/Statistical Used	Respondents Source of Data	Expected Outcome	Variables Scale of Measurements for each objective. (Determinant of analytical method)
1.	Identify the socio-economic characteristics of households in the study area	Questionnaire survey Questionnaire survey	SPSS/correlation bivariate /two tailed significant test /Pearson and Chi-square Regression model Regression coefficient and model	All respondents	Determine the socio-economic characteristics of household with respect to the rate of water demand and use.	Interval/ and Nominal scale Interval and Nominal scale
2.	Assess the reliability of existing water sources in Auchi	Questionnaire survey	analysis of variance (ANOVA) Multiple regression analysis / analysis of variance (ANOVA)	All respondents	Identify the existing trends of domestic water sources	Nominal and Interval scale
3.	Examine the	Questionnair	SPSS/ Spearman rho test of correlation		Develop factors	

	level of accessibility of various water source in the study	e survey	SPSS/ Regression analysis model analysis of variance (ANOVA)	All respondents	contributing water accessibly to meet a sustained vital need of water supply	Interval and Interval scale
4.	Examine the level of water-related water-risks to people in Auchi and;	Questionnaire survey		All respondents	Identify per capita consumption of water, its effects on socio-economy of residents.	Interval scale
5.	Assess the efficiency of water sources in meeting the demand of people in Auchi.				Improve the frame that enhance availability and efficiency to solve the problem of inadequacy	

Source: Source: Author's Fieldwork, 2018.

RESULTS AND DISCUSSION

Proximity to Water Source

Proximity is a crucial factor determining which water source to use. Convenience usually does not always override any preference for improved over unimproved sources, which indicates the value of time and effort to a household's broader livelihood security. Proximity to a reliable water source that provided enough water of adequate quantity as analyzed in Fig.2 confirms that most of the respondents 38.7% collected water from within their residential area. Meaning they get their water from either groundwater or rainwater and vendor services around their home. While about 41.6% get theirs from an average distance of about 1 km, 12.8% collect water from 1-3kms; 6.9% of the respondents claimed that the primary water source's transport distance is more than 3km (Fig.2). One of the reasons for considerable time and energy spent fetching water in Auchi because some of their sources are considerably far, especially during the dry season. Apart from this fact, many mobile respondents obtain their water from boreholes, rivers/streams, and are located far away. Apart from setting limitations on the quantity obtained and used by households, time and resources wasted on sourcing for such water could better be harnessed for other productive ventures or livelihood activities.

The result also shows excellent deviance from the recommended maximum distance of 500 meters to get a safe and reliable water quantity for household use. A source that would require more than 30 minutes of walking.

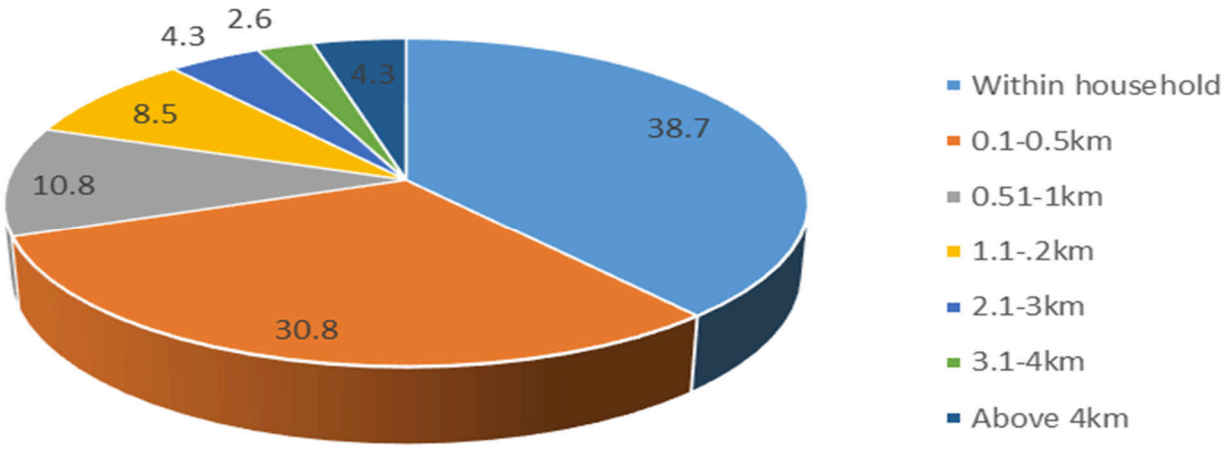

Fig. 2 Analysis of proximity to water source in Auchi

or stay is unhealthy [6,7]. Also, no single household in Auchi has access to piped water within 1 kilometer from their dwelling places. Moreover, far water sources require more extensive energy; all this would lead to high water costs.

Water coverage and distribution

In Auchi, claimants over various water sources are multiplying. Competition on access also increases, thereby affecting period used to source water. Already, residents suffer from severe water shortages. In many cases, water resource scarcity has become the limiting factor in the area's economic and social development. Large water storage reservoirs are commonly used to store rainwater water and gradually release it for use. This enhanced their ways of maximizing the efficiency of harnessing rainwater and minimizing their demand from other unimproved sources. Assessment of the large household reservoir's effectiveness showed that reservoirs built for water storage typically could provide water for the planned household needs.

However, during the rainy season, households can hold vast quantities of water in reservoirs. It allows them to act as useful and steady water sources for households, while tankers that supply water from rivers and boreholes act as alternatives during the dry season. As a result, in Table 2, it is also imperative to comment on the period used to source water among households in Auchi. In general, 47.29% of the total household source for water from sources which in most cases are found near the house and identified by a relatively high proportion of the population, 22.08% source for water weekly, seasonal, and occasionally.

Table -2 Water gathering period

Period	Frequency	Percent %
Daily	332	47.29
Weekly	155	22.08
Monthly	98	13.96
Seasonal	81	11.53
Occasionally	36	5.13
Total	**702**	**100.0**

Source: Author's Fieldwork, 2018

Table -3 Average Return Trip

	Frequency	Percent %
One Trip	216	30.8
Two Trips	172	24.5
Three Trips	128	18.2
Four Trips	87	12.4
Five Trips	84	12.0
More than five Trips	15	2.1
Total	**702**	**100.0**

Source: Author's Fieldwork, 2018

The respondents were asked how many trips they made to the water source each day. [14] recommend measuring return trips when investigating the travel time of water collection. Using the return trip for estimates will help ensure that the time will represent water's actual transport. In general, respondents emphasized that the number of return trips made to the source is dependent on the closeness of the source. However, the results in Table 3 revealed a relatively high proportion of the population (73.5%) between one and three trips to get water delivered from all residential use sources. In comparison, almost 24.4% make between 4 and 5 trips to fetch water, and 2.1% make more than five trips to fetch water. The implication of several trips to source water limits other house chores and productive activities that could be embarked upon by households. In short, several trips to a source imply time loss that is detrimental to the economy and the area's socio-economic development.

Water Procurement Cost

The concept of affordability of urban services, according to Agboola (2004), is the willingness and capability of urban dwellers to pay the economic value of the particular service. However, without depriving themselves of the ability to effectively meet other obligations, which are essential to healthy living. The [12 and [13] indicated water affordability as the cost of procuring water to the household income and suggest that households should spend between 3 to 5% of their income on water procurement. However, this result does not satisfy this condition, based on the compromised or unavailable water source and supply, low-income level, and the proportion spent on Auchi's water procurements. These

further prevent people from getting access to drinking water services at an affordable price. From the results of Table 4.16, 32.3% spent less than ₦150 on daily procurement, 39.2% spent between ₦151–N300 on daily procurement, 9.8% spent ₦301– ₦450 on daily procurement, while 7.3% spend ₦451– ₦1000 on daily procurement and only 0.3% spend above ₦700 to buy water daily.

Water is often more expensive to supply in areas with a concentration of people on low incomes, as shown in Table 4. However, this indicates that the water supply and distribution system in the area is ineffective due to low affordability as tariffs protect consumers from sufficient qualitative water demand. Hence, households, often the poorest, end up purchasing steady and quantitative water supply from informal vendors at additional cost than the public water supply. This is contrary to [11] o submission and percentage of income to spend on water procurement.

Table -4 Amount Expended on Water Procurement

	Frequency	**Percent %**
Less than ₦150	230	32.8
₦151- ₦300	275	39.2
₦301- ₦450	69	9.8
₦451- ₦600	24	3.4
₦601- ₦750	51	7.3
₦751- ₦1000	51	7.3
Above ₦1000	2	0.3
Total	**702**	**100.0**

Source: Author's Fieldwork, 2018

The standardized regression coefficients for DIST (0.741), NUMB (0.749), TRIP (0.675) and TIME (-0.430) are statistically significant to accessibility to water source in Auchi at $P < 0.05$ respectively. The findings Table 5 reveal that additional units DIST, NUMB, and TRIP of respondents in the study area, have a positive impact of 0.741, 0.749, and 0.675 on ACCESS (accessibility of water source). On the other hand, additional unit TIME has negative effects of 0.178 on ACCESS. However, it is usual for TIME to possess a negative attribute. Therefore, for every unit increase in DIST, NUMB, TRIP and TIME will increase in ACCESS by 74.1%, 74.9%, 67.5%, and 43.0%. All variables are held constant in the study area, and accessibility water source is indeterminable. However, the standardized regression coefficient for the selected variables was not statistically significant at $P < 0.01$.

Table -5 Regression coefficient of relationship among the variables of accessibility and distribution of water sources

Distribution of water source	**Unstandardized**		**Standardized Beta**	**T**	**Sig.**
	B	**Std. Error**			
Constant	0.662	0.042		15.737	0.000**
DIST	0.240	0.027	0.741	8.917	0.000*
NUMB	0.358	0.029	0.749	12.429	0.000**
TRIP	0.244	0.031	0.675	7.796	0.000**
COST	0.033	0.027	0.095	1.249	0.212
TIME	-0.178	0.028	-0.430	-6.313	0.000**

Dependent variable, accessibility, sig. if P< 0.01 or 0.05 level at 1% and 5% level.

Hint: DIST= Water distribution/coverage; NUMB = Number of trip; TRIP = Mode of water transportation; COST = Procurement cost; TIME = Time spent to fetch water

Source: Field survey, 2018.

CONCLUSION

The finding reveals that Auchi and its environs are highly water-stressed. Hence, the observation collaborates with many empirical investigations by numerous researchers and stakeholders on domestic water security. The complicated situation has seriously affected the human and economic development of the study area. It is revealed that 90% of the health issues are related to the quality of drinking water such as the outbreak of cholera, schistosomiasis, guinea worm, and others. Also, the budgeting allocation for household safe drinking water consumption is high and out of reach for the low to middle-income earners. Therefore, it is essential to develop robust integrated water management and provides a mechanism to address the challenges by investing in water resource projects through revamping and renovating existing

dams/ reservoirs, effective reticulation, and metering system. This will yield improvement in health and socio-economic indicators in Auchi.

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