

Analysis Of The Accessibility Of Portable Water Among Urban And Rural Poor

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Abstract

This is an analysis of accessibility of portable water among inhabitants of Cross River State of Nigeria. A sample of two thousand (2000) was studied form among male and female junior public servants (GL1-6). Data for the study were collected using a structured questionnaire and analyzed using Analysis of Variance (ANOVA). The result of the analysis showed an insignificant difference in accessibility/utilization of portable water between urban and rural dwellers. But a significant difference was found among people of various poverty levels with regards to accessibility/utilization of portable water in Cross River State of Nigeria. Based on the findings it was recommended among others that government should review her water policy to enable the poor have access to portable water without any financial burden.

Key words: Accessibility, portable water, poverty

1. Introduction

Water is as fundamental to human life as the air we breathe. Yet this essence of life can have an injurious impact if its source is not free from pollution and contamination. With its many uses - for drinking, recreation purposes, sanitation and hygiene, and many industrial uses, water appears to be one of our most precious resources globally (Center for Disease Control and Prevention CDC, 2020).

Most likely pollutant of water sources is human faeces that has not been properly disposed of, and have spread because of lack of basic sanitation and hygiene (United Nations International Children Emergency Fund UNICEF, 2006). Scholars and experts on water resources and health had observed that, people living below the poverty line were likely to draw drinking water from stream, than those living below the poverty line. These same categories are much more afflicted with diarrhea, pneumonia, neonatal disorder, typhoid, among others, which have a strong relationship with unsafe and insufficient quantity of water (Usoro & Akah, 2011; United Nations International Children Emergency Fund, 2006; Goldman, 2005).

Experts in public health use the term 'portable' to describe water that does not cause disease when consumed by humans. Non-portable water results in over 250 million cases of disease worldwide every year and 5-10 premature death (Center for Disease Control CDC, 2020; Life Water, 2019; Ajala, 2005). UNICEF (2005) further observed that young children are more vulnerable than any other age group to the ill effects of unsafe water. Insufficient quantities of water, poor sanitation

¹Levi Udochukwu Akah, ²David Adie Alawa, ¹Martina Ayibeya Apie, ¹Joseph Odey Ogor and hygiene are the leading killers of over 10.5 million children under the age of five especially in developing countries annually, including diarrhea diseases, pneumonia, and neonatal disorders (Emeribe & Akah, 2011). Water pollution kills and causes illnesses like typhoid, cholera, giardia, dysentery, escherichia coli (*E.coli*), hepatitis A, and salmonella. It caused over 1.8 million deaths in 2015. Further report showed that every year over 1 billion people are afflicted with water related illnesses, especially among low-income communities (Natural Resource Defence Council NRDC, 2018; Lancet, 2017).

The report of Poverty and Shared Prosperity (2020) note that societal poverty line is adjusted to each country's income, and captures the increase in basic needs that a person requires to conduct a dignified life as a country becomes richer. The World Bank use available evidence from household surveys to ascertain the number of people living in households where consumption per person falls below the poverty line. The poverty line was at 1 dollar a day per person. It later changed to 1.08, 1.25, and finally 1.90 in 2015 (World Bank, 2017). In Cross River State, the grade level 1 to 6 earners utilized for this study perfectly fits into the extreme poverty definition of World Bank. A preliminary survey by the researchers show that majority of people at the level of the workforce (GL 1-6) have an average of 5 persons per home, while they earn between 30 and 45 thousand naira only. This amount translates to between 78.00 to 116.05 dollars a household per month. Even where both parents are employed, though rarely, the family earning per head still falls below the extreme poverty line of 1.90 dollar a day per person.

2. Significance of the Study

Many health problems revolve around the lack of housing and environmental sanitation, lack of access to safe drinking water, lack of good modern health facilities, high illiteracy, unemployment, high infant mortality rate, low income, among others. In the slum and squatter areas of the developing world, housing is make-shift and congested. Environmental sanitation is grossly lacking or inadequate. While in rural areas, the need for portable water supply is greater than that of sanitation. In other words, access to portable water is limited in rural areas as compared to urban areas. Water, both in quality and quantity is necessary for disease prevention. The findings of the study may assist government in policy making as per provision of portable water as a basic amenity to her citizens in urban and rural areas. Health advocacy groups may also find it useful in their crusade for better health for the less privilege.

3. Review of Related Studies

UNICEF (2001) reports a strong relationship between income and access to sources of water. According to the report, the less than one dollar per day income groups, including farmers were almost twice more likely to draw their water from stream than those earning more than one dollar per day. By contrast, 39 percent of the higher income group obtained water from the mains, compared with 28 percent of those in lower income group. Grouping together streams, rainwater, and uncovered wells as unsafe sources of water, boreholes and piped water as safe sources, UNICEF (2001) submits that 57 percent of the lower income group had access to safe water, compared with 75 percent of the higher income group.

World Health Organization WHO (1988) and Ukwu (1998) opine that the health situation, which arises from rapid urbanization, truly reflects the problem of poverty. In Nigeria pipe borne water is available to only 11% of rural household as against about 65% among urban households, while 40% of rural dwellers obtain their water from streams, 75% of urban households make use of pit latrines. About 25% of rural dwellers have no conventional toilets, so they use bush or dunghills (Ihejiamaizu, 2002; Emeribe & Akah, 2011).

Center for Disease Control CDC (2020) and Roy, Crow and Swallow (2005) posit that lack of access to safe and sufficient water means sick children, unhealthy food, infrequent clothes washing, little milk from cow, few vegetables in gardens, and sparse fruit on trees. It also means long time spent climbing up and down hills carrying heavy loads. The brunt of this burden of poor health and heavy labor are often born by women and children, especially of the poor class. If the problem of water quality and quantity is solved, it is the opinion of the researchers that it will definitely assist to improve health of people in such areas. Roy, Crow and Swallow (2005) from a study report a strong relationship between improved portable water supply and a dramatic reduction in prevalence of typhoid fever among communities in Kenya. Other notable improvements include women experiencing relieve from some fifteen hours per week of hard labour collecting water; using of this additional time most remuneratively in selling their labour, growing more crops, diversifying into new products; among other benefits.

The importance of adequate water in the metabolic processes of the human body cannot be overemphasized. High percentage of body fluid is made up of water. Metabolic process of the human body cannot take place efficiently without enough water intakes. Safe Water Association-SWA (2006) further submits that everybody has the right to be educated, but the threat of illnesses can be a major factor to battle with in this regard. Somebody who is not in good health cannot be in the best frame to undertake educational training. UNICEF (2005) also posits that unsafe water and unhygienic conditions do not only have a detrimental effect on wellbeing of children under five, it will also have an impact on their health, attendance to school and learning capacities of school age children. This can in turn lead to poverty or worsen it. Secondly, poor environmental sanitation, which influences the quality of water in a particular area, will adversely affect the health of the people. Good and adequate water use enhances good and healthy living, and good and adequate water use results to good environmental sanitation. Sanitation, which is the act of making sure that the water to be consumed is fit for drinking, also ensures that the environment is not polluted enough to influence the source of water. Thus, sanitation culture must be taught and regularly practiced, so as to guide against water related infections and diseases.

Safe Water African Community Initiative (SWACI) an NGO pioneered by World Water Council (WWC), in Safe Water Association-SWA (2006) notes on conditions of water and sanitation that schools are located on or close to refuse dumping sites, which oozes with offensive ordours, and that most class rooms are structures dilapidated in Nigeria and other developing countries. The organization also remarks that Nigeria is among the poorest countries in the world having over 72% of its population of over 140 million being classified as poor, and over 35% living below the US \$1 per day poverty level and over two-thirds of the Nigerian populations are poor, in spite of vast potential wealth of the country. Thirdly, over 50% of the entire population lacks access to portable water. They further explained that over 1000 urban and semi-urban water supply schemes were in existence in Nigeria by 1990, but were all in poor condition and were fast deteriorating. The situation in rural areas according to the report is worse, and a far cry from the situation in urban areas. Finally, same source reports that the various state water agencies that were responsible for water supply services are at a very low level of development, and characterized by poor funding, administration and organization (SWA, 2006).

It may be important to also note that the matter of portable water supply is basically the responsibility of the government. The lack of it would be the result of how the government is run, and this signifies deprivation. Another worrisome situation is the push by the World Bank that government should commodify water resource. Usoro and Akah (2011) observe that this will further place financial burden on the already poor populace. It will imply that they will seek water from unsafe sources due to lack of purchasing power.

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In the bid to meeting the Sustainable Development Goals (SDGs) in developing countries such as Nigeria, it may be important to note that key issues like health and education need to undergo transformation process in the area of water and sanitation intervention. Government and non-governmental agencies also need to be well informed that water is a crosscutting issue in meeting the set targets of the United Nation's SDG's by 2030. Health Reform Foundation of Nigeria- HERFON (2006) posit that Nigeria among other sub-saharan African countries are lagging behind in all the MDGs, which 191 countries including Nigeria signed at the turn of the millennium in 2001. Nigeria's overall health system was ranked 187th by WHO in 2000 (SWA, 2006 and HERFON, 2006).

According to Ajala (2005) the major causes of morbidity in Nigeria are infectious diseases. Notable among such diseases with very high degree of risk include food or water born diseases (bacterial and protozoan diarrhea, hepatitis A, and typhoid fever); Vector-borne disease (malaria), among others. He observed poor availability and accessibility of safe water supply and sanitation as the major causes of infectious diseases. According to him, the central problem confronting growing populations besides inadequate quantities of water is poor quality of water. UNICEF (2005) posited that access to clean water and improved sanitation could reduce the mortality diseases (*dacunliasis* and *schistosomiasis*) by more than three quarters. The poor, especially in the rural areas appears to be the worst hit in the regard (NRDC, 2018; UNICEF, 2005).

The bottom line for eradication of other diseases like guinea worm according to Life Water (2019) is provision of safe water. The problem is not just trying to reach the un-reached with safe water, but inability to sustain previous efforts has continued to undermine recorded success in eradication of guinea worm and other related waterborne diseases. Even some water schemes being embarked upon by way of intervention by some State governments have been found to be unsafe by experts. For instance in Cross River State, Ihejiamazu (2002) notes that the UNICEF assisted water and sanitation project came to Cross River State in 1987 under a memorandum of understanding between government and UNICEF. The project according to it Coordinator, Mr. Edim, focuses on provision of boreholes that are equipped with hand pumps, and or mine water scheme boreholes that is equipped with motorized pumps and over-head tanks; non borehole components or alternative to borehole which include harvesting of rain water, development of pond water schemes, and provision of hand dug wells.

In the project, each community was encouraged; either to carry out the project by herself or Rural Water Supply Agency (RULWATSAN) would provide their techniques to help them carry out the project (Ihejiamazu, 2002). However, it may be important to note that water experts have observed that rainwater, hand dug wells (especially uncovered ones), and streams water are very unsafe sources of water for drinking and other important uses (Lancet, 2017; UNICEF, 2001; Park, 2000). Thus, they cannot serve for portable water.

4. Objective of the study

Most of the causes of mortality and varying degrees of morbidity are easily preventable and remediable. Most communicable diseases have been shown in studies reviewed, to be preventable if urban and especially rural dwellers have access to portable and sufficient water supply. Poor hygiene/sanitation which is also a serious public health concern is found to have a direct link with poor and unsafe water supply, both in quantity and quality. The researchers' concern over this informed this study to determine the accessibility of portable water resource among inhabitants of Cross River State. The study thus seeks to find out how the poor in urban and rural settings differ in accessibility of portable water in Cross River State, Nigeria.

5. Hypothesis of the study

In order to guide the outcome of this study, it was hypothesized that there is no significant difference in accessibility/utilization of portable water between urban and rural dwellers of various poverty levels in Cross River State of Nigeria.

6. Population and Sample

The population of the study comprised of married junior public servants of Cross River State Civil Service. The figure as obtained from Cross River State Local Government Service Commission comprised 3,787(urban, 1956 and rural, 1831) junior public servants in the LGAs isolated for the purpose of this study. A sample of 2000 junior public servant (Grade level 1-6) were isolated and studied. This population was isolated for the study because they fall below the 1 dollar per day poverty line stipulated by the World Bank. They are the lowest income earners with an average of 60 dollar per month. Most persons in this category are lowly educated and have children, spouses and other extended family members who depend on them for survival. Poverty level was categorized into low, medium and high. The low poverty level were the civil servants with additional certificates to the Senior Secondary Certificate Examination (SSCE), but less than a degree. The medium poverty level are those with SSCE as highest qualification. The high poverty level are those with First School Leaving Certificate (FSLC).

The sample was drawn using stratified and convenience sampling techniques. The strata included urban and rural areas, since the study involved comparing samples from both settings. Data was generated for the study using structured questionnaire validated by two experts in research method and statistics in Department of Educational Foundations, one expert in Health Education and one expert in Public Health Department, all of the University of Calabar. Split-half reliability technique/Pearson Product Moment and Spearman Brown Prophecy Formula was used to determine the reliability of the instrument and coefficient 0.91 was obtained. The researchers employed the assistance of four trained research assistants in some LGAs in the State. Over 2050 copies of the instrument was printed and taken to the field. The questionnaire was administered to as many who were eager and willing to complete the instrument. At the end, the researcher sorted the instrument retrieved from the respondents, 2000 (1000 urban and 1000 rural) well completed copies were utilized, while others were discarded.

6.1 Statistical Technique Used in the Present Study

Data collected were analyzed using Two-way Analysis of Variance (ANOVA). The casual-comparative research design (also known as ex-post facto) was adopted for this study. This study sought to analyze accessibility of portable water between urban and rural dwellers of various poverty levels in Cross River State of Nigeria.

6.2 Data Analysis and Interpretation

The result of this study was based on the hypothesis that guided the study: there is no significant difference in the accessibility of portable water between urban and rural inhabitants of Cross River State, Nigeria. The result of data analysis is here presented in tables 1, 2, and 3.

TABLE1

Showing mean, standard deviation and summary of two-way ANOVA of access to portable water of urban and rural dwellers of various poverty levels

Location	Poverty level	N	\bar{X}	SD
Rural	Low	130	24.904	3.084
	Medium	636	24.690	3.250
	High	234	25.077	3.194
	Total	1000	24.809	3.217
Urban	Low	314	26.541	4.948
	Medium	648	25.554	3.725
	High	38	23.421	3.867
	Total	1000	25.783	4.200
Total	Low	444	26.063	4.541
	Medium	1284	25.126	3.523
	High	272	24.846	3.338
	Total	2000	25.296	3.771

Source of variation	sum of squares	Df	mean squares	F	sig. level
Intercept	505978.009	1	505978.009	36684.241	.000
Location	15.887	1	15.887	1.152	.283
Poverty level	226.683	2	113.341	8.217*	.000
Location x poverty level	261.742	2	130.871	9.488*	.000
Error	27502.822	1994	13.793		
Corrected total	28430.768	1999			

* $p < .05$ $F_{.05}(1,1994) = 3.84$ $F_{.05}(2,1994) = 3.00$

TABLE2

Fisher's LSD post hoc comparison of mean scores of people of various poverty levels on access to portable water

	Poverty level	N	1	2	3
1	Low	444	26.063 ^a	.937b*	1.217*
2	Medium	1284	.401 ^c	25.126	.280*
3	High	272	.560	.486	24.846

N/B: a = Mean scores are along the principal diagonal
 b = Difference between mean scores are above the principal diagonal

c = Fisher's LSD critical values are below the principal diagonal.

* p < .05.

TABLE3

Fisher's LSD post hoc comparison of the mean score on access to portable water for urban and rural dwellers of various levels of poverty

Group	N	1	2	3	4	5	6
1 Rural low	130	24.908 ^a	.218 ^b	.169	1.633*	.646*	.14*
2 Rural medium	636	.701 ^c	24.690	.387	1.851*	.864*	.1.21*
3 Rural high	234	.796	.557	25.077	1.464*	.477 *	1.65 *
4 Urban low	314	.759	.502	.629	26.541	.987*	3.12*
5 Urban medium	648	.700	.406	.555	.501	25.554	2.13
6 Urban high	38	1.342	1.216	1.273	1.250	.1.250	23.42

MSE = 13.793

N/B: a= Mean scores are along the principal diagonal

b = Difference between mean scores are above the principal diagonal.

C = Fisher's LSD critical values are below the principal diagonal.

* P < .05

Interpretation of Table 1

The result in Table 1 showed that urban dweller had a higher mean score on access to portable water ($\bar{X} = 25.783$, $S = 4.200$) compared to rural dwellers ($\bar{X} = 24.809$, $S = 3.217$). In terms of poverty level, people of low poverty level had the highest mean score on access to portable water ($\bar{X} = 26.063$, $S = 4.541$), followed by those of medium poverty level ($\bar{X} = 25.126$, $S = 3.523$) and then those of high poverty level ($\bar{X} = 24.846$, $S = 3.338$). When the two variables are combined, the results indicated that urban dwellers of low poverty level ("urban low") had the highest mean score on access to portable water ($\bar{X} = 26.541$, $S = 4.948$), followed by "urban medium" ($\bar{X} = 25.554$, $S = 3.725$), "rural high" ($\bar{X} = 25.079$, $S = 3.194$), "rural low" ($\bar{X} = 24.908$, $S = 3.084$), "rural medium" ($\bar{X} = 24.590$, $S = 3.250$), and lastly "urban high" ($\bar{X} = 23.421$, $S = 3.867$) in descending order of magnitude of mean scores.

The results of the ANOVA indicated that the main effects for location was not statically significant because the calculated F value for location, 1.152 is less than the critical F value of 3.84 at

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.05 significance level and (1,1994) degrees of freedom. This means that there was no significant difference between urban and rural dwellers with regard to access to portable water.

On the other hand the main effects for poverty level was statically significant because the calculated F value for poverty level which is 8.257 was greater than the critical F value of 3.00 at .05 significance level and (2,1994) degrees of freedom. This means that people of various poverty levels differed significantly with regard to access to portable water.

Similarly the interaction of location and poverty level was statistically significant because the calculated F value 9.488, was greater than the critical F value of 3.00 at .05 significance level and (2,1994) degrees of freedom. This means that urban and rural dwellers of various poverty levels differed significantly with regard to access to portable water. Therefore, the null hypothesis was rejected.

According to the result, the ANOVA indicated that there was no significant difference between urban and rural dwellers with regards to access to portable water. This result contradicted the position of WHO (1988), Ukwu (1998), SWACI (2006), and UNICEF (2005), among others. They submitted that the need for portable water supply is greater in rural areas compared to urban. They further noted that the existence of water supply schemes was worst in the rural areas, and a far cry from what was obtainable in the urban areas. They also observed that the poor in the rural areas were the worst hit with regards to access to clean (portable) water and sanitation. They further posited that in Nigeria pipe borne water is available to 11% of rural dwellers as against about 65% among urban dwellers.

The researcher observed that the non significant difference as per access to portable water, between the urban and rural settings might mean that the spread of water intervention schemes were evenly distributed in both the urban and rural settings. For instance, the WATSAN/RULWATSAN projects launched in 1987 by the Cross River State government had recorded significant stride with regards to even distribution of portable water facilities in both the urban and rural areas of the state.

In another dimension, the result of the ANOVA indicated that there was a significant difference in access to portable water by people of various poverty levels. This finding was in consonance with the findings of UNICEF (2001); and Row, Crow, and Swallow (2005). UNICEF (2001) who report less than one dollar per day income groups (the absolutely poor) are almost twice more likely to draw their water from stream than those earning more than one dollar per day. While Row, Crow, and Swallow (2005) submit that the burden of heavy labour in search of water due to lack of access to safe water is often born by woman and children of especially the poor class. The researcher opined that variables such as cost of obtaining water from available source might be the constraint of people of the high poverty class, followed by those of the medium poverty class, who were found to have less access to portable water.

Interpretation of Table 2

To determine the point(s) of difference among the different poverty levels, a post hoc comparison of the mean scores was done using Fishers LSD. The results are shown in Table 2.

As shown in Table 2, the difference in mean scores for people of low and medium poverty levels and low and high poverty levels were statistically significant at .05 significance level. The difference in mean scores of people of medium and high poverty levels was not significant.

Interpretation of Table 3

Since the interaction effect is significant, the point(s) of difference among the various groups was also determined using Fishers LSD method. The results are shown in Table 3.

The results in Table 3 indicated that difference in the mean scores of the following pairs of groups was statistically significant at .05 significance level. Rural low and urban low, rural low and urban high, rural medium and urban low, rural medium and urban medium, rural medium and urban high, rural high

and urban low, rural high and urban high, urban low and urban medium, urban low and urban high, urban medium and urban high. The differences in the mean scores of the remaining pairs of groups are not statistically significant.

7. Recommendations

Based on the findings, the following recommendations were made:

- i. Government at both the Federal and State levels should review her water policy, with the aim of removing financial burden on the poor so that they can access portable water at no extra cost.
- ii. Bore holes and piped water (portable water) should be made accessible to everyone, especially the poor class irrespective of where they live or work. Funds spent on unsafe water schemes should be directed to provision of portable water.
- iii. Efforts should be made by both Federal and State governments to greatly reduce the level of poverty among her citizenry.
- iv. Further studies need to be conducted to examine the incidence of water borne diseases among the urban and rural poor, in comparison with the upper class in the state; including the extent of financial burden of access to potable water on the urban and rural poor.

8. Conclusion

The implication of this result might mean that the high poverty class would be faced with the burden of water borne diseases such as guinea worm, bacterial and protozoan diarrhea, hepatitis A, and typhoid fever, among others. The burden of such diseases would further place demand on their already lean resources. This situation further impoverishes them or they may die due to lack of inability to procure medical services. Thus high morbidity and mortality rate resulting from water related problems may be higher among the high poverty class, followed by the medium poverty group. This is based on the findings of related studies reviewed.

However, it may be important to note that, this study did not examine the incidence of water borne diseases among the urban and rural poor. The study did not also investigate the extent of financial burden accessibility to potable water placed on the urban and rural poor.

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