

DETERMINANTS OF PERI URBAN HOUSEHOLDS CHOICE OF DRINKING WATER; A CASE STUDY OF IJEBU NORTH EAST, OGUN STATE

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DOI: <https://doi.org/10.5281/zenodo.6674423>

Published Date: 21-June-2022

Abstract: Water is one of the most valuable natural resources vital to the existence of any form of life. Safe drinking water is an essential component of primary health care and have vital role in poverty alleviation. This project explores peri urban household choices of safe drinking water by surveying and analyzing 120 household of ijebu north east local government. Descriptive statistics was used to analyze household socio economic characteristics while multinomial logit regression was adopted to identify factors affecting choices of household water source. The result shows that 69.2% of the household have taps running in their house with 48.3% of the household having piped water as their major source of drinking water. Using piped water as the base, the probability of choosing well water relative to piped water are government subsidy and drinking water in liters meanwhile probability of the household choosing bottled water relative to piped water are numbers of individual below SSCE and the household experience of disease i.e. The probability of choosing bottled water relative to piped water increases by 4.7% for a unit increase in the number of individuals in the household below SSCE level. This is significant at 10 percent level of significance. It shows that the awareness and drinking of bottled water is not based on level of education but how safe the household considers it to be. 54.2 percent of the household adopt boiling water as a means of water purification due to the low cost associated with it.

Keywords: peri-urban, household, choice, drinking water.

1. INTRODUCTION

Water covers three quarters of the earth surface although only about one percent is available to us as drinking water. But reliable and sufficient supply of safe water is one of the basic needs of all mankind. In spite of this, 1.1 billion people worldwide still have no access to clean, entirely hygienic water.

Drinking water is the basic need of human life. Safe drinking water is an essential component of primary health care and have vital role in poverty alleviation. Water is one of the most valuable natural resources vital to the existence of any form of life. An adequate supply of safe, clean water is the most important precondition for sustaining human life, for maintaining ecosystem that support all life and for achieving sustainable development [1].

There is positive correlation between increased national income and the proportion of population with access to improved water supply. An increase of 0.3 percent investment in household access to safe drinking water generates one percent increase in GDP. Inadequate drinking water not only resulted in more provision of safe drinking water supply is an effective health intervention reduces the mortality caused sickness and deaths, but-also augments health costs, lower worker productivity and school enrolment [2].

Although Nigeria is known to be endowed with abundant water resources, the availability of potable water is a problem in many parts of the country [3]. The Nigerian Government has long considered the provision of water supply services to be the domain of the Federal, State and Local governments. However the public sector has not been successful in meeting more than a small portion of water of residential and commercial users. Government insists it cannot handle water supply all by itself for lack of fund and have ceded its statutory role to shyllock water producers who do not know or care about safe water standards [4].

The peri-urban is characterized by high, and often increasing, population density, small holdings, rich countryside homes, poor slums, diverse sources of income, a lack of regulation, contested land tenure rights, uncoordinated conversion of farmland to housings, pollution, environmental problems, intensified resource exploitation, considerable economic dynamism and a severe lack of service provision [5],[6],[7]. Access to sufficient water and adequate sanitation facilities by many peri-urban inhabitants to meet their needs could be described as being poor. However, the absence of reliable and detailed data makes it difficult to present valid numbers for "adequate" provision, as the peri-urban interface is not a geographically fixed area and, at best, statistics only distinguish between urban and rural areas. Moreover, the crisis of peri-urban water access remains understudied, and poorly understood compared to urban-rural trans-boundary governance dynamics. It is thus imperative to understand the safe drinking water supply situation, household's perception about it and factors influencing their choices. Hence this study which identified the different household sources of safe drinking water available and the determining factors of the household major source of drinking water.

2. METHODOLOGY

2.1 The Study Area

The study area is Ijebu North East Local Government Area of Ogun State. The area has a number of households that have access to different sources of water. Ijebu North East Local Government Area is one of the 20 Local Government Area in Ogun State. It has its Local Government headquarters located at Atan.

2.2 Data Source

Primary source of data was used in the study. It was collected using a well-structured questionnaire. The questionnaire was administered to various households using random sampling techniques to gather information in these four key areas:

- Socio-demographic information i.e personal information covering gender, occupation, and income.
- The sources people used to get water and their relative priority for each household.
- Water purification methods
- Factors which influenced choice of water sources.

2.3 Model Specification for Choice Drinking Water Source

The multinomial logistic (MNL) regression model was utilized to analyze the determinants of choice of primary water sources. This model is applicable because the dependent variable, choice of sources of drinking water has more than two categories. Choice set available to the household's piped water, well water, sachet water and bottled water.

The multinomial logit regression model specified below was used to obtain the household choice of water source; Choice of Drinking Water Source = $f(X_i, X_{ii})$

$$CDW_i = \beta_0 + \beta_i X_i + \beta_{ii} X_{ii} + U_i \dots \dots \dots 1$$

Where

CDW_i is dependant variable Choice of Water Source

β_0 is the intercept which is constant.

X_i and X_{ii} is a set of independent variables.

X_i = source attribute

X_{ii} = socio economic characteristics.

$\beta_i \dots \beta_{ii}$ are coefficient of variables that affect household Choice or primary water Source.

U_i is the error/disturbance term

Dependent Variable;

CDWi – Choice of Water Sources. (if piped water = 1, well water = 2, sachet water = 3, bottled water = 4) where piped water is reference category.

Explanatory Variable;

X_i – Source Attribute

X_1 = Water supply service (1 if good, 0 otherwise)

X_2 = Quantity of water in Litres

X_3 = Reliability of the source (1 if good, 0 otherwise)

X_4 = Collection time in minute

X_5 = Distance to the source in kilometers

X_6 = Latest water shortage (min/hrs/dys)

X_5 = Price of water in naira

X_{ii} – Socioeconomic Variable

X_1 = Age in Years

X_2 = Marital status

X_3 = Household size (in numbers)

X_4 = Highest educational attainment (1, if tertiary, 0, otherwise)

X_5 = Occupation (1, if government employee, 0, otherwise)

X_6 = Average monthly income (naira)

3. DATA ANALYSIS AND DISCUSSION OF FINDINGS

3.1 Socio-Economic Characteristics of Respondents

The socio economic characteristics of the household used in this study are sex, age, marital status, number of people in the household (adults and children), source of household drinking water, type of housing ownership, highest education attained, years of schooling, occupation, and household average monthly income.

3.1.1 Gender of Respondents

Table 3.1.1 below shows the gender of respondents. Female respondents represent 51.7 percent as household heads and the males 48.3 percent of the population.

Table 3.1.1: Distribution of Respondents by Gender

Sex	Frequency	Percent	Cumulative Percent
Female	62	51.7	51.7
Male	58	48.3	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.2 Age of Respondents

The distribution of respondents by age in Table 3.1.2 below shows that 31.7% are between ages 40-49 years, 25% are between ages 30-39 years followed by 19.2% that are aged 50 years and above as their age. About 13.3% are within ages 20-29 years and 10.8% are below age 20. The mean age of the respondents is 43 years. This result shows that these age cohorts are the most active.

Table 3.1.2: Distribution of Respondents by Age

Age	Frequency	Percent	Cumulative Percent
Less than 20	13	10.8	10.8
20-29 yrs	16	13.3	24.2
30-39 yrs	30	25.0	49.2
40-49	38	31.7	80.8
50 and above	23	19.2	100.0
Total	120	100.	

Source: Field Survey 2019

3.1.3 Marital Status

The result of the analysis on Table 3.1.3 shows that 47.5% of the respondents are single. 51.7% are married while 0.8 % are divorced.

Table 3.1.3: Distribution of Marital Status of respondents

Marital Status	Frequency	Percent	Cumulative Percent
Single	57	47.5	47.5
Married	62	51.7	99.2
Divorced	1	0.8	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.4 Distribution of Respondents by Number in Household

The result of the analysis on table 3.1.4 below shows that in every household, 75.8% of them have between 1-3 adults, 20.8% have 4-6 adults while 3.3% have more than 6 adults.

Table 3.1.4: Distribution of Respondents by Number of Adults in Household

No of Adults	Frequency	Percent	Cumulative Percent
1-3 adult	91	75.8	75.8
4-6 adult	25	20.8	96.7
Above 6 adult	4	3.3	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.5 Distribution of Respondents by Number of Children in Household

Table 3.1.5 shows that 18.3% of the whole household have no children; 56.7% have 1-3 children, 23.3% have 4-6 children and 1.7% have above 6 children. This shows that most households have 1-3 and the least is above 6 children.

Table 3.1.5: Distribution of Respondents by Number of Children in Household

No of Children	Frequency	Percent	Cumulative Percent
0 children	22	18.3	18.3
1-3 children	68	56.7	75.0
4-6 children	28	23.3	98.3
Above 6 children	2	1.7	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.6 Highest Education Level

Table 3.1.6 below shows the distribution of respondent by highest level of education attained. Those with University education have the highest teachers training college education with 11.7% those that possess primary education, professional education and others are 10.8%, 8.3% and 1.7% respectively. This shows that a higher percentage of the respondents are literate.

Table 3.1.6: Distribution of Respondents by Highest Education Level

Education level	Frequency	Percent	Cumulative Percent
Primary sch	13	10.8	10.8
Secondary sch	36	30	40.8
Teachers training	14	11.7	52.5
Professional school	10	8.3	60.8
University	45	37.5	98.3
Others	2	1.7	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.7 Occupation of Respondents

The result of the analysis shows that majority of the respondents are into the teaching profession (24%), these are followed closely by those involved in trading of all sorts with 22.5% civil servants are also predominant in the are having 15% of the total percentage. Farming and tailoring have the percentage 8.3%; this shows that farming in the area of not prevalent based on little expanse of land available for agriculture. Those involved in fishing activity are few (0.8%). Handwork like hairdressing, mechanics are 5.0% and 4.2% respectively. The people also involved in menial jobs (hired labour) are 4.2%. The respondents involved in Professional work like nursing are 1.7% while those involved in other occupations are 5.8%. This shows that the households have variety of sources of income to meet their needs.

Table 3.1.7: Distribution of Respondents by Occupation

Occupation	Frequency	Percent	Cumulative Percent
Fishing	1	0.8	0.8
Farming	10	8.3	9.2
Nursing	2	1.7	10.8
Hired labor	5	4.2	15.0
Mechanic	5	4.2	19.2
Tailoring	10	8.3	27.5
Hair dressing	6	5.0	32.5
Trading	27	22.5	55.0
Teaching	29	24.2	79.2
Civil Servant	18	15.0	94.2
Others	7	5.8	100.0
Total	120	100.0	

Source: Field Survey 2019

3.1.8 House Ownership

The result of the analysis in Table 4.9 below shows the distribution of the type of respondent's house ownership. About 43.3% are private house owners while 32.4% live in public houses, 24.2% live in semi-public houses i.e they are not paying for the house neither are they owner of the house they stay (e.g family houses)

Table 3.1.8: Distribution of Households by Ownership Type

House ownership	Frequency	Percent	Cumulative Percent
Public	39	32.5	32.5
Semi public	29	24.2	56.7
Private	52	43.3	100.0
Total	120	100.0	

Source: Field Survey 2019

3.2 Water Sources**3.2.1 Household with Tap**

The result of the analysis shows that 69.2% of the household have tap running in their house while 30.8% do not have tap running in their house.

Table 3.2.1: Distribution of Households with Tap Running

House ownership	Frequency	Percent	Cumulative Percent
Presence of tap water	83	69.2	69.2
Absent	37	30.8	100.0
Total	120	100.0	

Source: Field Survey 2019

3.2.2 Major Household Source of Drinking Water

The result of the analysis on table 3.2.2 below shows that 48.3% of the household have piped water at their major source of drinking water. About 10.8% use well water, 11.7% used bottled water and 29.2% of the total household used sachet water as their major source of drinking water. The result shows that the major source of drinking water in the area is piped water, followed by sachet water, bottled water, well water in that order.

Table 3.2.2: Distribution of Households by Major Source of Drinking Water

Source of water	Frequency	Percent	Cumulative Percent
Piped water	58	48.3	48.3
Well water	13	10.8	59.2
Bottled water	14	11.7	70.8
Sachet water	35	29.2	100
Total	120	100.0	

Source: Field Survey 2019

3.2.3 Drinking Water in Liters

Table 3.2.3 shows the liters of drinking water consumed by household on daily basis. About 36.7% the household consume 11-15 litres of water per day. About 27.5% consumes 6-10liters per day. About 15.8% each, for 1-5 and 16-20 liters of drinking water per day. The remaining 4.2% consume above 20 liters of water daily.

Table 3.2.3: Distribution of Households by Consumption of Drinking Water in Litres

Water consumption per day	Frequency	Percent	Cumulative Percent
1-5 liters	19	15.8	15.8
6-10 liters	33	27.5	43.3
11-15 liters	44	36.7	80.0
16-20 liters	19	15.8	95.8
Above 20 litres	5	4.2	100.00
Total	120	100.0	

Source: Field Survey 2019

3.2.4 Water shortage

The result in Table 3.2.4 shows the respondents experience of water shortage. About 35.8% do experience water shortage for several days. About 32.5% experience water shortage for several hours while 7.5% experience it for several minutes.

Table 3.2.4: Distribution of Respondents on Water Shortage Period

Water shortage period	Frequency	Percent	Cumulative Percent
Several minutes	9	7.5	7.5
Several hours	39	32.5	40.0
Several days	43	35.8	75.8
Do not know	29	24.2	100.0
Total	120	100.0	

Source: Field Survey 2019

3.2.5 Water Purification Method

The respondent in the study area feel that the quality they are receiving is not safe and resultantly they adopt certain measures for the safety of water. Water purification method of the household is shown in table 3.2.5 below. The result shows that 54.2% of the household uses boiling method in purifying their water, these are followed by 26.7% that add alum for purification, while 10.8% employed addition of chemical or biological purification (using of some plant seeds). Some 8.3% used filtration method of water purification. This result is similar to an interventional study conducted in a peri-urban community in Tanzania [8] which found out that boiling was the commonest method of water purification.

Table 3.2.5: Distribution of Respondents from Household by Water Purification Method

Water purification method	Frequency	Percent	Cumulative Percent
Boiling	65	54.2	54.2
Adding alum	32	26.7	80.9
Filtrations	10	8.3	89.2
Others	13	10.8	100.0
Total	120	100.0	

Source: Field Survey 2019

3.3 Determinants of Choice of Major Source of Drinking Water

The multinomial logistic regression is used to analyse the determining factors of the household major source of drinking water. This regression is used because the dependent variable has more than two categories showing the options faced by the household in terms of their major source of water. In Estimating this, a base is required which is/ piped water is taken. The dependent variables have four categories, vis-a-vis piped water, well water, bottled water and sachet water. Estimate parameters used is the maximum likelihood procedure. The log likelihood value of -107.25761 and log likelihood ratio chi square value is 70 which is significant at 1% level of significance. The result shows that all slope co-efficient are significantly different from zero. The percentage of correct prediction is given as 24.63.

Well Water

The significant factors that increase the probability of choosing well water relative to piped water are government subsidy and drinking water in liters. These are both significant at 10 percent level of significance. The probability of choosing well water relative to piped water increases by 17.1 percent for a unit increase in government subsidy. The household will rather choose well water than piped water to avoid queue. The probability of choosing well water relative to choosing piped water increases by 23.1 percent for a unit increase in household drinking water in liters.

Bottled water

The significant factors that increase the probability of the household choosing bottled water relative to piped water are numbers of individual below SSCE and the household experience of disease while the ones that decrease the probability of choosing bottled water to piped water are occupation, volume of drinking water in liters and improvement in water services. The probability of choosing bottled water relative to piped water increases by 4.7% for a unit increase in the

number of individuals in the household below SSCE level. This is significant at 10 percent level of significance. It shows that the awareness and drinking of bottled water is not based on level of education but how safe the household considers it to be. Also a unit increase in the number of households that experience water borne diseases increases the probability of choosing bottled water relative to piped water by 11.8% and this is significant at 5 percent level of significance. This is in line with [9],[10] that Domestic water supply is affected by several factors, among which is gender, age and family size.

Meanwhile, the probability of choosing bottled water relative to piped water decreases by 1.6 % based on occupation, and it is significant at 10% level of significance. Moreover, as the drinking water in liters of the household increases, the probability of choosing bottled water relative to piped water drops by 6.6%. This is significant at 10 percent level of significance. This shows that the household tries to cut their cost by choosing piped water instead of bottled water as their need for drinking water increases. A unit increase in improvement of water service decreases the probability of choosing bottled water relative to piped water by 9.9 % and this is significant at 10% level of significance. These shows that the household tends to go for a cheaper source of water if the service improves.

Sachet Water

The significant factors that decrease the probability of choosing sachet water to piped water are number of individuals of the household below SSCE, number of children. occupation, and improved water services. The factor that increases the probability of choosing sachet water to piped water is government subsidy.

A unit increase in the number of household below SSCE decreases the probability of choosing sachet water to piped water by 24.7% and it is significant at 10% level of significance. This shows that household that are less learned go for piped water than sachet water in the study area. As the number of children increases by a unit in the household, the probability of choosing sachet water decreases relative to piped water by 15.5% and it is significant at 10%. This shows that as number of children increases in the household, the household chooses piped water because it reduces the cost attached to getting sachet water. Occupation also decreases the probability of choosing sachet water to piped water by 4.8% and it is significant at 5% level of significance.

A unit increase in the improvement of the water service reduces the probability of choosing sachet water relative to piped water by 35.3% and is significant at 5% level of significance. This shows that if there are improvements in water services, the household still prefers the cheaper source of water. As government subsidy increases by a unit, the probability of choosing sachet water relative to piped water increases by 25.23% and this is significant at 10% level of significance. This shows that when government increases subsidy on water household chooses sachet because of its reduced price.

Table 3.3: Factors that influences the Choice of Drinking Water Source

Variable	Well water			Bottled water			Sachet water		
	Marginal effect	Standard error	p>/z/	Marginal effect	Standard error	p>/z/	Marginal effect	Standard error	p>/z/
Below SSCE	0.047	0.044	0.292	0.089	0.047	0.057*	-0.247	0.132	0.063*
Marital Status	0.035	0.046	0.444	0.062	0.050	0.213	0.024	0.115	0.833
Number of children	-0.031	0.035	0.385	0.022	0.020	0.182	0.070	0.055	0.076
Average monthly income	0.032	0.023	0.166	-0.027	0.020	0.182	0.070	0.055	0.0203
Any disease	0.017	0.040	0.669	0.118	0.053	0.026**	-0.036	0.119	0.759
House ownership	0.754	0.050	0.132	-0.030	0.044	0.487	-0.120	0.111	0.282
Occupation	-0.010	0.089	0.223	-0.016	0.008	0.061*	-0.048	0.024	0.044
Government subsidy	0.171	0.103	0.096*	0.128	0.092	0.165	0.0252	0.143	0.078*
How many with cash income	-0.158	0.193	0.411	-0.163	0.150	0.279	0.247	0.182	0.892
Drinking water in liters	0.231	0.193	0.063*	-0.066	0.036	0.071*	0.0129	0.146	0.378
Improve services	-0.048	0.126	0.399	-0.099	0.054	0.070*	-0.355	0.152	0.020

Number of observation = 118

Pseudo R2 = 0.2463

Log likelihood = 017.25761

L.R chi2(33) = 70.08

Prob chi 2 = 0.0002

*P (ZZ) values are in parenthesis ***significant at 1% at 5% and 10% (Public Borehole (4) is the reference category)*

4. SUMMARY, CONCLUSION AND RECOMMENDATION

A well-structured questionnaire was used to collect information on socio economic characteristics of the respondents, choice of water source, relative priority for the water source for drinking. The analytical tools used in the study are descriptive statistics, multinomial logit

The probability of choosing well water relative to piped water increases by 17.1 percent for a unit increase in government subsidy. The household will rather choose well water than piped water to avoid queue. This study recommends that the government should put more effort in making piped water available in not too distance area in the location. This study also recommends that the government pay attention to the issue of subsidy when it comes to water because according to the result of this study the factor that increases the probability of choosing sachet water to piped water is government subsidy.

Meanwhile a unit increase in the number of household below SSCE(secondary school leaving certificate) decreases the probability of choosing sachet water to piped water by 24.7% and it is significant at 10% level of significance. This shows that household that are less learned go for piped water than sachet water in the study area. The importance of education cannot be over emphasized when it comes to choice of drinking water. The government and non-governmental organizations are encouraged to sensitize the community on the issue of education and its importance.

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