DETERMINANTS OF THE FACTORS AFFECTING WILLINGNESS TO PAY FOR IMPROVED SANITATION AMONG RURAL HOUSEHOLDS IN OYO STATE, NIGERIA

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Abstract
Improved sanitation is one of the core development indicators in the world. Households in sub-Saharan Africa lack improved sanitation. This study examined factors influencing rural households' willingness to pay (WTP) for improved sanitation (in terms of access to toilet and waste disposal) in Oyo State, Nigeria. Primary data was obtained from 268 rural households selected through a multi-stage sampling procedure. Descriptive statistics and Tobit regression analysis were used for data analysis. Results revealed that 92.5% of the respondents made use of unimproved toilet. The mean WTP per household per month for improved public toilet services was N658.80k. The factors that significantly influenced WTP for improved toilet services were respondents' age ($p<0.01$), Gender ($p<0.01$), household size ($p<0.01$), income ($p<0.05$), distance to toilet ($p<0.01$) and use of covered latrine ($p<0.05$). The study inferred that respondents made use of unimproved sanitation sources. The study recommended that government and Non-Governmental Organisations (NGOs) should prioritize provision of improved sanitation services close to respondent's locations at an affordable price.

Key Words: Sanitation, Willingness to pay (WTP), Tobit model**,** household, toilet, waste disposal

Introduction

The state of sanitation in many Nigerian rural areas is deplorable. Since 1990, there has been little change in sanitation coverage in Nigeria (Sanitation and water for all, 2012). Access to basic sanitation means ensuring hygienic excreta disposal, waste disposal and having a healthy environment both at home and within the neighbourhood. Sanitation as a concept is defined as the safe disposal of human excreta (WHO/UNICEF, 2010). Safe disposal means that excreta must be contained or treated to avoid adverse effect on people's health, not only that people must excrete hygienically. UNICEF (2008) postulated that70% of households must have access to basic sanitation by 2015. The MDGs also are encapsulated by the Sustainable Development Goals (SDGs) which focussed on "ensuring availability and sustainable management of water and sanitation for all." Closely related to this is the goal of achieving a significant improvement (in terms of standard of living) in the lives of at least 100 million rural farm households by year 2020. Similarly, 17% of rural dwellers in Latin America and the Caribbean and 9% in Northern Africa still resorted to open defecation. Out of 1.1 billion people who still practice open defecation, majority (94.9 %) live in rural areas (WHO, 2012). Also, the United Nations re-affirmed that 2.4 billion people lacked access to adequate latrine services (UN, 2016). The limited access to sanitation have adversely affected millions of people in the world most especially the poor, in that they die from preventable diseases caused by inadequate sanitation services (Bogale and Urgessa, 2012).

A WHO report published in 2012, observed that about 2.6 billion people lacked access to basic sanitation in 2002. During the period 1990-2002, access to improved sanitation increased by 9% globally i.e. from 49% in 1990 to 58% in 2002. In Nigeria, sanitation coverage rates are among the lowest in the world. Likewise, access to adequate sanitation decreased from 39% in 1990 to 35% in 2010; in which 25% of Nigerians used shared sanitation facilities, which were not adequate (UNICEF,

2012). In 2010, only 35% and 27% in urban and rural areas respectively had access to sanitation which is far-fetched from the national target of 75% by 2015 (Sanitation and water for all, 2012). The consequence of failure to provide improved sanitation is that a large proportion of persons had resorted to the use of bushes around their vicinity. The implication of this is that people are exposed to cycles of innumerable number of diseases.

The lack of sanitation facilities therefore are the primary causes of outbreak of water related diseases like diarrhoea, malaria, cholera, typhoid and guinea worm, particularly in rural communities. The United Nations' General Assembly has recognised basic sanitation as human right that means everybody must have access to it. The benefits related to water sanitation are quite immense. This is true for developed countries, but is quite far-fetched from reality in developing countries, most especially in rural areas.

This study examined types or sources of sanitation, Willingness to Pay (WTP) and factors influencing WTP for improved sanitation in Oyo State, Nigeria.
The study is strictly focused on Public toilet as improved sanitation which was not a common feature in the village as at the time of the study.

Concept of Willingness to Pay:
The Willingness to Pay (WTP) value of a good or service may be elicited in two ways: (i) directly by asking consumers, through carefully orchestrated elicitation methods; or (ii) indirectly by examining market prices. The Contingent Valuation (CV) method is a survey-based elicitation technique to estimate WTP values of a good that is not traded in the conventional market. The CV method is often referred to as stated preference method, in contrast to revealed preference methods, which use actual revealed behaviour of consumers in the market. The CV method directly asks consumers' WTP for a non-marketed good under a given condition or a prescribed circumstance. To elicit consumers' WTP values for non-marketed goods, a hypothetical market scenario should be formulated and described to the survey respondents. Thus, the elicited WTP values of a good are "contingent upon" the hypothetical market prescribed in the survey instrument.

Since a CV survey always asks WTP questions, it has been commonly called a "WTP study." Subsequently, the key fundamentals of "contingent" market scenarios are often overlooked by practitioners as the term "WTP" predominates over "CV method." WTP as a concept refers to the economic value of a good and CV method is the survey-based technique to estimate WTP values.

The importance of willingness to pay for infrastructural facilities including maintenance and improvement has been variously amplified in literature. Pean (1993) opined that willingness to pay for urban services as the basis of effective demand, good infrastructural provision and maintenance and indeed responsible urban governance.

The value of the good/service in the CV technique is obtained through an elicitation technique which is an important component of any CV method (Portney, 1994; Mitchell and Carson, 1989). The elicitation technique (or approach) used in CV studies is of different types. Currently, there are four major types of elicitation techniques available in the literature, namely:

(1) The bidding game,
(2) Payment card (PC)
(3) Open-ended (OE) and
(4) Dichotomous choice (DC) approach (Boyle *et. al.,* 1996).

The dichotomous choice approach is further divided into two types namely: single-bounded dichotomous choice or take-it or-leave-it; and double-bounded dichotomous choice or take-it-or-leave-it with follow-up.
This present study adopted the double- bounded dichotomous choice or take-it –or –leave –it with follow-up will be used as elicitation method for WTP for improved sanitation (public toilet).

Methodology

Area of Study:
The study was conducted in Oyo State, Nigeria. Oyo State has its capital at Ibadan (the largest city in West Africa). The State is approximately located between latitude 7^0N and 9^0N and longitude 2.5^0E and 5^0E. It is bounded in the South by Ogun State and in the North by Kwara State. It is partly bounded by Ogun State and partly by the Republic of Benin in the west while it is bounded by Osun State in the east. Oyo State has a land mass of 27,460sqkm; a population density of 204 people per sq. km and ranked 14th by size in West Africa with the population of5,591,589 (NPC, 2006). It was estimated at 7,800,266.66 in 2017 given a population growth rate of 3.95%.

The dry season lasts from November to March while the wet season starts from April and ends in October. Average daily temperature ranges between 25 °C (77.0 °F) and 35 °C (95.0 °F), almost throughout the year. The rainfall pattern is bimodal, which ranges between 1000-3000mm. Agriculture is the main occupation of the people of Oyo State. The Yoruba people constitute the main tribal group in the State. It has 33 Local Government Areas with farming as the predominant occupation of the rural people. Primary Health care services exist in virtually all the Local Government Areas of the State (www.oyostate.gov.ng).

Method of Data Collection:
Primary data were used for the study and these were obtained from households with the aid of a structured questionnaire.

Sampling Technique:
This study adopted multistage sampling procedure in selecting respondent households. The first stage featured the selection of all the four zones in Oyo State (Ibadan/Ibarapa, Saki, Ogbomoso and Oyo) while the second stage featured selection of blocks using simple random technique to select four blocks per zone. In the third stage, simple random sampling technique was also adopted to select 28 cells with only 22 cells being used for meaningful analysis due to general hostility and perceived negative cultural belief of the people for the study, as well as the non-responsiveness of respondents in the study area. In the fourth stage, systematic random sampling technique was adopted to pick fifteen (15) respondents per cell; making a total of three hundred and thirty (330) respondents. However, only 81.2% of the questionnaire (268 respondents) could be used for meaningful analysis to achieve the objectives of the study.

Analytical Technique:
Descriptive statistics was used to describe the sources and WTP for improved sanitation practices. This include the use of frequency, percentages and cross-tabulations. Also, Tobit model was used to determine factors influencing WTP for improved sanitation practices. The Tobit model was then used to estimate the bid curves, which provides a statistical relationship between willingness to pay and a set of independent variables. The econometric model presented in this section adopts Tobin (1958). The linear regression model for the bid function was specified as:

$$y_i = x_i\beta + \mu_i \quad \text{--------- (1)}$$

Where:

y_i= WTP_i represents the ^{ith} rural dwellers' willingness to pay for improved environmental sanitation [Defecation (using public toilet)]

Note: An improved toilet (public toilet) was the hypothetical commodity presented to the respondents given its non-existence in the area as at the time of the study.

The model is specified explicitly as:

$y_i=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\text{-------}+\beta_{22}X_{22}$ ----- (2)

X_s are the explanatory variables.

The explanatory variable that was used to determine the factors influencing rural dwellers willingness to pay for improved environmental sanitation services (objective 3) include:

X_1= Age of household head (years)
X_2 = Gender (1- male, 0 otherwise)
X_3 = Level of education (years)
X_4 = Household size (number of people)
X_5 = Monthly income (naira)
X_6= Own house (1-own house, 0 otherwise)
X_7 = Rent house (1-rent house, 0 otherwise)
X_8 =River water used for domestic purposes (1-river water used for domestic purposes, 0 otherwise).
X_9= Stream water used for domestic purposes (1- stream water used for domestic purposes, 0 otherwise).
X_{10} = Distance of toilet to the house (kilometres)
X_{11} = Defecating in water closet (1-defecating in water closet, 0 otherwise).
X_{12}= Defecating in covered latrine (1- defecating in covered latrine, 0 otherwise)
X_{13}= Defecating in uncovered latrine (1- defecating in uncovered latrine, 0 otherwise)
X_{14} = Occupation (dummy)
X_{15} = Farming (dummy)
X_{16} = Trading (dummy)
X_{17}= Artisanship (dummy)
X_{18} = Marital status (dummy)
X_{19} = Married (dummy)
X_{20} = Single (dummy)
X_{21} = Flood (1- dispose refuse in to flood, 0 otherwise)
X_{22} = River (1-dump refuse into river, 0 otherwise)
***Note:** Civil servant serves as reference category for occupation.
Divorced serves as reference category for Marital status.

The mean WTP was obtained from the marginal effect generated after tobit regression model (the linear prediction)

Result and Discussion
Table 1 shows the socio-economic characteristics of the respondents in the study area. Findings revealed that 26.1% of the household heads had age ranging between 41and 50 years. The mean age of 48 years indicated that most of the respondents (household heads) were in the active age. This may suggest an increase level of work activities which may have implications on water utilization. Only 37.3% were female-headed households while 62.7% were male-headed households. These imply that male-headed households dominated the study area. Also, 92.5% of the respondents were married, 4.5% were singles, 2.6% were widows while 0.4% were divorced. Approximately, 52.6% of the households had formal education while only 47.4% of the households had informal education, indicating that the prevalence of formal education may broaden the respondents' understanding of the importance of using good sanitation practices in order to safeguard against various disease especially water-borne diseases. Result further revealed that 61.6% of the respondents were farmers while 21.3% and13.4% were traders and artisans respectively. Majority of the households (49.3%) had between 5 and 8 people in their households and the mean household size was 6 people. This is indicative of potential availability of family labour for the farm activities. The modal monthly income in the study area was less than N10,000 per month and this constituted 32.5% while the mean monthly income of respondents was N25,893.46.

However, respondents generally fell within the low income household. This has implication on their quality of life and attendant adoption and affordability of good sanitation practices.

Result revealed in table 2 that 92.5% of the rural households defecated in bushes while 2.6% defecated in pit latrine with slab (which is classified as improved toilet). This implies that respondents are prone to diseases associated with flies. This finding supported the study of Adeboyejo *et al*. (2009) and Nkwocha *et al*. (2012) who asserted that significant proportion of the households lacked toilet facility.

Factors influencing rural households' willingness to pay for Improved Sanitation (Public toilet) services in the study areas were determined using Tobit Regression Analysis. The result (Table 3) shows that the model produced a good fit for the data analysed with the log likelihood value of 1225.1142 ($p<0.01$).

The coefficient of age was negative and statistically significant ($p<0.01$). This shows that increase in age lowers the willingness to pay for improved sanitation (toilet) services. Older people or individual had lower preference for improved sanitation than the youth. It means they had been stereotyped to stick to the traditional way of defecation (within their vicinity/bushes). This is in line with the life cycle income hypothesis and conforms to the findings of Whittington *et al.* (1993) and Minh *et al*. (2013) who affirmed that older individual pay less for sanitation services.

Gender as a variable was positive and significant ($p<0.01$). This suggest that male headed households had higher willingness to pay for improved toilet services. This might be subject to the fact that male had been infected via improper sanitation. This is similar to the study of Minh *et al*., (2013) who found out that male-headed household had higher WTP for improved toilet facilities.

The parameter estimates of the variable household size had a positive sign, which was statistically significant ($p<0.1$). This implies that the more the number of household members the higher household's willingness to pay for improved sanitation practices. Households with more members most especially female folks have higher likelihood for preventing reproductive infections, which might be contacted due to inadequate toilet facility, hence WTP will increase.

Income of the household was positively significant ($p<0.05$). This implies that increase in income increases the willingness to pay for improved toilet services by rural households. Indications have shown that rural households or dwellers were more willing to pay for public toilet facility, peradventure they might have been infected. This finding conforms to some studies on willingness to pay for improved sanitation (toilet) services as confirmed by Francis (2013) and Minh *et al*.(2013) who reported that higher income increases WTP for sanitation in Uganda and Vietnam.

Ownership of personal house was positive and statistically significant ($p<0.01$). This implies that respondents living in their own buildings had higher willingness to pay for improved toilet services. Respondents in this category were showing a higher willingness to invest in their own property. Rural households in this category opt for improved toilet than existing sanitation. This finding confirms the work of Whittington *et al.* (1993) which found that owners bid more for improved sanitation services than tenants, thus indicating a greater willingness to invest in their own property in Ghana.

Use of stream had a negative coefficient that was statistically significant ($p<0.01$). This shows that the higher the number of households defecating in stream, the lower the willingness to pay for improved toilet services. Rural households believe monetary cost should not be attached to defecation, since there was large expanse of land covered with water within their environs. Moreover, distance to toilet was positive and statistically significant ($p<0.01$). This suggests that increase in distance to existing toilet increases willingness to pay for improved sanitation services. Scenarios where the distance of existing toilet (bush used by 80.8%) is much more than necessary, rural households would bid more for improved sanitation services that is nearer. Hence, distance factor should be considered in citing improved toilet facilities in rural areas.

In addition to this, covered latrine was positively significant ($p<0.05$). This means that increase in the number of rural households utilising covered latrine increases the WTP for improved sanitation services. Usage of improved sanitation (covered latrine) over the years would had prevented the prevalence of infections in rural households, hence the higher likelihood of paying for improved sanitation (toilet) services. However, uncovered latrine had a positive sign, which was statistically significant ($p<0.01$). This shows that the higher the number of rural households using uncovered latrines, the higher the willingness to pay for improved sanitation services. The adverse effect of poor sanitation on rural households positively influenced their preference and bidding ability for improved sanitation services. This finding is similar to the work of Minh *et al*. (2013) which indicates that respondents showed dissatisfaction with the existing toilet and were willing to pay more for improved toilet.

The mean willingness to pay for improved sanitation (public toilet) in the study areas was N658.80k per household (with a mean of 6 people) per month. This is not unexpected given the high poverty presumed to be prevalent in the rural areas.

Conclusion and Recommendations

Age, gender, household size, income, own house, stream water, distance to alternative toilet and types of toilet influenced rural households' WTP for sanitation (toilet services) in the study area. Also, the mean WTP for public toilet services was N658.80k per household per month. Procurement of safe sanitation practices in each household and proper inspection should be done by environmental officers in order to curb spread of related diseases. Rural households should be sensitised on the need to adopt usage of improved sanitation practices. These could be made available by extension agents in the Local Government areas at an affordable price.

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Table 1: Socio-economic characteristics of respondents.

Variables	Frequency	Percentage
Age		
<20	6	2.2
21-30	35	13.1
31-40	60	22.4
41-50	70	26.1
51-60	37	13.8
61-70	46	17.2
Mean	48 years	
Total	268	100.0
Gender		
Female	100	37.3
Male	168	62.7
Total	268	100.0
Marital Status		
Married	248	92.5
Single	12	4.5
Divorced	1	0.4
Widow(er)	7	2.6
Total	268	100.0
Education		
Primary	73	27.2
JSS	1	0.4
SSS	55	20.5
Tertiary	12	4.5
Standard 2	0	0
Informal	127	47.4
Total	268	100.0
Occupation		
Farming	165	61.6
Civil servant	5	1.9
Artisans	36	13.4
Trading	57	21.3
None	2	0.8
Others	3	1.1
Total	268	100.0
Household size		
<4	85	31.7
5-8	132	49.3
9-12	35	13.1
13-16	10	3.7
17-20	5	1.9
>21	1	0.4
Mean	6 people	
Total	268	100.0
Income (Naira)		
< 10,000	87	32.5
10,001-20,000	51	19.0
20,001-30,000	71	26.5
30,001-40,000	15	5.6
40,001- 50,000	17	6.3
>50,001	27	10.1
Mean Income	N25,893.46	
Total	**268**	**100.0**

Table 2: Distribution of respondents by toilet sources.

Toilet Sources	**Frequency**	**Percentage**
Pit latrine without slab	9	3.4
Bucket	0	0.0
Water Closet	3	1.1
Pit latrine with slab	7	2.6
Bush	248	92.5
Total	**268**	**100.0**

Table 3: Tobit regression result on factors influencing rural households' WTP for improved public toilet services in Oyo State

Variables	**Coefficient**	**T-value**
Age	-0.1171***	-3.14
Gender	5.1299***	4.05
Education	-0.7362	-0.76
Household size	0.2944***	2.71
Income	0.00003**	2.38
Own house	4.1888***	3.28
Rent house	-0.2433	-0.21
River	-0.5674*	-1.80
Stream	-4.1959***	-4.18
Distance to toilet	0.0049***	4.00
Water Closet	5.8178	1.56
Covered latrine	3.6734**	2.52
Uncovered latrine	8.2395***	4.91
Farming	4.8638	1.36
Trading	4.9495	1.34
Artisans	2.7322	0.73
Married	0.2456	0.10
Single	1.5186	0.36
Constant	8.5033	1.64
No of observation	268	
Prob>F	0.0000	
PseudoR^2	0.0128	
Log likelihood	-773.9284	
Mean WTP	₦658.80k/household/month.	

* 10% significant, **5% significant, ***1% significant.