Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.48, 2018
www.iiste.org

Analysing Rural-Urban Disparity in Access to Safe Toilet in Nigeria

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Abstract
This study examines the socio-economic determinants of access to safe toilet facilities in Nigerian households. It also investigates the factors responsible for rural-urban disparity in accessing safe toilets among Nigerians. It uses the 2013 Demographic Health Survey (DHS) on Nigeria for all the analyses. Binary and Ordered Probit Regressions Models as well as Oaxaca-Blinder decomposition were used to determined factors affecting access to safe toilet facilities in the country. The results shows that, households head age, marital status, gender, household size, education, wealth index, locations, ethnicity and geopolitical variations are the significant determinants of households' access to safe toilets in Nigeria. While, household size, rural locality, zones, gender, and lower wealth index have negative impacts; households head age, marital status, ethnicity and education level, have positive effects on the households' access to safe toilets in the country. Secondly, differences in the age of households head, household size, wealth index, gender, zones and marital status are the factors responsible for the rural-urban variation in access to safe toilets in Nigeria. The study recommends poverty reduction programmes, public-private partnership, provision of public toilets, rural development, educational improvement, cultural and value re-orientation and social security programme among others as measures to improve access to safe toilet facilities in the country.
Keywords: Safe toilets, socioeconomic, probit, Blinder-Oaxaca decomposition and socio-economic development.

1. Introduction

Having access to sanitation is a basic human right, yet almost a third of the world's population suffer on a daily basis from a lack of access to a clean and functioning toilet. Without toilets, untreated human waste can impact a whole community, affecting many aspects of daily life and ultimately posing a serious risk to health. The issue runs deeper into societal impacts, such as teenage girls often leaving school at the onset of menstruation due to lack of privacy and the risk of attack or rape associated with being forced to defecate in the open during nightfall. Gogarty (2012)

Access to decent and clean toilets is globally considered as fundamental to the human survival and welfare. It remains one of the targets of the Millennium Development Goals (MDGs). United Nations (2010) declares it as a human right and its denial constitutes a gross violation in addition to other basic human rights (right to live, health and so on) denial. Access to improved sanitation facilities, particularly efficient and decent toilet remains very critical not only to achieve MDGs but also to sustain environment and development. Lack of access to toilet forces defecation in open places. As a result, public health, dignity, privacy, security and human well-being are endangered. This thwarts the efforts geared towards curtailing poverty and ensuring economic and social development (UNICEF, 2014). UNDP (2006) reports that inadequate access to improved and clean sanitation services is more disastrous than war or any act of terrorism; as the former consumes more lives and destroys a great deal of properties than the latter (p. 9-12). Roma & Pugh (2012) and WHO (2011) assert that women and girls face the risks of rape and abuse while teenage girls tend to leave schools during menstruation period (p.12-17). Also, such people face the risk of being harmed by criminals and wild animals as they go about defecating in the bush. In addition, unimproved sanitation services cause communicable and diarrhoeal diseases (cholera, typhoid and dysentery) which are the second killer diseases, after pneumonia, of under-5 children (Roma & Pugh 2012 and WHO 2011).

It is reported by Global Citizen (2012) that unclean sanitation deprives developing countries between 3% and 8% of their Gross Domestic Product (GDP) every year. However, every USD $1 spent on improving the sanitation in developing countries generates a return of about USD $9 through reducing health care costs, increasing productivity, raising revenue from tourism and promoting educational attainment. With all the afore-said advantages of access to improved sanitation and negative repercussions of its unavailability, many developing countries are not making significant progress in enhancing the proportion of people with access to such basic services. This is happening at a time when the world is celebrating the achievement of the target of MDG 7 on safe. Average access to sanitation is even more embarrassing in the developing countries of Southern Asia and sub-Saharan Africa as could be revealed from the available data below.

It is reported by the Joint Monitoring Programme (JMP) of WHO/UNICEF (2014) that about 2.5 billion

people or 40% of the world's population lack safe and clean toilets and 1 billion out of them practise open defecation. 82% of the 1 billion live in ten countries of India, Indonesia, Pakistan, Nigeria, Ethiopia, Sudan, Niger, China, Nepal and Mozambique (p. 16-20). As a consequence, over 750,000 under-5 children die from diarrhoeal diseases every year, of which 88% of the diseases are caused by unhygienic environment. UN (2010) also revealed that 443 million school days are lost every year due to sanitation and water problems. The report indicates that the Sub-Saharan Africa (SSA) is leading with 44% of its population living without access to safe and effective toilets. Southern Asia follows with 18% and is leading other regions in terms of practising open defecation with 39%. 26% of SSA's population practice open defecation. Moreover, 80% of diseases in developing world are triggered off by unsafe water and unclean toilets. Ironically, the global rate of open defecation dropped from 24% in 1990 to 15% in 2011 but remains very high in Africa. Sanitation and health related problems are perhaps responsible for the SSA's highest under-5 mortality rate.

The case of Nigeria in terms of access to safe toilets is a paradox. The country has enormous natural and human endowments, high and sustained economic growth in recent times and is currently the largest economy in Africa and 27th in the world. However, the country is the 4th in terms of highest number of population without access to safe toilets, with about 39 million people practising open defecation, after India, Indonesia, and Pakistan (World Bank 2014, p. 1 and WHO/UNICEF 2014, p. 21). JMP observes that about 119 million Nigerians (about 72% of the population) use indecent and unsafe toilets with about 50 million practising open defecation. It remains worrisome that a large number of Nigerian finds it stressful to access toilets. About 46.3% of Nigerians cover a distance of somewhat 500 metres before they could access toilets (NBS, CBN & NPC, 2008, p. 5). The situation deteriorates due to inadequate clean and shambled state of the existing public toilets coupled with the alarming rate of about 3.2% growth rate of the population. It is therefore vital to conduct this empirical study to examine the major determinants of access to safe and clean toilets as well as its variability between rural and urban households as a vast majority of Nigerians live in rural areas. Therefore, the main objective of this study is to examine the determinants of access to safe and decent toilets and its rural-urban variation.

2. Conceptualization and empirical literature review

Fundamentally, basic sanitation refers to the act of keeping human environment safe and hygienic. Towards effective sanitation, improved toilet facilities are provided. These include piped sewer system, septic tank, flush/pour flush to pit latrine, ventilated improved pit latrine (VIP), pit latrine with slab and composting toilet among others. As a major and integral component of sanitation services, toilet facilities make it possible for human excreta to be disposed safely ensuring environmental safety and hygiene. This hygienic procedure separates human excreta from human contact which reduces health risks (JMP of WHO/UNICEF, 2008, p. 6-12 and Roma & Pugh 2012, p. 5-7). Unsafe toilets, according to JMP, include: Flush/pour flush to elsewhere (not into a pit, septic tank, or sewer); Pit latrine without slab; Bucket; Hanging toilet or hanging latrine; Shared facilities and open defecation (no facilities or bush or field).

Roma & Pugh (2012: 12-13), in line with millennium development goals, believe that provision of safe and decent toilet becomes necessary not only to respond to the call of nature but also to: Improve individual and communal economy as investment in sanitation saves health care costs and boosts tourism; improve education among children as lack of safe and decent toilet exposes children to sanitation and water related diseases which hinder them from attending school; ensure privacy and dignity, especially of women, as lack of toilet endangers women to sexual abuse as they resort to open defecation; save lives of under-five children as sanitation and water related problems cause diarrhoeal diseases which are the second highest killer diseases of children under five years; and improve climate and environmental condition and avoid negative climate change.

There are theories connecting certain socioeconomic factors to changes in access to improved sanitation or toilet facilities. Lack of access to effective and safe toilet remains a good indicator of poverty. Individual attribute theory of poverty is a conservative theory that blames poverty-stricken individuals to be architect of their misfortunes due to their laziness, incompetence, inherent disabilities and bad choice. This implies that individuals become poor if they refuse to work harder, to get skills and make bad choice between future and short-term investments. It is believed that competition usually rewards the winners; and punishes the lazy and those with bad choice. In connection, individuals lack safe and decent toilets owing to their laziness to work hard and get the needed resources. They refuse to be educated. They also refuse to make right choice of owning toilets in their houses.

Bradshaw (2005) postulates that the structural theory of poverty or social exclusion is a progressive social theory that views economic, political and social system as being responsible for the people's poverty (p. 10-12). This is so because the system denies the opportunities and resources to achieve a given welfare level. He further proposed that there tend to be systematic barriers which deny the poor access to socioeconomic services such as jobs, education, sanitation, housing, health care, safety and political representation. In other words, the theory of social exclusion deals with tactical procedure of excluding certain individuals or groups from effective participation in the society. This exclusion involves the denial of access to resources, employment, education and

public services (Davis and Sanchez-Martinez 2014, p. 51-54). Typically, people are excluded based on their religion, race, ethnicity, gender or region among others. To check the structural barriers, there should be efforts towards ensuring equal opportunities to jobs, education, income, political participation, housing and banking among others. In line with this theory, one deduces that structural barriers hinder the poor from accessing safe and clean toilets. These barriers can be eliminated by providing the poor with employment, education, shelter and health facilities.

Individual laziness promotes lack of access to decent and clean toilets. So also, government policies which dictate social system also restrict economic, political and social structures which directly affect individuals and families.

Li, Gao, Miao & Chen (2014) state, with reference to rural China, that income, education, minority status and temperature were the major determinants of improved sanitation coverage. The temperature has a negative effect on the cost of improved sanitation. The Concentration Index (CI) shows that income made the largest contribution (more than 50%) to the socioeconomic inequality in sanitation improvement annually from 2003 to 2011. This is followed by minority status (about 13%) and education level (about 5%) while temperature made almost no impact. In a cross-sectional study of the impact of geographical and socioeconomic disparities on access to improved sanitation facilities in Indonesia using Indonesia Family Life Survey data and multivariate binary regression model. Praisetyoputra & Irianti (2013) found that there exists a rural-urban disparity (95% CI) and wealth index affect access to improved sanitation facilities. Hence, they conclude that both geographical and socioeconomic disparities impact affect access to improved sanitation facilities in Indonesia.

Asset indices and rural-urban differences have significant positive and negative effects on sanitation access in Bangladesh, India, Malawi, Nigeria, Kenya and Tanzania respectively (Rheingans, Anderson, Luyendijia & Cumming 2014). Sbrana (2009) also analysed the determinants of water and sanitation access in Yemen using the country's DHS dataset for the period 2003 and Binary Binary Regression Model. The outcome shows that wealth has a strong and significant positive impact on the probability of having access to improved water and sanitation facilities by 3% and 30% respectively. Pubic per capita spending in health and population also increases the likelihood of accessing improved water and sanitation by about 1% and 4% respectively. Lastly, electricity raises the probability of having access to improved water and sanitation by 12% and 18% respectively. The results indicate also that the significant variables are stronger in determining access to improved sanitation than access to safe water.

With reference to Kumasi in Ghana, willingness to pay for improved sanitation depends on household's income, residence-nature (personal or rented house), current expenditure on sanitation and level of satisfaction with the existing sanitation system (Whittingten, Lauria, Wright, Choe, Hughes & Swarna 1992). They disclose that educational level, social and cultural variables remains insignificant. Koskei, Ondimu, Obwoyere & Mironga (2013) conclude that educational level and marital status of the household head affects the type of toilet facility used by the household members. Dungumaro (2009) says that there is a link between socioeconomic status and availability of water and sanitation. Moreover, Mohammed, Zungu & Hoque (2013) conducted a cross-sectional study of 391 households to analyse the accessibility of safe drinking water and availability of environmental sanitation in Dukem town of Ethiopia. They used non-parametric and descriptive statistics. Their results indicated that there is statistically significant link between private house ownership and private toilets, and between family size and private toilets.

Dare (2014) says that sex, occupation and income determine the rural household's willingness to pay for sanitation in Southwest Nigeria. While, Ige & Adetunji (2014) established that, although there are variations among various socio-economic factors in relation to household sanitation techniques, but none of the factors is significant in affecting household sanitation in Ekiti State of Nigeria. Unlike the reviewed literatures, this research focuses specifically on access to safe toilets in Nigeria with emphasis on rural-urban disparity.

3. Empirical Model Specification

Based on the theoretical and empirical studies reviewed in section 2, the structural form of the model for the study is:

$$st = f(SECO_i) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

Where, st represents access to safe toilet facilities, and SECO stands for the various socioeconomics factors of each household. (1) can be further simplified as,

$$st_i = f\ (we_i, ed_i, ge_i, lo_i, hz_i, ag_i, ms_i, re_i, tr_i\ ) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Where, we_i is the wealth index of each household, ed_i is the educational level of each household head, ge_i stands for the sex of the household head, lo_i represents location (either urban or rural), hz_i is the size of each household, ag_i is the age of the household head, ms_i is the marital status of the household head, re_i is the geopolitical region where each household resides and tr_i is the tribe of each household.

A linear representation of (2) is given as:

$$st_i = \beta_0 + \beta_1 we_i + \beta_2\, ed_i + \beta_3 ge_i + \beta_4 lo_i + \beta_5\, hz_i + \beta_6\, ag_i + \beta_7 ms_i + \beta_8 re_i + \beta_9\, tr_i + u_i) \ldots (2)$$

All the variables are as defined in (2) above.

Table 1: Definition of Variables

Variables	Definitions
SECO	Socioeconomic Characteristics of Head of Household
Safetoilet	Safe Toilet Facilities (coded based on quality of the facilities)
Age	Age of Head of Household
Agesqr	Square of the age of head of household
Edulevel	Level of Education of head of household
Gender	Gender of Head of Household (Male=0 and Female=1)
Geopolitical Zones	Region of Head of Household (North-Central/North-East/South-East/South-South/South-West)
Locality	Locality of Head of Household (Rural=1 and Urban=0)
HHsize	Household Size
Maristatus	Marital status of Head of Household (Married=1 and Single=0)
Ethnic	Tribes of the household (Hausa/Igbo/Others)
Wealth	Wealth Index (Poor=1 and Non-poor=0)
μ_i	Error term capturing other determinants not included in the model

Source: Author's Construction (2015)

4. Data and Estimation Techniques

This study used the 2013 National Population Commission's Demographic and Health Survey (DHS) dataset. Thus, the DHS data on Toilet-type and the relevant socioeconomic variables are used to estimate the model specified above. The reports of WHO/UNICEF's Joint Monitoring Programme (JMP), NBS and others were used in analysing the trend and coverage of basic sanitation services in Nigeria as well as international comparison. Given the discrete nature of the variables, Probit Regression Model was used to estimate the equation (2) since the assumptions of OLS technique break down. However, to ensure consistency and reliability of the results, OLS, binary and ordered probit models would be estimated. Thereafter, the findings of probit model would be discretionarily selected (not because it is better than those of binary but for the author's preference). The Probit Regression Model is used to determine the probability of event occurring or not. In this case, the Probit Model looks for the probability of households having access to safe toilets or not given the probabilities of changes in the socioeconomic variables included in the model. Moreover, Ordered Probit Regression Model is precisely chosen because the dependent variable (access to safe toilets) is ranked from composting toilet to flush toilet (see Greene, 2012, p 671-690 and Maddala, 1992, p 15-35). As such, equation (2) can be re-specified as follows:

$$Log\left[\frac{\Pr(St)\geq j}{1-\Pr(St)\geq i}\right] = \propto_i + \delta_n SECO_i + \mu_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

Where: Pr(st) is the probability of household having access to safe toilet while 1-Pr(st) is the probability of household not having access to safe toilet

In order to explain rural-urban difference in having access to safe toilets, the well celebrated model of Blinder-Oaxaca decomposition is used (Blinder-Oaxaca 1973, Hahn and Bauer 2008 Adewara and Visser 2013, Adewara and Oloni, 2013). The model could be used to analyse rural-urban gap in having access to safe toilets by decomposing the outcome variables between the rural and urban areas into a part explained by differences in observed characteristics and the remaining part to be captured by differences in the estimated coefficients. Given the two groups Urban (U) and Rural (R) areas, the Blinder-Oaxaca decomposition model can be derived as follows:

$$st_e = E(st_U) - E(st_R) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

$E(st)$ indicates the expected value of the outcome variable, explained by the group differences in the predictors. Equation (6) can be derived on the basis of the linear model stated in equation (5) below.

$$st_e = SECO_e\delta_e + \mu_e \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Where; $E(\mu_e) = 0, e\epsilon\{U,R\}$; $SECO$ contains all the predictors, δ is a series of parameters and the constant, and μ is the error term. Equation (6) can be used to express the mean outcome difference in form of linear prediction at the group-specific means of the explanatory variables. Thus,

$$st_e = E(st_U) - E(st_R) = E(SECO_U)'\delta_U - E(SECO_R)'\delta_R \ldots\ldots (6)$$

Given that

$$E(st_e) = E[(SECO_e)'\delta_e + \mu_e] = E[(SECO_e)'\delta_e] + E(\mu_e) = E[(SECO_e)'\delta_e] \ldots\ldots\ldots (7)$$

Where $E(\delta) = \delta$ and $E(\mu) = 0$ based on theoretical assumption.

Equation (8) can be derived below to determine the contribution of group differences in predictors to the

overall outcome difference.

$$st_e = [E(SECO_U) - E(SECO_R)]'\delta_R + E(SECO_R)'(\delta_U - \delta_R) + E[(SECO_U) - (SECO_R)]'(\delta_U - \delta_R) \ldots\ldots (8)$$

Equation (8) contains three decompositions, which can be split into the following parts:

$$R = E + C + I$$

The first part $E = [E(SECO_U) - E(SECO_R)]'\delta_R$ explains the group differences in the predictors (the endowment effect). The second part $C = E(SECO_R)'(\delta_U - \delta_R)$ captures the contribution of differences in the coefficients inclusive of the intercept differences. The last part $I = E[(SECO_U) - (SECO_R)]'(\delta_U - \delta_R)$ is an interaction term accounting for the possible multicollinearity in the differences in endowments and coefficients between the two areas.

Note that the decomposition in equation (8) above is constructed from the perspective of Group R (rural households). This signifies that the group differences are adjusted by the coefficients of Group R to find the endowment effect (E) and coefficients (C). That is, E, C and I measure the expected variation of Group R. This means the outcome should assume the predictor's levels of Group U. Also, the negative coefficient of Blinder-Oaxaca decomposition tells us that such a variable is narrowing the gap but positive value implies widening of the gap for the group under consideration. This is so because the Z-scores are multiplied by -1.

5. Safe and Clean Toilets in Nigeria: Situation and Trend Analysis.

Nigeria and its teeming population need safe and clean toilets to guarantee sanitation as well as healthy environment and inhabitants. Access to safe toilets over the years and coverage across the Nigerian population as well as comparative analysis with other countries are presented below.

Table 2: Trend of Unimproved Toilet in Nigeria (1990-2013)

Year	Unimproved (%)	Population (Million)
1990	64	61.19
2000	66	73.00
2006	70	98.00
2010	69	105.04
2011	69	109.64
2012	72	117.13
2013	71.5	119

Sources: JMP Report 2008-2014 and author's computation

Table 2 shows the trend of unimproved sanitation in Nigeria. It shows that people without access to safe toilets increased to 69% in 2010 and to 71.5% in 2013 compared to 64% in 1990. This corresponds with the rise in population using unsafe toilets in absolute term from 61.19 million in 1990 to 105.04 million in 2010 and 119 million in 2013. Thus, the proportion of the population with unsafe toilets has been rising by an annual average of 0.51% or 2.5 million since 1990.

Table 3: Components of Unimproved Toilet in Nigeria (1990-2012)

Year	Shared Toilet (%)	Other Unimproved	Open Defecation
1990	28	11	24
2000	27	18	23
2006	21	29	20
2010	25	22	22
2011	24	22	23
2012	26	23	23

Sources: JMP Report 2008-2014

Table 3 reveals the distribution of users of unsafe toilets between 1990 and 2012. There was 28% of the Nigerian population using shared toilet in 1990 and 21% in 2006. Thereafter it increased to 25% in 2010 and again decreased slightly to 24% in 2011 but then increased marginally to 26% in 2012. Other unimproved toilets increased from 11% in 1990 to 18% in 2000 and 29% in 2006. It decreased to 22% in 2010 and remained so in 2011 but increased to 23% in 2012. The population practising open defecation decreased from 24% in 1990 to 23% in 2012. In 2012, shared toilets users stood at 26% which was higher than users of open defecation and other unimproved toilets.

Table 4a Comparative Analysis of Access to Improved Toilet

Year	Nigeria	South Africa	Brazil	Malaysia	SSA	World	MDGs Target
1990	36	71	68	84	26	49	75
2000	34	75	74	92	28	56	75
2006	30	77	77	94	31	62	75
2010	31	79	79	96	30	63	75
2011	31	74	81	96	30	64	75
2012	28	74	81	96	30	64	75

Sources: JMP Report 2008-2013

In Table 3a, population with access to improved toilet in Nigeria is compared with those in South Africa, Brazil and Malaysia, SSA's, Global averages and MDGs' target between 1990 and 2012. The table shows that Nigeria is lagging behind these countries, global average and MDGs' target by far. Access to improved toilet in Nigeria was lower than sub-Saharan African average as at 2012,

Table 5a: Urban-Rural Disparity in Access to Improved Toilet in Nigeria

Year	Urban	Rural
1990	36	37
2000	34	32
2006	35	25
2010	35	27
2011	33	28
2012	31	25

Sources: JMP Report 2008-2013

Table 5a signifies disparity in access to improved toilets between urban and rural areas of Nigeria over the period 1990-2012. The table indicates that urban households have more access than rural ones by except in 1990. Rural households with access to improved sanitation reduced drastically from 37% in 1990 to 25% in 2012. Moreover, urban households with access to improved sanitation slowly declined from 36% in 1990 to 31% in 2012. Furthermore, figure 5b, below, indicates that the proportion of rural households with access to improved sanitation was higher in 1990 than that of urban households with little margin. Thereafter, rural households with access to improved sanitation declined rapidly. Relatively, the proportion of urban households with improved sanitation went down slowly thereby making that of urban area to be higher in 2012. It could be deduced from the trend analysis, so far, that population with access to safe toilet facilities remains low since 1990 and it continues decrease making it difficult for Nigeria to meet the MDGs target deadline. Provision of improved toilets seems neglected by policy makers and stakeholders in Nigeria. Disparities between rural and urban areas became pronounced since 1990 till date.

6. Presentation and Discussion of Results

Tables 6 and 7 contain the frequency of households' access to safe toilet facilities and summary or descriptive statistics on other variables respectively. Table 6 indicates the proportion of people having access to different forms of toilet facilities, which are accorded based on their respective qualities.

Table 6: Frequency Table of Access to Safe Toilet Facilities (Based 2013 DHS Dataset)

S/No.	Safe Toilets	Coding Score	Frequency	Percent
1	Flush to piped sewer sys	5	2,039	5.30
2	Flush to septic tank	4	3,968	10.31
3	Flush to pit latrine	3	2,135	5.55
4	Ventilated improved pit latrine (VIP)	2	7,325	19.04
5	Pit latrine with slab & Composting toilet	1	4,746	12.33
6	Unimproved toilet	0	18,268	47.47
		Total	38,481	100.00

Source: Author's Computation

According to the 2013 DHS dataset, 47.47% (about 18,268) of the households surveyed lack decent and effective toilets, thereby resulting in either open bush defecation; or use of unimproved toilet facilities. This implies that 52.53% (20,213) of the total observed have access to various types of improved toilet facilities: Flush to piped sewer system (5.30%), flush to septic tank (10.31%), pit latrine (5.55%) and VIP (19.04%) among others

Table 7: Rural-Urban Distribution in Access to Safe Toilets in Nigeria

S/No.	Safe Toilets	Rural	%	Urban	%
1	Flush to piped sewer sys	461	2.0	1,578	10.0
2	Flush to septic tank	708	3.1	3,260	20.6
3	Flush to pit latrine	555	2.5	1,580	10.0
4	Ventilated improved pit latrine	4,384	19.4	2,941	18.6
5	Pit latrine with slab & Composting toilet	2,423	10.7	2,323	14.7
6	Unimproved toilet	14,105	62.3	4,163	26.3
	Total	22,636		15,845	

Source: Author's computation

Table 7 above shows the distribution of access to safe toilets between rural and urban households in Nigeria. Of 22,636 rural households surveyed, it is only 8,531 (about 37.69%) that have access to various forms of safe toilets. However, 11,682 (about 73.73%) of 22,636 urban households surveyed have access to various forms of safe toilets. This confirms the earlier rural-urban inequality in accessing safe toilets in Nigeria.

Table 8: Socioeconomic Distribution in Access to Safe Toilets in Nigeria.

S/No.	Safe Toilets	Poor	Non-Poor
1	Flush to piped sewer sys	3	2,036
2	Flush to septic tank	4	3,964
3	Flush to pit latrine	32	2,103
4	Ventilated improved pit latrine (VIP)	2,931	4,394
5	Pit latrine with slab & Composting toilet	762	3,984
6	Unimproved toilet	9,291	8,977
	Total	13,023	25,458

Source: Author's computation

Table 8 also indicates the variation in access to safe toilets between poor and non-poor households in Nigeria. Out of 13,023 poor households surveyed, it is only 3,732 (about 28.66%) households that can access safe toilets. 16,508 (64.84%) non-poor households have access to various types of access safe toilets.

Table 9 above contains the estimates from OLS, Ordered and Binary Probit regression models. In the table, it is shown that age in years, age squared, household size, education level, locality, wealth index (poor) and ethnicity are significant at 1% level of significance in all the models. Also, marital status is significant at 1% in OLS and Ordered Probit Models but at 5% in Binary Model. The inclusion of age in years and age squared in the models is to capture both the linear and non-linear effects of the age. The significant positive coefficient of age (i.e. age linear) shows that as the age of household's head adds by a year, the probability of such a household to have access to safe toilets improves. The significant negative coefficient of age squared (age non-linear) tells us that at a certain age level, the probability of household having access to safe toilets falls down, as his/her age rises by a year. Thus, this means the age of household has positive effect on the access to safe toilet up to a certain limit beyond which it has negative effect. It is perhaps due to fewer opportunities to access safe toilets at an older age.

Table 9: Determinants of Access to Safe Toilet Facilities in Nigeria in 2013

	Dependent Variable=Safe Toilet Facilities			
	LPM (OLS)	***Ordered Probit (MLE)***	***Binary Probit (MLE)***	
	Coefficients	***Coefficients***	***Coefficients***	***Marginal***
Age in years	*.0193608****	*.0142704****	*.0101753****	*.0040473*
	(.0026044)	*(.002211)*	*(.0025494)*	
Age squared	*-.0001891****	*-.0001345****	*-.0000793****	*-.0000316*
	(.0000257)	*(.0000217)*	*(.0000249)*	
Marital status: Married=1 Others=0	*.071402****	*.0524565****	*.0412108***	*.0164035*
	(.0224891)	*(.0176921)*	*(.0205467)*	
Gender: Female=1 Male=0	*-.1027107****	*-.0790802****	*-.1059****	*-.0421852*
	(.0222022)	*(.0173971)*	*(.0197331)*	
Household Size (in log)	*-.0988952****	*-.0677039****	*-.0353528****	*-.0140618*
	(.0122069)	*(.0098654)*	*(.0117282)*	
Education Level	*.1794002****	*.1294295****	*.096133****	*.0382375*
	(.0071441)	*(.005254)*	*(.0065015)*	
Locality: Rural=1 Urban=0	*-.9472903****	*-.6798354****	*-.7113418****	*-.2753301*
	(.0185902)	*(.013926)*	*(.0163381)*	
Wealth Index : Poor=1 Nonpoor=0	*-.6850416****	*-.6951427****	*-.837124****	*-.3239394*
	(.0160862)	*(.0150419)*	*(.018586)*	
Ethnicity: Hausa	*.3734413****	*.4446455****	*.8989764****	*.3287363*
	(.0259526)	*(.0198153)*	*(.0271005)*	
Igbo	*.3572526****	*.2766441****	*.2343127****	*.0921305*
	(.0293178)	*(.020129)*	*(.0232733)*	
Others	*.0919779****	*.0684612****	*.1271362****	*.0505144*
	(.0246353)	*(.0178878)*	*(.0206912)*	
Intercept	*1.382351****		*.1279936***	
	(.0631588)		*(.060636)*	
Cut1		*-.1006805****		
		(.0519934)		
Cut2		*.262812****		
		(.0520845)		
Cut3		*.9256333****		
		(.0521331)		
Cut4		*1.187527****		
		(.0522229)		
Cut5		*1.900637****		
		(.05288)		
Sample Size	***38176***	***38176***	***38217***	
Pseudo R2/R-Squared	***0.2446***	***0.0935***	***0.1656***	
Prob > chi2	***0.0000***	***0.0000***	***0.0000***	

Note: Robust standard errors in parentheses. Adjusted for clustering and heteroskedasticity. LPM= Linear probability model, OLS=Ordinary Least Squares, MLE=Maximum Likelihood Estimator., **, and * indicate significance at 1%, 5%, and 10%, respectively***

The models also show that household size has a negative effect on the likelihood to access safe toilets, which suggests that the probability of accessing safe toilets decreases as the size of household rises by 1%. But the probability improves as the level of education increases. Moreover, there is less likelihood of having access to safe toilets if the household is a rural dweller and it is unlikely for poor household to access safe toilets. Moreover, female household is also less likely to access improved toilets than her male counterpart but being married improves the household's likelihood to use safe toilets than not married.

Finally, it is shown in all the models that if the ethnic group of the household is either Hausa, Igbo or Others, the household will be more likely to utilize improved toilets than his/her Yoruba counterpart. It is note-worthy that all the significant determinants fall under different cuts in ordered probit model. While, age-squared, female gender, household size and poor wealth fall below cut1, that is, below Pit latrine with slab & Composting toilet; age, marital status, other ethnic groups and education level are between cut1 and cut2, i.e., Pit latrine with slab & Composting toilet, and ventilated improved pit latrine. Again, Hausa and Igbo ethnic groups fall between cut2 and cut3, that is, between ventilated improved pit latrine and flush to pit latrine.

Binary model shows the marginal effects of the respective variables on the probability to access improved or unimproved toilet. As age increases by a year, the household's probability to utilize improved toilet rises by 0.40% while being female reduces the likelihood by 4.22%. Being married improves the tendency of household to access improved toilet by 1.64% but increase in household size by 1% leads to 1.41% reduction in household's likelihood to use improved toilet. When level of education improves, the probability of accessing safe toilet rises by 3.82% whereas being rural household reduces the chance of using safe toilet by 27.53%. Likewise, poor household has 32.39% less chance to access safe toilet. Finally, Hausa, Igbo and other ethnic groups have 32.87%, 9.21% and 5.05% more likely to access safe toilet than Yoruba respectively. To sum it all up, the models arrived at somewhat consistent results. That is, the models show that the variables are significant at same levels of significance and with almost same size. The models report that Hausa, wealth index and locality are the strongest determinants of household's access to safe toilet facilities followed by Igbo, other ethnic groups, gender and education level.

Table 10 shows the estimates from OLS, Ordered Probit and Binary Probit models but with some Geopolitical zones. The models show that age in years, age squared, household size, education level, locality, wealth index (poor) and zones are significant at 1% level of significance in all the models. Also, marital status is significant at 1% in OLS and Ordered Probit Models but insignificant in Binary Model. These models maintain that age in years, age squared, gender, marital status household size, education years and locality have the same impacts on the households' likelihood to access safe toilets as in table 10. It reveal that all the five Geopolitical zones are less probable to utilize improved toilets than North-west respectively. This has further confirmed the findings of models in table 10 especially on ethnic groups given than Hausa is from North-west.

The binary probit model contains the marginal effects of individual variables on the probability to access safe toilet. It is revealed that increases in age and education level increases the household's likelihood to use improved toilet by 0.60% and 4.16% respectively. Being female and rise in household size lead to 3.10% and 2.68% reduction in probability of household to use safe toilet respectively. Also, being rural household and poor household bring about 28.39% and 40.27% fall in the chance of household to access improved toilets respectively. North-Central and North-East all have less probabilities to adopt safe toilets by 39.14% and 13.54% than North-West respectively. Lastly, South-East, South-South and South-West also have 33.53%, 38.10% and 40.20% less tendencies to adopt improved toilets than North-West respectively. The models report that Hausa, wealth index and locality are the strongest determinants of household's access to safe toilet facilities followed by Igbo, other ethnic groups, gender and education level. The models arrive at consistent findings in terms of levels of significance, signs and sizes of the variables.

Table 10: Evidences of Geopolitical variation in Access to Safe Toilet in Nigeria 2013

Dependent Variable=Safe Toilet Facilities				
	LPM (OLS)	***Ordered Probit (MLE)***	***Binary Probit (MLE)***	
	Coefficients	***Coefficients***	***Coefficients***	***Marginal***
Age in years	*.0217448*** (.0026167)*	*.0165066*** (.0022138)*	*.0150913*** (.0025674)*	*.006000*
Age squared	*-.0002065*** (.0000258)*	*-.0001517*** (.0000217)*	*-.0001184*** (.0000251)*	*-.0000471*
Marital status: Married=1 Others=0	*.0704496*** (.0226065)*	*.0551421*** (.0177502)*	*.02802 (.0208184)*	*.0111474*
Gender: Female=1 Male=0	*-.0926603*** (.0224056)*	*-.0722716*** (.0174539)*	*-.0779081*** (.0200702)*	*-.031021*
Household Size (in log)	*-.1139635*** (.0122517)*	*-.0846661*** (.009904)*	*-.0674406*** (.0118491)*	*-.0268159*
Education Level	*.179636*** (.007222)*	*.1289788*** (.0052739)*	*.1047259*** (.0067857)*	*.0416414*
Locality: Rural=1 Urban=0	*-.9820303*** (.0183571)*	*-.708715*** (.0138743)*	*-.7350185*** (.0163811)*	*-.2838582*
Wealth Index : Poor=1 Nonpoor=0	*-.7246398*** (.0161822)*	*-.7492721*** (.0150268)*	*-1.060998*** (.0209423)*	*-.4027268*
Zones North-central	*-.3137337*** (.0209882)*	*-.4269934*** (.0192289)*	*-1.059532*** (.0273602)*	*-.3914076*
North-east	*-.1658738*** (.0182616)*	*-.1956998*** (.0185147)*	*-.3412868*** (.0251805)*	*-.1353957*
South-east	*-.2086012*** (.028305)*	*-.2965297*** (.0215004)*	*-.8944003*** (.0293073)*	*-.3353025*
South-south	*-.2616059*** (.0252403)*	*-.3612846*** (.0208265)*	*-1.031317*** (.0286888)*	*-.3809584*
South-west	*-.3929265*** (.0242162)*	*-.4924076*** (.0191159)*	*-1.092639*** (.0285968)*	*-.4019792*
Intercept	*1.763327*** (.060474)*		*1.122873*** (.0616653)*	
Cut1		*-.5507566*** (.0505309)*		
Cut2		*-.1855916*** (.0505027)*		
Cut3		*.4758384*** (.0504217)*		
Cut4		*.7341594*** (.0506433)*		
Cut5		*1.440722*** (.0517478)*		
Sample	***38176***	***38176***	***38217***	***38217***
Pseudo R2/R-Squared	***0.2417***	***0.0928***	***0.1777***	*0.1777*
Prob > F	***0.0000***	***0.0000 0.0000***		*0.0000*

Note: Robust standard errors in parentheses. Adjusted for clustering and heteroskedasticity. LPM= Linear probability model, OLS=Ordinary Least Squares, MLE=Maximum Likelihood Estimator. ***, **, and * indicate significance at 1%, 5%, and 10%, respectively

Source: Author's Computation

Table 11 contains predicted probabilities of access to different safe toilet facilities or responses. It is

indicated that 11.98% of the households will likely access composting toilets and pit latrine with slab as compared with the observed frequency of 12.33% in table 6 (i.e. there is difference of 0.35%). 19.26% households are predicted to likely access ventilated improved pit latrine as compared with 19.04% observed frequency in table 6, which brings about a difference of 0.22%.

Table 11: Predicted Probabilities of Probit Model with Ethnicities

Variable |	Observation	Mean	Std. Dev.	Min	Max
Pr(Safetoilet==1) p1oprobit	38217	.1198022	.0216635	.0253751	.1442181
Pr(Safetoilet==2) p2oprobit	38217	192625	.0664881	.042971	.2596657
Pr(Safetoilet==3) p3oprobit	38217	.0589344	.0320208	.0060328	.1041825
Pr(Safetoilet==4) p4oprobit	38217	.1033183	.0744923	.0051865	.2785702
Pr(Safetoilet==5) p5oprobit	38217	.0513013	.0550736	.0006021	.5218742

Source: Author's Computation

It is also predicted that 5.89% will likely use flush to pit latrine as contrasted with 5.55% observed frequency, thus the difference of 0.34%. Moreover, 10.33% households are predicted to probably utilize flush to septic tank as parallel to 10.31% observed frequency, hence the deviation of 0.02%. Lastly, it is predicted that 5.13% households may access flush to piped sewer system versus 5.30% observed frequency, with a difference of 0.17%.

Table 12 contains predicted probabilities of access to different safe toilet facilities or responses. It is indicated that 12.06% of the households will likely access composting toilets and pit latrine with slab as compared with the observed frequency of 12.33% in table 6 (i.e. there is difference of 0.24%). 19.19% households are predicted to likely access ventilated improved pit latrine as compared with 19.04% observed frequency in table 6, which brings about a difference of 0.15%. It is also predicted that 5.80% will likely use flush to pit latrine as contrasted with 5.55% observed frequency, thus the difference of 0.25%. Moreover, 10.26% households are predicted to probably utilize flush to septic tank as parallel to 10.31% observed frequency, hence the deviation of 0.05%. Lastly, it is predicted that 5.20% households may access flush to piped sewer system versus 5.30% observed frequency, with a difference of 0.10%.

Table 12: Predicted Probabilities of Probit Model with Geopolitical Zones

Variable |	Observation	Mean	Std. Dev.	Min	Max
Pr(Safetoilet==1) p1oprobit	38217	.1205577	.0210914	.0228957	.1448744
Pr(Safetoilet==2) p2oprobit	38217	.1919979	.0656348	.0379428	.2591402
Pr(Safetoilet==3) p3oprobit	38217	.0580254	.0314801	.0051226	.1027694
Pr(Safetoilet==4) p4oprobit	38217	.1026534	.0740447	.0043712	.2761212
Pr(Safetoilet==5) p5oprobit	38217	.0520108	.056247	.0004982	.5488151

Source: Author's Computation

Furthermore, the binary probit model with ethnic group predicted that 53.07% households will access safe toilet facilities as against the actual figure of 55.41% in table 6, thus the variation of 2.34%. However, the binary probit with geopolitical zones predicted that 53.24% households will adopt improved toilet facilities as compared with the observed figure of 55.42%, leading to a difference of 2.18%.

Given the differences between the predicted and actual proportions of households with access to various forms of safe toilets, it could be concluded that the ordered and binary models with geopolitical zones have predictive power than the models with ethnic groups. This is because the former models have smaller differences with the actual values than the latter models. Therefore, the findings of the models with geopolitical could be more reliable.

Table 13 presents the results of Blinder-Oaxaca decomposition on rural-urban inequality in access to safe toilet facilities among households. Column (ii) reveals that the mean prediction of urban households to access safe toilets is 2.1404 while that of rural households is 0.7950, resulting in difference of 1.3455. This implies that rural households are 1.3455 less likely to use safe toilets than their urban counterparts. The gap is brought about by the three major factors: overall endowment, the overall coefficient and overall interaction effects.

Table 13: Blinder-Oaxaca Decomposition of Rural-Urban variation in Access to Safe Toilet in Nigeria, 2013

	Rural-Urban Disparity in Access to Safe Toilet Facilities in Nigeria			
Mean Predictions (i)	*Differential (ii)*	*Endowments (iii)*	*Coefficients (iv)*	*Interaction (V)*
Group 1(Urban)	*2.140461*** (.0138037)*			
Group 2 (Rural)	*.7950078*** (.0081218)*			
Difference	*1.345453*** (.0160158)*			
Total		*.2500885*** (.0101309)*	*.5810029*** (.0274069)*	*.5143621*** (.0253476)*
Age in years		*.0068312*** (.0025402)*	*1.114828*** (.2540519)*	*.0162815*** (.0055597)*
Age squared		*-.0039388** (.0019277)*	*-.5720351*** (.126185)*	*-.011749** (.0049482)*
Marital status: Married=1 Others=0		*-.0057085*** (.0019276)*	*-.0443875 (.034769)*	*.0043023 (.0033793)*
Gender: Female=1 Male=0		*-.003114* (.0018001)*	*-.012084* (.0070608)*	*-.0052667* (.0030914)*
Household Size (in log)		*.010958 (.0021619)*	*-.0621881* (.0343313)*	*.0072018* (.0039906)*
Education Levels		*.0456905*** (.004116)*	*.2563782*** (.0136824)*	*.1505515*** (.0085756)*
Wealth Index : Poor=1		*.2865214*** (.0089641)*	*-.3434081*** (.0274576)*	*.2874364*** (.0230615)*
Region: North-Central		*.0186431*** (.0023908)*	*.1719084*** (.0108571)*	*-.0293183*** (.0039699)*
North-East		*.024452*** (.0026432)*	*.0486665*** (.011939)*	*-.0275347*** (.0067998)*
South-East		*.0076182** (.0037303)*	*.0001132 (.0050274)*	*.000142 (.0063036)*
South-South		*.0243244*** (.0022396)*	*.1367848*** (.0110558)*	*-.0443286*** (.0044716)*
South-West		*-.1621888*** (.0082472)*	*.0607921*** (.0048975)*	*.1666439*** (.013256)*
Intercept			*-.1743659 (.1314432)*	
Observations	*38176*	*38176*	*38176*	*38176*

Standard Errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1

Source: Author's Computation

The total endowment effects contributed significantly to the inequality by 0.2501 or 18.59%. This means that certain natural qualities of rural households must improve by 18.59% for them to have equal likelihood to access safe toilets as their urban counterparts.

The total coefficient effects contributed significantly to the gap by 0.5810 or 43.18%. This suggests that certain socioeconomic features of rural households should rise by 43.18% for them to have the same probability to access safe toilets as their urban counterparts. Finally, the total interaction effects contributed significantly to the difference by 0.5144 or 38.23%. The combined effects of endowment and coefficient have to be enhanced by 38.23%. These effects are all significant at 1% level of significance.

The endowment effects of individual variables show that age linear and age nonlinear contributed significantly to the endowment gap by 0.0068 or 2.73% and -0.0039 or -1.57% respectively. This means that difference in age linear widens the gap by 2.73% but difference in age nonlinear narrows the gap by 1.57%. Also, being female and married narrow the endowment gap by 0.0031 or 1.25% and 0.0057 or 2.28% respectively. Being poor and with large household increase the inequality by 0.2865 or 114.57% and 0.0110 or 4.38%. Additionally, the differences in education level and from North-Central widen the gap by 0.0457 or 18.27% and

0.0186 or 7.45% respectively. Being from North-East and South-East also widened the gap by 0.0245 or 9.78% and 0.0076 or 3.05% respectively. If household is South-South, there will be 0.0243 or 9.73% rise in the gap while from South-West; there will be 0.1622 or 64.85% reduction in the gap.

The coefficient effects of individual variables indicate that age linear and education level contributed significantly to the gap by 1.1148 or 191.88% and 0.2564 or 44.13% respectively. Age nonlinear and female reduce the gap by 0.5720 or 98.46% and 0.0121 or 2.08% respectively. Also, being poor and with large household narrow the gap by 0.3434 or 59.11% and 0.0622 or 10.70% respectively. Moreover, being from North-Central and North-East lead to 0.1719 or 29.59% and 0.0487 or 8.38% rise in the inequality respectively. Again, being from South-South and South-West increase the gap by 0.1368 or 23.54% and 0.0608 or 10.46% respectively.

Finally, the interaction effects of individual variables suggest that differences in age linear and education level widen the inequality by 0.0163 or 3.17% and 0.1506 or 29.27% respectively. Moreover, the being female and poor contributed significantly by -0.0053 or -1.99% and 0.2874 or 55.88% respectively. Variations in household size and age nonlinear contributed to the gap by 0.0072 or 1.40% and -0.0117 or 2.28% respectively. However, being from North-Central and North-East reduce the gap significantly by 0.0293 or 5.70% and 0.0275 or 5.70% respectively. Lastly, being from South-West and South-South increase the gap by 0.1664 or 32.40% and 0.0443 or 8.62% respectively.

7. Policy Implications, Recommendations and Conclusion

This study discussed important stylized facts regarding the factors determining households' access to decent and safe toilet facilities as well as those responsible for rural-urban disparity in access to improve toilet facilities in Nigeria. First and foremost, the study established that the major socioeconomic determinants of households' access to safe toilets are age in years (through linear link), household size, education level, age squared (nonlinear link), marital status, gender, locality (if rural), geopolitical zones, poor wealth index, ethnicity. Age-squared, female gender, household size, rural locality, poverty and all other zones in relation to North-West exert negative impact on households' likelihood to access improved toilets. Age linear, education level, marital status and all other ethnic groups in relation to Yoruba influence households' access to safe toilets positively. Thus, this helps the study to achieve its first objective. Secondly, the study established the factors responsible for the widening gap in access to safe toilets between rural and urban areas which among others, include age in years, household size, education level, age squared, zones, poverty, female gender and marital status. Therefore, there is no gainsaying that it is not only socioeconomic elasticity that determines rural-urban inequality in access to safe toilets but also socioeconomic disparities. To this effect, any economic and health intervention should target these variables to improve the households' access to safe toilet facilities as well as bridge the rural-urban gap in access to safe toilet facilities in Nigeria. In other words, policy interventions should not only focus on socioeconomic differences in improving access to safe toilet facilities but also on the rural-urban disparity.

On the basis of the above findings and their policy implications, the following have been recommended by the author as the measures to improve the proportion of households having access to safe and decent toilet facilities in Nigeria. Firstly, given the negative link between age-squared (exponential relationship) and access to safe toilets, there should be old age social security program to help the old people to have access to safe toilets. Secondly, an effective population measure should be formulated to checkmate the problem of unnecessary household size on the access to safe toilets in Nigeria. Thirdly, education should be highly subsidized and create awareness on the importance of education. By so doing, the rate of school enrolment will be raised thereby improving the percentage of people with access to safe toilets in the country. Fourthly, there should be also public-private partnership with view to reduce poverty by generating job opportunities and creating wealth as well as providing public safe toilets with effective system of maintenance so that households will afford safe toilet facility. Fifthly, concerted and sincere efforts should be directed towards rural development so that the gap between the urban and rural dwellers in accessing safe toilets will be bridged. Sixthly, although the North-West households have more probability of accessing safe toilets, government should still embark on the balance or inclusive growth approach so as to improve the situation. Lastly, there should be value re-orientation so as to encourage the culture of using safe or improved toilets in Nigeria. This is so given the significant effect of ethnic groups on access to safe toilets

In conclusion, this study examined the socioeconomic factors responsible for the growing number of Nigerians without access to improved and decent toilet facilities. The study has been informed by the 2014 ranking of Nigeria as the 4th country with highest number of people practising open defecation due to lack of safe toilets alongside the consequences of such acts on the dignity, health, economic activities and human existence. The study sought to empirically find out the factors responsible for the problem using 2013 National Population Commission's DHS dataset. The study used different econometric regression techniques such as OLS, binary, Probit Regression Models and Blinder-Oaxaca decomposition technique. The study established wealth index, age, household size, education, gender, marital status culture, rural and zones are the major determinants

of access to safe toilets. The same factors are the determining factors for rural-urban gap in access to the safe toilets. Hence, any policy intervention on safe toilets should pay more attention to those variables. The study made recommendations.

References

Adewara S.O., Ijaiya, G.T., Arosanyin, G.T., Bello, R.A., & Atoyebi, G.O. (2015): Health Risks in Poor Households in Nigeria. *Ilorin Journal of Economic Policy Vol.1, No.1.* Department of Economics, Faculty of Social Sciences, University of Ilorin.

Adewara S.O And Oloni E.F. (2013): An analysis of Regional Inequality in Underweight in Nigeria *International Journal of Development and Sustainability* Vol.2(4) 2402- 2413 Japan International Society for development and sustainability, ISDS www.isdsnet.com/ijds

Adewara S.O And Visser M.(2013) The effects of sources of water and sanitation on children weights in Nigeria *Lapai International Journal of Management and Social Sciences- LIJOMASS.* Vol.6 (1&2) 123-136. Faculty of Management and Social Sciences, Ibrahim Babangida University, Nigeria

Bradshaw, T. K. (2005). *Theories of Poverty and Anti-Poverty Programs in Community Development.* Columbia: Rural Poverty Research Center.

Dare, A. M. (2014). Rural households' access, willingness to pay (wtp) and factors influencing wtp for safe water and sanitation in Southwest Nigeria. *Agricultural & Applied Economics Association's AAEA Annual Meeting July 27-29, 3014* (pp. 4-24). Minneapolis, MN: Agricultural & Applied Economics Association (AAEA).

Davis, E. P., & Sanchez-Martinez, M. (2014). *A Review of Economic Theories of Poverty.* London: National Institute of Economic and Social Research.

Dungumaro, E. W. (2009). Availability of domestic water and sanitation in households: a gender perspective using data in South Africa. (A. A. Rahman, A. Barbieri, J. C. Fotso, & Y. Zhu, Eds.) *Urban Population-Environment Dynamics in Developing World: Case Studies and Lessons Learned*, 108-123.

Global Citizen. (2011, October 11). *Introduction to the Crisis of Clean Water and Sanitation*. Retrieved December 15, 2014, from Global Citizen Web site: http://www.globalcitizen.org/content.aspx?id=9c09b47b-8274-451d-8b7a408ce9ffd9ec

Greene, W. H. (2012). *Econometric Analysis* (7th Edition ed.). Boston, MA: Pearson/Prentice Hall.

Ige, S. O., & Adetunji, A. A. (2014). On some socioeconomic factors affecting household sanitation in Ado-Ekiti, Ekiti State. *Nigeria Journal of Environment and Earth Science, 4*(9), 35-41.

Koskei, E. C., Ondimu, K. N., Obwoyere, G. O., & Mironga, J. M. (2013). Determinants of variation in households' levels of access to improved water sources and basic sanitation in Bomet Municipality, Kenya. *International Journal of Development and Sustainability, 2*(2), 1499-1512.

Li, X., Gao, Y., Miao, Y., & Chen , W. (2014). Understanding determinants of inequality in sanitation improvement in rural China. *Iranian Journal of Public Health, 43*(8), 1148-1159.

Maddala, G. S. (1992). *Introduction to Econometrics* (2nd Edition ed.). New York: Maxwell Macmilla.

Mohammed, A. I., Zungu, L. I., & Hoque, M. E. (2013). Access to safe drinking water and availability of environmental sanitation facilities among Dukem town households in Ethiopia. *Journal of Human Ecology, 41*(2), 131-138.

National Bureau of Statistics (NBS); National Population Commission (NPC); Central Bank of Nigeria (CBN);. (2008). *National Integrated Survey of Households (NISH): General Health Survey.* Abuja: NBS, NPC and CBN.

National Population Commission, (NPC); ICF International;. (2014). *Nigeria Demographic and Health Survey (DHS) 2013.* Abuja, Nigeria, and Rockville, Maryland, USA: NPC and ICF International.

Praisetyoputra, P., & Irianti, S. (2013). Access to improved sanitation facilities in indonesia: an econometric analysis of geographical and socioeconomic disparities. *Journal of Applied Sciences in Environmental Sanitation, 8*(3), 215-224.

Rheingans, R., Anderson, J. D., Luyendijia, R., & Cumming, O. (2014). Measuring disparities in sanitation access: does the measure matter? *Tropical Medicine and International Health, 19*(1), 2-13. doi:doi:10.1111/tmi.12220

Roma, E., & Pugh, I. (2012). *Toilet for Health.* London: London of School of Hygiene and Tropical Medicine, and Unilever.

Sbrana, G. (2009). *Technical Note on the Determinants of Water and Sanitation in Yemen.* New York: Department of Economic and Social Affairs (DESA), United Nations.

Sinning, M., Hahn, M., & Bauer, T. K. (2008). The Blinder-Oaxaca decomposition for nonlinear regression models. *The Stata Journal, 8*(4), 480-492.

United Nations (UN). (2010, September 18). *Sanitation as a Human Right.* Retrieved December 15, 2014, from UN Central Asia Regional Web site: http://www.unric.org/en/sanitation/27281-sanitation-as-a-human-right

United Nations (UN). (2013, November 19). *United Nations (UN) Web site.* Retrieved November 23, 2014, from World Toilet Day 19 November: http://www.un.org/en/events/toiletday/

United Nations (UN). (2014, October 23). *National Decade for Action "Water for Life": Access to Sanitation. Factsheet.* Retrieved December 17, 2014, from United Nations (UN) Web site: http://www.un.org/en/waterforlifedecade/sanitation.shtml

United Nations' Children Emergency Fund (UNICEF). (2014, November 19). *Lack of Toilets Dangerous for Everyone.* Retrieved December 12, 2014, from UNICEF Web site: http://www.unicef.org/media_77952.html

United Nations Development Programme (UNDP). (2006). *Human Development Report: Beyond Scarcity, Power and Global Water Crisis.* New York: UNDP.

University of Waikato. (2014, February 2014). *APA Referencing.* Retrieved November 27, 2014, from University of Waikato Web site: http://www.waikato.ac.nz/library/study/referencing/styles/apa/examples

Whittingten, D., Lauria, D., Wright, A., Choe, K., Hughes, J. A., & Swarna, V. (1992). *Households' willingness to pay for improved sanitation in Kumasi, Ghana: results from a contigent valuation study.* Washington DC: Infrastructure and Urban Development Department, World Bank.

World Bank. (2014). *World Development Indicators: Gross Domestic Product 2012 Ranking.* Wahington DC: World Bank.

World Health Organization (WHO). (2011, November 20). *Water, Sanitation and Hygiene Intervention and the Prevention of Diarrhoe: Biological and Contextual Rationale.* Retrieved December 19, 2014, from WHO Web Site: http://www.who.int/elena/title/bbc/wsh_diarrhoea/en/

World Health Organization (WHO); United Nations' Children Emergency Fund (UNICEF);. (2013). *Progress on Sanitation and Water: 2013 Update.* Geneva: WHO/UNICEF.

World Health Organization (WHO); United Nations' Children Emergency Fund (UNICEF);. (2014). *Progress on Sanitation and Water: 2014 Update.* Geneva: WHO/UNICEF.

World Health Organization(WHO); (UNICEF), United Nations' Emergency Fund. (2008). *Progresss on Sanitation and Water: 2008 Update.* Geneva: WHO and UNICEF