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Application of Tobit Model in Identifying Causes of Poverty in Urban Slum

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Abstract

Although rural areas were typically thought of as regions of poverty, however, with rapid shift from rural to urban life, poverty is migrating to urban areas. An empirical study was conducted in the slum of Agege, Lagos, Nigeria in order to identify perceived causes and estimate the determinants of poverty in the slum. Simple random sampling procedure was employed to select a total of sixty (60) slum dwellers for the study. With the aid of questionnaire, primary data were obtained from slum residents. Data were analysed using tables, charts and Tobit regression model. Results of analysis showed the dominance (53 percent) of men in the slum. Results also revealed that majority of slum dwellers (70 percent) were within economically active age. Findings revealed a varied perception of causes of poverty among the slum dwellers to include lack of money, material possession, basic amenities, joblessness, violence, inability to earn a living and low living standard. Findings further showed that as slum dwellers advanced in age, more employment opportunities and income sources were created with lower poverty levels. Results further showed that a room increase per person, reduced the likelihood of poverty in the slum. Also, increase in family size and walking time to the nearest health facility raised the likelihood of being poor by 43.13 and 6.85 percent respectively. Result of analysis also revealed that the educational level of slum dwellers was inversely related to poverty as more educated slum dwellers were less prone to be poor. Increasing educational and training opportunities for residents, reforming existing housing policy and integrating slum residents in urban planning and development are suitable and sustainable policy options that should be pursued in order to reduce poverty among slum residents.

Keywords

Causes, Poverty, Slum, Nigeria

1. Introduction

Although poverty is a multi-dimensional and rural phenomenon as most of the poor reside in the rural areas (Etim, 2007; Fan et al 2007; Matuschke, 2009 and Etim and Edet, 2014), it is best exemplified in urban areas because the share of poor living in the urban areas is rising with urbanization and wage rapidly than for the entire population as a whole (Matuschke, 2009; Etim and Edet, 2014). Notwithstanding, urbanization per se according to Overman and Venables (2005) and Matuschke (2009), is a driver of economic growth and development, uncontrolled urbanization and inability of cities to accommodate the rising population may lead to the development of informal settlements, and this has a strong impact on the degree of poverty. According to Etim and Edet (2013), rapid urbanization is being accompanied by a phenomenon known as the urbanization of poverty and although urban poverty is often ignored and overlooked, it is even more acute than rural poverty and is threatening to become worse as the rural exodus rises. UN-HABITAT (2003) also reported that urban poverty is not only characterized by inadequate income (and hence inadequate consumption of basic necessities) but also by inadequate asset base, shelter and provision of public infrastructure (for example piped water, sanitation, drainage so forth) as well as inadequate access to services such as health care, schools, vocational training and protection of poorer group's right. Before now, rural areas were typically thought of regions of poverty. With rapid shift from rural to

urban life, poverty is migrating to urban areas. Montgomery (2008) and Etim and Edet (2014) reported that 60 percent of urban population growth are due to natural growth (i.e a higher birth than death rates) while 40 percent are due to rural-urban migration and areal expansion. United Nations (2008) had earlier projected that between 2007 and 2050, the world population will increase from 6.7 to 9.2 billion, and most of the growth will occur in urban areas of less developed and developing countries. Urban poverty inspires the formation and development of slums as approximately 70 percent of the urban population in Sub-Saharan Africa are slum dwellers and greater number living under health threatening fortune with a large and increasing proportion lacking support from governmental agencies (Kombe & Kreibich, 2000; Rakodi & Leduka, 2005; Skuse & Cousins, 2007).

Lagos state has witnessed unprecedented and massive infrastructural development within the past decade. This has resulted in greater influx of people into the already overpopulated city areas. These infrastructure and services have low absorption capacities for the increasing population. This has however led to the development of informal settlements manifesting as overcrowded and unkempt dwellings with poor living and human conditions. According to Etim and Edet (2013) and Etim and Edet (2014), these poor living conditions manifest in poverty. An empirical study by Chen and Ravallion (2007) using time series data to compare rural-urban poverty rates showed that uncontrolled urbanization and low absorption capacities by cities have a strong effect on poverty rates as the incidence of poverty increased with urbanization. The need to know peoples perception of the reasons for rising poverty levels therefore becomes imperative. This study aims at filling this lacuna by providing information on the urban slum residents perception of causes and determinants of poverty in Agege, Lagos State.

2. Methodology

2.1. Study Area, Sampling and Data Collection Procedure

Agege is located in Lagos State, South West of Nigeria Agege is a suburb and local government area in the Ikeja division of Lagos State, Nigeria. Boundary of Agege from the Northern part of Lagos stretches from Dopemu road through Anu-Oluwapo Street to Olukosi down Fagbola through Osobu Street Orile road down to old Agege motor road opposite Nitel. From the Southern part of Lagos, it stretches from Ashade retail market to Akilo Street. From the Eastern part of Lagos, it stretches from Oba Ogunji road up to the by-pass to Agege motor road by Nitel office. From the Western part of Lagos, the boundary of Agege stretches from Abeokuta express road from boundary with Ikeja Local Government to Dopemu junction. Agege is located at a latitude $6^0 37'$ and $6^0 6'$ North and longitude $3^0 18'$ and $3^0 3'$ East. It is one of the densely populated areas of Lagos with an estimated population of 459,939 people (NPC, 2006). The study area is in the rainforest zone and has two distinct seasons viz the rainy season and short dry season. The annual precipitation ranges from 2000mm 3000mm per annum. The predominant occupations of Agege people are farming, fishing and hunting. The settlement pattern is nucleated, and they speak English and Yoruba. Primary data were used for this study. Intensive itinerary household survey provided the basic cross-sectional data from households in the study area. Data were collected from households using questionnaire. Primary data included data on socio-economic and farm-specific variables. Simple random sampling technique was used to select the representative farm households that were used for this study. A total of 60 households were selected for the study. The choice of Agege for the study was due to its typically slum nature.

2.2. Analytical Technique

Several analytical tools and techniques were employed in the analysis of data. These include pie charts, bar charts, tables, frequencies, percentage and Tobit regression analysis.

2.3. Empirical Model

The Tobit regression, a hybrid of the discrete and continuous dependent variable was used to determine the effect of the explanatory variables on the probability of being poor. The model is expressed based on Tobin (1958).

$$q_1 = P_1 = + x_i\beta + e_i \text{ if } P_i > P_i$$

$$= 0 = x_i\beta + e_i \text{ if } P_i \leq P_i$$

$$i = 1, 2\text{---------- } 60 \text{ ----------(i)}$$

where q_i is the dependent variable. It is discrete when the households are not poor and continuous when they are poor. P_i is the poverty depth/intensity defined as $(Z — Y_i/Z)$ and P is the poverty depth when the poverty line (Z) equals the expenditure per adult equivalent. X_i is a vector of explanatory variable, β is a vector of unknown coefficient and e_i is an independently error term.

The explanatory variables specified as factors responsible for poverty among city slum dwellers are;

X_1 = Sex of the household head (D = I if female, o if otherwise)

X_2 = Age of the household head in years

X_3 = Marital status of the household head (D = I if married, o if otherwise)

X_4 = Education measured as years of formal schooling

X_5 = Household Size

X_6 = Room per Person

X_7 = Walking time to health facility in minutes

2.4. Test of Collinearity of Variables Used in the Model

Multicollinearity is one of the important econometric problems of cross sectional data analysis. In this study, multicollinearity was tested between the dependent variable

and independent variables to ensure the consistency and unbiaseness of the Tobit model estimates. The variance inflation factor (VIF) was employed. The VIF has a minimum possible value of 1.0. Value greater than 10 indicates a probably collinearity problem between the dependent variable and the independent variable under consideration. VIF was estimated using the formula stated below.

$$VIF; = 1/\{1-R_j^2\}$$

Where R_j^2 is the multiple correlation coefficient between dependent variables j and the independent variable under consideration.

3. Results and Discussion

Table 2 present the VIF test result for multicollinearity between the dependent variable and the explanatory variables used in the Tobit equation. The result revealed that there was no significant collinearity between the explanatory variables and the dependent variables in the model. The result implies that the estimates of the Tobit model have minimum variance, consistent and probably unbiased.

3.1. Socio-economic Attributes of Slum Dwellers

Figure 1 shows that (53.33 percent) of the residents were men whereas 46.67 percent were women. This result is an indication that slum residents in Agege were mostly dominated by men. This finding is synonymous with earlier empirical report by Lukeman et al (2012) that most slum households were dominated by men.

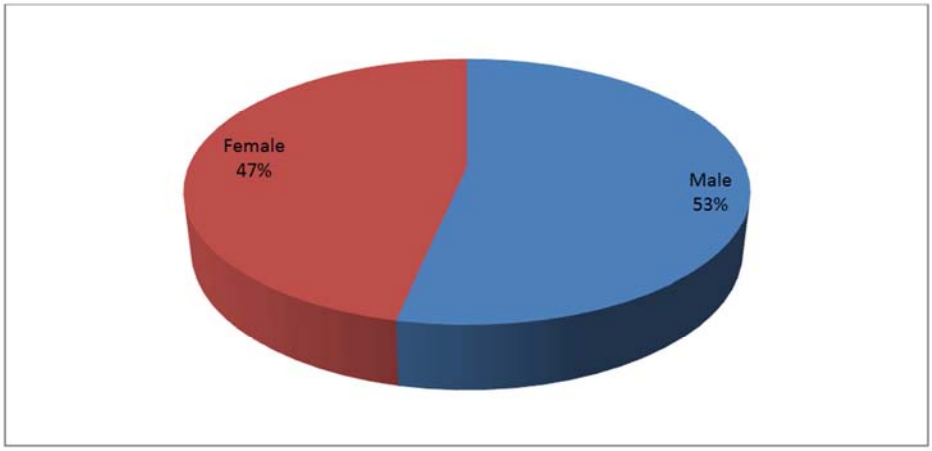
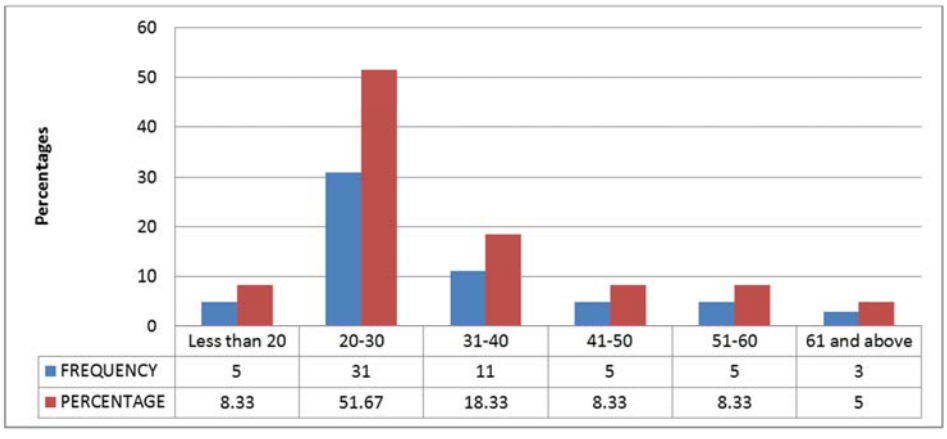


Figure 1. *Sex of Slum dwellers.*

The age distribution of slum dwellers revealed a varied picture but with a dominance of young people. Figure 2 shows that about 51.67 percent slum residents were within the age range of 20-30 years. This implies that most slum dwellers were within active and productive age Finding is synonymous with earlier empirical work of Lukeman et al (2012).



Mean age = 33.05 years.

Figure 2. *Age of Slum dwellers.*

With respect to marital status of slum dwellers, figure 3 reveals that majority (53.33 percent) were single whereas only 35 percent of the slum settlers were married…This result is contrary to findings by Lukeman et al (2012) who reported that most slum dwellers were married.

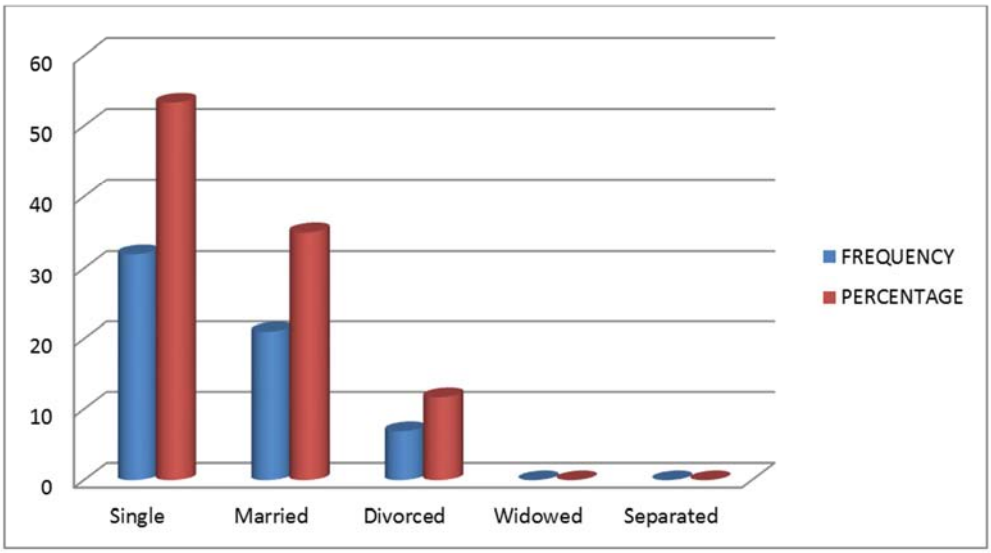
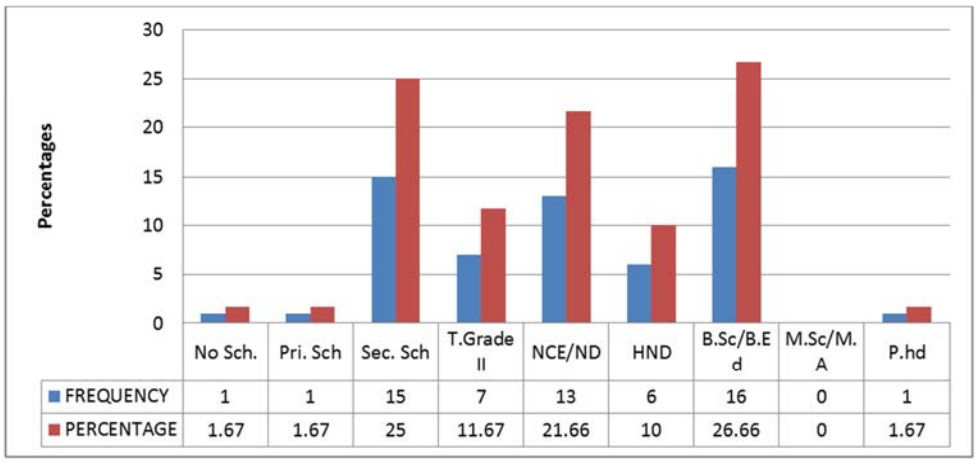


Figure 3. *Marital Status of slum dwellers.*

The educational background of the slum dwellers was quite impressive as most of the residents had formal education. Figure 4 shows that about 71.67 percent had post secondary qualifications. Only 1.67percent no formal and primary education each respectively. The mean years of schooling as 14.4 years. The fact that most of the dwellers literate were an indication that the adoption of innovations will be faster than uneducated counterparts. Earlier empirical findings by Udoh Etim (2006); Udoh and Etim, (2008); Chainu and Tsujii (2004) agree that programs and materials promoting technologies change typically favour literate people.



Mean: 14.4 years

Figure 4. *Educational Attainment of Slum Dwellers.*

The primary occupation of respondents is shown in table 1. Result revealed that 43.33 percent of the respondents were artisans; 38.33percent were involved in farming whereas 6.67 and 11.67 percent were traders and civil servants respectively.

Table 1. *Primary occupation of Slum Dweller.*

Primary occupation	Frequency	Percentage
Farming	15	38.33
Trading	4	6.67
Civil/public service	7	11.67
Artisans	26	43.33
Total	60	100

Table 2. *The variance inflation factor (VIF) test result for multicollnearity of variables used in the Analysis.*

Variables	VIF Estimates
X_1 Age	1.153
X_2 Sex	3.968
X_3 Marital Status	1.368
X_4 Education	1.267
X_5 Household Size	3.484
X_6 Room per person	1.713
X_7 Walking time to health facility	1.190

Table 3. *Maximum Likelihood estimates of the determinants of Poverty in urban slum.*

Variable	Coefficient	Standard Error	z-value
Sex of Household head (X_1)	0.0891	0.0981	1.1010
Age of Household Head (X_2)	0.6771	1.3552	2.002**
Marital of Household Head (X_3)	0.9192	0.2463	0.268
Education (X_4)	-0.2249	0.6248	-2.778***
Household Size (X_5)	0.4313	0.8123	1.883*
Room Per Person (X_6)	0.8774	1.8992	2.165**
Walking time to Health Facility (X_7)	0.0685	0.2460	3.591**
	Diagnostic Statistic		
Sigma σ	0.1258	0.3781	3.006***
Normality test	30.284		
Log Likelihood	-399.55		
Akaike info criterion	13.6185		
Swhwarz Criteria	13.93273		
Hannan-Quinn Critter	13.74146		

***, ** and * denote significance @ 1%, 5% and 10% respectively.

3.2. Determinants of Poverty in Urban Slum

In estimating the determinants of poverty in urban slum, censored regression model made up of 7 regressors was specified. The result shows that sigma (σ.) 0.1258 with a z-value of 3.006 statistically significant (P<0.01) indicating that the model has a good fit to the data. The analysis revealed that age variable is significant and negatively related to poverty. As slum dwellers increase in age, the level of poverty tends to decrease. This is because as one advances in age, he tends to create more income sources and therefore becomes less dependent with lower poverty. This result contrast with findings of World Bank (1996); Dercon and Krishnan 1998; FOS (1999) that the level of poverty was directly related to the age of household.

The variable education is significant (P<0.01) and negatively related to poverty of urban slum dwellers. A unit increase in education reduces poverty among residents in urban slum. This implies that educated slum dwellers are likely to adopt innovations earlier and thus increase their incomes faster than the uneducated ones. The result is synonymous with earlier empirical findings by Schubert (1994) and Ahmed et al (2007) who reported that people with high level of human capital and education are less prone to be poor.

The elasticity of Household size is 0.4313 implying that a unit increase in size of household will raise the poverty depth by 43.13 percent. This is true since more dependent family members particularly children contribute little or nothing to family income. The family on the other hand spends money in educating and training them in school. Result is synonymous with earlier studies by House (1989); World Bank (1991); and Etim and Edet (2014). This findings conform with earlier empirical studies by Etim (2007), Lipton (1983); House (1989); World Bank (1991); Lanjouw and Ravallion (1994); Etim and Edet (2014). Whose findings showed that larger sized household is associated with greater incidence of poverty.

The elasticity of 0.8774 for the variable rooms per person is significant (P<0.05) implying that a room increase per person will decrease the level of poverty by 0.8774 units. This is because overcrowded houses coupled with larger sized households are mostly linked to poor families who lack the financial ability to acquire comfortable and spacious accommodation. Thus, this invariably increases the likelihood of poverty. A similar result was obtained by Etim (2007) in the study of factors determining urban poverty of farming households in a tropical region.

The elasticity of walking time to the nearest health facility is 0.0685 and is significant (P<0.01) meaning that poverty will be increased by 6.85 percent when the walking time to the nearest health facility is increased by a minute. This implies that households located nearer health facilities have a higher propensity to access medical treatment more rapidly than those farer from these facilities who may be incapacitated due to deplorable and bad road network, and high transportation cost. This finding conform with results of earlier study by Ahmed et al (2007) and Etim (2007) who reported that access to public services like health, education and transfers are important in reducing the likelihood of poverty and hunger.

Table 4. *Perception of Causes of Poverty.*

Perceived causes of Poverty	Young		Adult	
	Male	Female	Male	Female
Lack of money	18(30)	17(28.33)	12(20.00)	13(21.66)
Lack of Material Possession	15(25.00)	20(33.33)	10(16.67)	15(25.00)
Lack of Basic amenities	23(38.33)	13(21.66)	11(18.33)	13(21.66)
Inability to earn a living	15(25.00)	15(25.00)	15(25.00)	15(25.00)
Insecurity/Violence	9(15.00)	26(43.33)	9(15.00)	16(26.67)
Slate of joblessness	24(40.00)	6(10.00)	20(33.33)	10(16.67)
Low standard of living	18(30.00)	12(20.00)	16(26.67)	14(23.33)

Figures in bracket represent percentages, while others are frequencies.

Table 4 shows the slum residents perception of causes of poverty by age and gender. The result of the descriptive analysis reveals that 21.66 percent and 20 percent of adult female and male perceived the causes of poverty as lack of money respectively. About 33.33 and 25 percent of the young male and female perceived the cause of poverty as lack of material possession. The perception of causes of poverty by young and adult female has a varied picture as majority (70 percent) perceived insecurity/violence as the cause of poverty.

3.3. Diagnostic Statistic

The result of the diagnostic test showed the R-squared value of 0.7089. McFadden R-squared measures the total variation in the dependent variable caused by the specified explanatory variables. It shows that 70.89% of variations in the farmers' willingness to pay for organic fertilizer are caused by the specified independent variables. Normality test for the symmetric distribution of error term produced in the probit model is significant (p<0.01) implying that the error

term generated was normally distributed.

4. Conclusion

This study analyzed the factors influencing poverty of residents in urban slum of Agege, Lagos State, Nigeria. Results of analysis showed that the most critical factors affecting poverty in the community are age, education, household size, rooms per person and walking time to health facility. The study also critically analyzed the perceived causes of poverty by gender among the slum dwellers. The causes of poverty as perceived by the male and female youth and adult varied considerably. Whereas majority of young males perceived the causes of poverty as lack of money and basic amenities, most of the young and adult females perceived the causes of poverty as lack of material possession.

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