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Article

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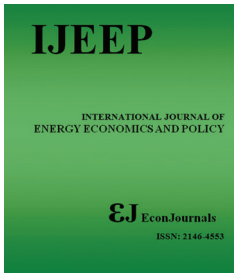

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An Evaluation of Rural Electrification and Households' Poverty in Ikole Local Government Area, Ekiti State, Nigeria: An Foster, Greer and Thorbecke Approach

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ABSTRACT

The rural areas in Nigeria have witnessed intense neglect and inadequate rural infrastructural development. This is contrary to the backdrop experienced in emerging cities where the provision of rural infrastructure was critical for improving the quality of rural life and opening up the areas for development. This study evaluated the relevance of rural electrification on households' poverty using structured questionnaire and a multistage sampling procedure to obtain cross sectional data. A total of 114 rural households were randomly selected, out of which 60 had access to electricity and 54 did not. The Foster Greer Thorbecke technique was used to evaluate the poverty incidence among the households. The results revealed that the mean age of the respondents was 52 years. The mean household size and farm size was 8 and 28.9% of the respondents had no formal education with majority engaging in farming as main occupation. The households in electrified communities spent more averagely, ₦4,017.90/month on the alternative sources of energy than their counterpart in non-electrified communities who averagely spent ₦2,890.90/month. The results further revealed that households in non-electrified communities were poorer than their counterpart in electrified communities. Therefore, rural electrification can actually curb poverty and improve standard of living in rural Nigerian areas.

Keywords: Electrification, Households, Infrastructure, Poverty, Rural Nigeria
JEL Classifications: I32, O18, R2

1. INTRODUCTION

Poverty has been defined by World Bank (2005) as the inability to attain a minimal standard of living, measured in terms of basic consumption needs or some income required for satisfying them. In Nigeria, nearly 75% of the country's population lives in rural areas where poverty has been on the increase (Awotide, et al., 2011). Hence, the urge to develop rural areas has been the concern of different government regimes over time since most of the population in Nigeria reside in the rural areas. One of the major ways to improve the quality of rural life and opening up the rural areas for development is through the provision of rural infrastructure such as electricity, health centers, bore-holes or potable water, good road networks, telecommunication, market centers, storage facilities, among others (Idachaba, 2006).

According to Ewah (2001), access to the rural infrastructural facilities such as roads, telecommunications, safe water supply, health, modern energy, farm structures etc. are important in reducing vulnerability, poverty and increasing prosperity. For instance in a survey conducted by UNICEF (2005) in Nigeria, water supply and energy services topped the list of the most pressing needs of the rural households. In the survey, 77% of the households rated access to adequate and safe water as most critical element in escaping poverty, followed by access to electricity, as rated by 53% of the households.

The rural areas in Nigeria have been suffering from serious inadequate rural infrastructural development. Nigeria which is the seventh largest country in the world with population of about 160 million (United Nations, 2011); out of which the urban dwellers represent about 30% of this population while the remaining 70% are rural dwellers and mostly farmers. Rural development is largely concerned with raising the quality of life of people living in the rural areas through electrification, nutrition, housing, health, education, as well as creating opportunities for employment. In the words of Fadayomi (1988), the provision of basic social and infrastructural facilities at the grassroots will lower rural poverty.

Rural electrification is the process of bringing electrical power to rural and remote areas, which can take two main forms: Grid electrification and off-grid electrification (Adegbulugbe, 2006). In most cases, the definition of rural determines the applicability of grid or off-grid electrification. Its meaning varies from one continent to the other and country to country. For some, rural area is a subjective state of mind. For others, rural is an objective quantitative measure. USDA (2007) defined rural area or non-metro as any area that is not urban. It is an area outside of cities and towns. It is a remote and underdeveloped area where farming is majorly practiced (Farlex, 2003). Omale (2005) further defined it as an area with a population lower than 20,000, occupationally specific and geographically removed from an urban area in terms of services e.g. water, health, electricity, etc.

The provision of electricity has however been a difficult task for the government in developing countries, particularly in Africa. Although Africa constitutes approximately 10% of the world population; yet the total primary energy consumption of Africa is only about 3% of the total world energy consumption (United Nations, 2007). Rural electrification has long been top on the development agenda towards improving the welfare of the local dwellers especially in the developing countries or continents such as Africa, South America, and Asia yet; as vast majority of the population in these countries are still in darkness due to lack of electricity (Aklilu, 2003). This paper therefore evaluates the impact of rural electrification on households' welfare. Specifically, it examines the socioeconomic characteristics of the respondents and constructs a poverty profile for the respondents in the study area.

2. REVIEW OF RELATED LITERATURE

The importance of electricity in rural areas can never be over emphasized. For instance, in rural areas of Tanzania, micro-enterprises act as a vehicle for creating income distribution for rural people and for poverty reduction. This occurs mainly because of the rural electrification in the area (Ofoefule, 2006). Rural electrification promotes the establishment, growth and expansion of small scale industries in Nigeria such as barbing, hairdressing salon, saw-milling, block-making, refrigerator repairing, grain-milling, grinding, welding, modern tailoring, and battery charging, among others.

Despite this huge relevance, literatures on rural electrification in Nigeria are still scanty. Among the limited are studies such as Energy Sector Management Assistance Program (ESMAP) in 2003, on "Expanding Access to Rural Electricity," UNICEF study in Nigeria (2005), focused on "Critical Infrastructure Services," Akinola (2007), analyzed infrastructural deprivation in rural Nigeria. Also, Oyekale (2012) assessed rural households' access to electricity and modern cooking fuels in rural and urban Nigeria using the DHS data. His study analyzed the factors influencing access to electricity and use of modern cooking fuel in Nigeria using the seemingly unrelated bivariate probit regression. His study concluded that Nigerian government needs to properly design some institutional mechanisms and approaches for increasing access to modern energy services in order to reduce indoor pollution and other associated health hazards. None of these studies have actually evaluated rural electrification on rural households' poverty status. Therefore, this study serves a link in gap. This study used mean per capita household expenditure (MPCHE) as a proxy for poverty.

Poverty has become an important topic of discussion among world leaders. Over the years, discourse on poverty has continued to engage the attention of scholars, development practitioners, politicians and international development agencies. World Bank (2001) defined poverty as a pronounced deprivation of human wellbeing; which include vulnerability to adverse events outside their control, or being badly treated. A search of the relevant literature shows that there is no general consensus in any meaningful definition of poverty. This is not unconnected to its multi-dimensional nature, which affects many aspects of human conditions, including physical, moral, social, and psychological aspects. Hence, many criteria have been used to define poverty.

While an economist would approach the subject from the view point of wants, needs and effective demand, the psychologist may look at it from the standpoint of esteem and ego deprivation. But in whatever perspective it is viewed, it is obvious that it is a condition of life that is so degrading as to insult human dignity. Poverty encompasses inadequate income and denial of the basic necessities such as education, health services, clean water and other infrastructural facilities (World Bank, 2007) which are essential for human survival and dignity.

In a way to assess the linkage between infrastructure and poverty, Seetanah et al. (2009) in their study using a panel data analysis discovered that transportation and communication infrastructure are indeed an efficient tool in fighting urban poverty in developing countries. In the study, provision of infrastructure was confirmed as a way to alleviate poverty. Similarly, Escobal (2001) established the link between roads and income diversification by studying off-farm activities in rural Peru. The author showed that access to roads, along with other public assets such as rural electrification and education, was a significant determinant of income diversification; which could be a pointer to reducing poverty in the area. Furthermore, in a related study by Warr (2005) in Lao PDR, it was revealed that all-weather roads had a positive and highly significant impact on poverty. Specifically they found that all-weather road access lowered poverty incidence by around 6%, and about 13% of the decline in rural poverty incidence between 1997-98 and 2002-03 can be attributed to improved road access alone.

There has also been skepticism about the impact of infrastructure on poverty reduction in the 1990s. This led to two schools of thought: On one hand, great importance was attached to physical infrastructure in the poverty reduction efforts of developing countries; on the other hand, many in the international development community viewed assistance for infrastructure with considerable skepticism on three grounds (Ifzal and Ernesto, 2003). First, though important for economic growth, infrastructure investment had little relevance to poverty reduction. Second, actual benefits from infrastructure were significantly less than anticipated. Third, weak governance and institutions gave way to corruption, distorted public investment choices, and neglected maintenance, thereby lowering infrastructure's contribution to economic growth and diverting benefits intended for the poor.

In Nigeria, poverty is a critical problem with the rural areas being worse affected. Higher incidence of poverty in Nigeria's rural is due to some environmental problems associated with agricultural production, high vulnerability to health hazards (Alayande, 2004), low level of education, lack of access to improved seeds and inputs, high fertility rate, poor access to social infrastructural facilities, among others (Okunmadewa, 2002).

Over two-thirds of Nigeria's population resides in the rural areas and increasingly, poverty in Nigeria is wearing a rural face. According to Awoyemi and Obayelu (2010), poverty is a rural phenomenon in Nigeria. Their study investigated poverty profile across geopolitical zones in rural Nigeria, using the 2003/2004 NLSS data. The result of Foster Greer and Thorbecke (FGT) poverty decomposition shows that majority of the poor (84.0%) live in the rural area. Adegbulugbe (2006), discovered that to alleviate poverty effectively in Nigeria particularly among the rural poor, it is important to increase access to energy services. Afolami et al. (2015) in their study used FGT to analyze the welfare impact of adoption of improved cassava varieties among rural households. In their study, poverty was used as an indicator for welfare. With many studies on the subject of infrastructure and poverty, there is a dearth of literature particularly in Nigeria on the linkage between rural electrification and poverty. Therefore, this study served to bridge the gap.

3. MATERIALS AND METHODS

3.1. Study Area

Ikole Local Government area (LGA) in Ekiti State, Nigeria was used for this study. It is the third largest LGA (with 16 communities under it) out of the sixteen LGAs in the state. Its coordinates are 7°40'N5°15'E. The state was created in 1996. Its vegetation type is within the deciduous rain forest (Adesina, 2008). This local government is located in the northern part of the state. It is endowed with good fertile farmland. People of Ikole are predominantly farmers. About 80.0% of the male adult population engage in farming and most of the women folk engage in various trading activities and part-time farming. Some of the off-farm activities present include; tailoring, blacksmithing, carpentry, bricklaying, block-making, grain milling, lumbering and sawmilling etc. (Adesina, 2008). Ikole LGA electricity scheme started under the first phase of the electricity programme of the old western state government around 1973 and was commissioned on June 24, 1975.

3.2. Data Source and Sampling Techniques

Primary data was used for this research. It was collected with the aid of a well-structured questionnaire and also aided with personal interviews. Data was collected on the socio-economic characteristics of the households and their economic activities. This LGA was purposively selected due to the presence of some communities with and without electricity. The communities were later stratified into two: Electrified and non-electrified communities. Five electrified communities were randomly selected while five non-electrified communities were purposively selected. Twelve households (which represent final sampling units) were then randomly selected from each community; making a total of 120 respondents. Out of the 120 questionnaires distributed, 114 questionnaires (which is 95% of the total questionnaire) were recovered and used for the analysis due to the incomplete information in them. STATA software was used the analysis (Table 1).

3.3. Analytical Techniques

The empirical model for the study is based on the objectives of the study. Descriptive statistics such as frequency, table, mean and percentage was used to analyse the socio-economic characteristics of the households, mean difference was used to test if there is any significant difference between the two strata (households in electrified and non-electrified communities) and FGT was used to analyse the poverty status which serves as proxy for households' welfare in this study.

3.3.1. Measurement of poverty

3.3.1.1. Poverty line

This is a predetermined and well-defined standard of income or value of consumption. A poverty line is often defined as a predetermined or well-defined standard of income or value of consumption, which is deemed to represent the minimum required for a productive and active life or even survival (Okunmadewa, 1999). Though several methods have been used by different studies such a specific amount of dollar per day, annual household per capita expenditure, total households' income and two-thirds of mean household per capita expenditure. The poverty line used in this study was based on the two-thirds of the per capita expenditure of the households. Household consumption is often preferred to household income for distribution analysis as it tends to be stable and data are more reliable. First, income varies from year to year and from season to season depending on farm production and prices. Secondly, most individuals are often reluctant to declare their true income and lastly, it is not the amount of income per se that matters but the amount spent on consumption. So, an analysis of poverty limited to income of the household may underestimate (if the household borrows to augment consumption) or overestimate (if the household saves much of the income earned without spending on consumption items that would translate to improved welfare). The approach using per capita expenditure has been used in many studies on poverty in Nigeria e.g. Okunmadewa, 2002.

A relative approach was used in which a household was defined as poor relative to others in the same society. Two third of the

Table 1: Distribution of questionnaires according to stratum

Communities with electricity	Number of questionnaires administered	Number of questionnaires collected	Communities without electricity	Number of questionnaires administered	Number of questionnaire collected
Odo-ayedun	12	12	Igboroko	12	12
Oke-ayedun	12	12	Odoogo	12	12
Ayebode	12	12	Aba-oyo	12	12
Ikole	12	12	Aba-isa	12	12
Ijesa-isu	12	12	Oke-ako	12	6
Total	60	60		60	54

Source: Field Survey, 2015

MPCHE was used as the moderate poverty line while one third was taken as the line for extreme poverty.

The categories of poverty line were given as:
- Extremely poor: Those spending <1/3 of MPCHE
- Moderately poor: Those spending <2/3 of MPCHE
- Non poor: Those spending >2/3 of MPCHE.

$$\text{Per capita expenditure } (\text{PCE}) = \frac{\text{Total expenditure}}{\text{Household size}}$$

MPCHE = Mean per capita household expenditure.

$$\text{MPCHE} = \frac{\text{Total household expenditure}}{\text{Total number of respondent}}$$

3.3.2. Poverty profile

The poverty line is an arbitrary divider of poor and non-poor. The poverty analysis requires establishing a poverty line, which then would be used in combination with welfare indicators. The FGT weighted poverty index was used for the quantitative poverty assessment (Foster et al., 1984). The equation is given below:

$$P\alpha = \left(\frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-Y}{Z}\right)\right)^{\alpha} \quad (1)$$

Where; Z = The poverty line,
q = The number of individuals below poverty line,
N = The total number of individuals in population,
Y_i = The is the per capital expenditure of i^{th} household and,
α = The degree of aversion and takes on the values 0, 1, 2.

$$P\alpha = \left(\frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-Y}{Z}\right)\right)^{0} \quad (2)$$

When α = 0
Pα = Po = n = Poverty incidence or head count ratio
Where q is the number of individuals below poverty line
"n" is the total number of individuals in the reference population.

The headcount ratio or index is also referred to as the poverty incidence. It is defined as the fraction of the population that is poor i.e. the fraction of population which lives below poverty line. When α is equal to 1, this measures the depth of poverty. According to Hall and Patrinos (2005), it is otherwise called the poverty gap-the average difference between the income of the poor and the poverty line. Poverty depth measures more specifically the extent to which income of the poor lie below the poverty line. When α is equal to 2, measures the severity of poverty. It can be defined as square of the poverty gap divided by the population. Distinction is made between the poor and the poorest (Foster et al., 1984; Assadzadeh and Paul, 2003).

$$P\alpha = \left(\frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z-Y}{Z}\right)\right)^{2} \quad (3)$$

The equation gives a distribution sensitive FGT index called the severity of poverty. It tells us the extent of the distribution of expenditure among the poor.

4. RESULTS AND DISCUSSION

4.1. Socioeconomic Characteristics of Rural Households

The result in Table 2 shows that 34.1% of the respondents were below 45 years of age, while about 69.5% of the respondents were 46 years and above. The mean age of the households in the study area was 52 years. This indicates that the area is occupied mostly by an ageing population. The result further shows that majority of the respondents (82.5%) are married while others are otherwise. The majority (28.9%) of the respondents had no formal education, while the least (22.0%) of the respondents had primary education. The mean year of education was about 8. This could enhance their capability to adopt and use new technology. The result indicates that majority (67.8%) of the households cultivated less than one hectare of farmland. This implies that they are mostly smallholder farmers. Only very few of them cultivated more than 10 hectares of farmland. The mean farm size of the farming households was 0.9 hectare.

4.2. The Mean Expenditure on Other Sources of Energy by the Respondents

The Table 3 shows the average expenditure of the households on various alternative sources of energy and the result reveals that on the average, the households in the electrified communities spent more on alternative sources of energy (₦4, 017.90) than their counterpart in non-electrified communities with ₦2, 890.90 on energy. Households in electrified communities spent more on fuel for generator than their counterpart in non-electrified communities. This could be as a result of terrible epileptic electric power supply. However, households in non-electrified communities spent more only on the use of battery for radio use, on diesel and candle.

4.3. Derivation of the Poverty Line

The poverty line used was based on the MPCHE and it was estimated at ₦3981.34 (Table 4). Households with per capita expenditure less than ₦1327.11 were classified as being extremely or core poor, while those households with per capita expenditure less than ₦2654.23 were classified as being moderately poor while those with per capita expenditure above ₦2654.23 were considered as non-poor.

Table 2: Socio-economic characteristics of the households

Characteristics	Frequency (%)
Age (years)	
26-35	11 (9.7)
36-45	28 (24.4)
46-55	30 (26.1)
56-65	31 (27.4)
>65	14 (12.4)
Total	114 (100.0)
Mean	52
Gender	
Male	73 (64.0)
Female	41 (36.0)
Total	114 (100.0)
Marital Status	
Married	94 (82.5)
Otherwise	20 (17.5)
Total	114 (100.0)
Household size	
1-5	24 (21.0)
6-10	72 (63.1)
11-15	14 (12.3)
>15	4 (3.6)
Total	114 (100.0)
Mean	8.0
Level of education (years)	
No formal education	33 (28.9)
Primary	24 (21.1)
Secondary	32 (28.1)
Tertiary	25 (22.0)
Total	114 (100.0)
Mean (years)	8
Occupation	
Farming	58 (51.9)
Non-farming	56 (49.1)
Total	114 (100.0)
Farm size (ha)	
<1.0	77 (67.8)
1.0-5.0	34 (30.0)
6.0-10.0	1 (0.9)
>10.0	2 (1.8)
Total	114 (100.0)
Mean (ha)	0.9

Source: Field Survey, 2015

Table 3: The distribution of mean expenditure on energy per month by the respondents

Alternative sources of energy	Monthly mean expenditure (N) (with electricity)	Monthly mean expenditure (N) (without electricity)
Generator (petrol)	1355.10	695.50
Battery	340.90	486.70
Charcoal	323.70	221.80
Firewood	672.70	265.80
Kerosene	1062.70	768.20
Diesel	254.20	418.20
Candle	8.60	34.70
Total	4017.90	2890.90

Source: Field Survey, 2015

4.3.1. Poverty status of the respondents

According to the distribution of the respondents based on their poverty status as shown in the Table 5, 7.02% were core poor, 22.81% were moderately poor and 70.18% were non-poor. This in line with the findings of Oyakhilomen and Olaleye (2016) where 70% of the farmers were non-poor while 30% were poor.

4.3.2. Poverty profile and decomposition of the respondents across the socio-economic characteristics

This section analyzes households' poverty status by decomposing it using three indicators: Headcount ratio (P_0), Poverty depth (P_1), and Poverty severity (P_2). Poverty profiles as shown in Table 6

Table 4: Derivation of the poverty threshold

Variables	Per capita household expenditure/month
Average number of households	8
Mean per capita household expenditure	₦3981.34
Core poverty line (one-third of MPCHE)	<₦1327.11
Moderate poverty line (two-third of MPCHE)	<₦2654.23
Non-poor poverty line (>two-third of MPCHE)	>₦2654.23

Source: Calculated from Field Survey Data, 2015. MPCHE: Mean per capita household expenditure

Table 5: The distribution of the respondents based on their poverty status

Poverty status	Frequency (%)
Core poor	8 (7.02)
Moderately poor	26 (22.81)
Non-poor	80 (70.18)
Total	114 (100.0)

Source: Field Survey, 2011

Table 6: Distribution of indices of poverty among households by socioeconomic characteristics

Socio-economic characteristics	Group	P_0	P_1	P_2
Age	≤30	0.200	0.169	0.144
	31-40	0.090	0.019	0.007
	41-50	0.323	0.054	0.015
	51-60	0.571	0.159	0.066
	61-70	0.185	0.045	0.016
	>70	0.250	0.097	0.038
Household head	Male	0.272	0.076	0.033
	Female	0.316	0.052	0.015
Marital status	Single	0.000	0.000	0.000
	Married	0.263	0.077	0.033
	Widowed	0.429	0.070	0.020
	Divorced	0.200	0.003	0.006
Household size	1-5	0.167	0.043	0.031
	6-10	0.243	0.049	0.015
	11-15	0.539	0.196	0.092
	16-20	0.400	0.289	0.094
	>20	0.500	0.172	0.059

Source: Field Survey, 2015

were related to some selected socio-economic characteristics of the respondents in the study area.

4.3.2.1. Age

In the age group presented, the respondents in the age category of 51-60 years experienced headcount poverty (57.1%) more than any other age group while the respondents with age 30 years and below suffered poverty depth (16.9%) and severity (14.4%) the most. This implies that this age group (≤30) would need 16.9% of the MPCHE to escape from poverty depth while the poverty severity is also mostly prevalent among the very young ones; probably most singles. This could be caused by serious unemployment situation being experienced among this age bracket.

4.3.2.2. Household head

The poverty incidence was more prevalent (31.6%) among the female headed households than their male counterpart (27.2%). This implies that the female respondents are more trapped below the poverty line than their male headed households' counterpart. This is in line with the findings of Etim and Ukoha (2010) that female headed households were poorer than their male counterparts. However, the poverty depth (7.6%) in male headed households was more than their female counterpart (5.2%). This implies that male headed households require 7.6% of their MPCHE escape poverty while female headed households require 5.2%. Similarly, poverty severity was also more prevalent in male headed households (3.3%) than their female counterpart (1.5%). This supports the findings of Omonona et al., 2008 and Awoyemi and Amao (2009).

4.3.2.3. Marital status

The widowed actually experienced worst headcount poverty situation. This suggests that the widowed are most vulnerable to poverty in this area. This could be as a result of lack of ownership of productive assets or resources that could generate income for them. However, the poverty depth and severity are most prevalent among the married with 7.7% and 3.3% respectively. This implies that the married require about 8% of their mean per capita expenditure to escape the poverty line.

4.3.2.4. Household size

Poverty headcount was found to be highest (53.9%) among the respondents with household size of 11-15 and lowest (16.7%) among the respondents with household size of 1-5. This implies that respondents with larger household size are more likely to be poor than their counterparts with smaller household size. This is in conformation with the findings of Awoyemi and Amao (2009) where respondents with the smaller household size had better standard of living than those with larger household size. The respondents with household size of 16-20 had highest values 28.9% and 9.4% for both poverty depth and severity respectively. This means that this household size category would spend 28.9% of their MPCHE in order to move out of poverty. In addition, poverty is most severe among the respondents with household size of 16-20 but least among the house size of 1-5.

4.3.3. Poverty status of households based on their electricity status

The poverty headcount was higher among the households living in communities without electricity (47.3%) than their counterpart in electrified communities (30.5%) (Table 7). This implies that poverty is more prevalent in the areas without electricity compared to those living in electrified communities. In addition, poverty depth and severity (16.2% and 7.6% respectively) were higher among households living in non-electrified communities than their counterpart living in electrified communities with poverty depth and severity of 6.2% and 1.9% respectively. This implies that households living in electrified communities who are poor would only need to spend 6.2% of their MPCHE to move out of poverty whereas their counterpart in non-electrified communities would have to spend 16.2% of their MPCHE to escape poverty. Overall, those living in electrified communities are better off in welfare than their counterparts in non-electrified communities. This supports the findings of Idachaba (2006) which states that provision of rural electrification and other social infrastructure is a way of improving the standard of living of people in rural areas.

Table 7: Distribution of indices of poverty among households in electrified and non-electrified communities

Electricity status	Poverty headcount	Poverty depth	Poverty severity
Access	0.305	0.062	0.019
No access	0.473	0.162	0.076

Source: Field Survey, 2015

5. SUMMARY, CONCLUSION AND POLICY RECOMMENDATION

This study evaluates access to rural electrification among households in electrified and non-electrified communities. It adopts FGT as the analytical tool to assess the poverty incidence in the communities selected. The study shows that the respondents comprise mostly of the ageing population since majority fall within the age range of 56-65 years and poverty incidence is more prevalent among the households in non-electrified communities than in electrified communities. The average expenditure per month on alternative sources of energy by the households in electrified communities is more than those in non-electrified communities.

The conclusion is that access to electricity reduced the poverty incidence among households living in non-electrified communities. In addition, households living in electrified communities spend more on alternative sources of energy than their counterpart in non-electrified communities. Therefore, rural electrification can actually be a way of reducing poverty and improving standard of living in rural areas, Nigeria. It is therefore recommended that connection fee to the grid could be subsidized for households without electricity and Meters should be provided free to enhance their connection to the national grid.

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