Welfare Impact of Rural Infrastructural Development in Oyo State, Nigeria

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Authors' contributions

*This work was carried out in collaboration between all authors. Author KOO designed the study,
performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript.
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searches. All authors read and approved the final manuscript.*

Article Information

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ABSTRACT

Aims: To assess the impact of rural infrastructure on poverty status of rural households in Oyo
State, Nigeria by profiling the socioeconomic characteristics of the rural households; identifying the
infrastructural facilities available by poverty status in the study area as well as examining the
impact of access to infrastructural facilities on poverty status of rural households in Oyo State.
Place and Duration of Study: The study was carried out in Akinyele Local Government area of
Oyo state, in Ibadan, Nigeria. Akinyele local government area occupies a land area of 464,892
square kilometers with a population density of 516 inhabitants per square kilometer. Oyo State is
located in the South Western part of Nigeria and has 33 Local Government Areas with estimated
population of 6,617,720.

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Methodology: Data were collected from a random sample of 263 households through the use of well-structured questionnaires. The data were subjected to descriptive statistics and inferential statistics such as Foster, Greer and Thorbecke (FGT) poverty measure and Probit regression model.

Results: The results revealed that about 77% percent of the households were categorized as poor. The likelihood of rural households being poor was influenced by years of experience, livelihood diversity, access to good road, access to educational facilities, access to agro-processing facilities, access to health care facilities and access to electricity.

Conclusion: The poor state of infrastructure and services calls for major investments across all categories which was found to have contributed to negatively to improved welfare of households in the study area. It is therefore recommended that rural poverty reduction polices should be designed to provide incentives and attract private sector investments towards infrastructure development in rural areas at affordable cost.

1. INTRODUCTION

The menace of poverty has been a global concern in policy making leaving the United Nations to have as its first Sustainable Development Goal, to end poverty in all its forms everywhere. The drive to eradicate extreme poverty in developing countries has become more urgent, given the need to attain the Sustainable Development Goals. Poverty eradication, being the first of the seventeen goals, becomes crucial, since more than one billion people live on less than US$1 per day [1]. A substantial proportion of world poor are located in the rural areas. However, the performance of developing countries over the past decade has been mixed and, in some regions, dismal. In fact, many countries in Sub-Saharan Africa and several in Asia and Latin America did not meet most of the Millenium Development Goals which precede Sustainable Development Goals. [2,3]. Despite the recent claim by some analysts, such as [4], that African poverty is declining and rapidly, Sub-Saharan Africa is perhaps the only region, in the past 20 years, where the proportion of the poor has been rising and is relatively worse off than their counterparts in other parts of the [5] world. Meanwhile, while some regions, notably Asia, have made significant progress in terms of poverty reduction over the last two decades, Africa has made less progress over this period. In some of the relatively few countries where evidence exists, poverty levels appear to have increased in the 1990s [5]. In a large number of cases, this is related to poor growth performance that has made it difficult to reduce absolute poverty.

Poverty is a rural phenomenon in Africa and consequently in Nigeria. More than 65% of the rural populations are poor in Nigeria [6]. Complete eradication or alleviation of poverty is a key to development of a country like Nigeria. Unfortunately, poverty is largely situated in rural areas where the poorest people live. For this reason, efforts such as National Poverty Eradication Programme, Family Economic Advancement Programme, Directorate of Food, Roads and Rural Infrastructure (DFRRI) and among others, to reduce poverty have largely targeted rural areas. According to FAO, [5] rural infrastructure plays a crucial role in poverty reduction, economic growth and empowerment for the African rural poor. In many communities in Nigeria, inadequate and low quality infrastructure has been known to have serious implications for welfare and the persistence of poverty of rural farmers.

It is noteworthy to state that the insensitivity of the government to provide adequate basic infrastructure may impose additional stress on the available ones which are not regularly maintained, leading to eventual breakdown in many instances. This has accounted for substantial loss of productive time, low productivity and poverty in Nigeria. Apart from the general infrastructural problem experienced nationwide, the entire rural areas are specifically worse-off, and this has accounted for poverty differentials between the rural and urban Nigeria [7].

Rural infrastructural development in Nigeria has long been neglected. Little or no investments in health, education and water supply have largely been focused on the cities. To deal with these numerous problems facing our rural communities, government at various levels have instituted a lot of programmes and projects

aimed at transforming them into the mainstream of national development. Some of these programmes include: Operation Feed the Nation (OFN) 1976, the Green Revolution (GR) 1985, the Directorate of Food, Roads and Rural Infrastructure (DFRRI) 1985, Better Life Programme (BLP) 1986, Family Support Programme (FSP) 1987, the Family Economic Advancement Programme (FEAP) 1988 and the National Poverty Eradication Programme (NAPEP) 1999, to mention but a few. In spite of the above mentioned programmes and projects, our rural communities remain underdeveloped, lack basic amenities such as good roads, power supply, healthcare facilities and at the same time, rural poverty persists.

The inadequacy and low quality infrastructure in many communities have serious implications on rural welfare and persistence of poverty in Nigeria. Infrastructural development in rural Nigeria has long been neglected, while investments in road construction, health, education and water supply are the focus of the government for urban areas. The poor tends to live in isolated villages that can become virtually inaccessible for development agenda [8].

Moreover, the existing body of research about the impact of infrastructural facilities on welfare and food security remains ambiguous, partially because it is hard to disentangle cause and effect. There is even less evidence on where investments might be the most transformative in creating new opportunities to link producers to markets. Also, given limited resources, there is a need for selectivity in deciding what investments should occur and where these should be located. This paper aims at tackling these issues by drawing on, and improving upon, the best data available, and by using a somewhat novel approach to overcome some of the technical challenges. This paper uses different econometric models to extent to which various infrastructures can improve livelihood of rural households. This will provide policy makers with policy direction in term of prioritization of important infrastructural facility(ies) that is or are key to welfare improvement. The approach that will be used in this paper will provide a more complete picture of the extent to which household welfare and food security are expected to improve with a given access to infrastructural facilities in the study area.

Many literatures have been written on rural infrastructures in Nigeria. For example,

Energy Sector Management Assistance Program (ESMAP) in 2003, worked on 'Expanding Access to Rural Electricity'; [5] in Nigeria (2005), worked on 'Critical Infrastructure services'; [6],' Coping with Infrastructural Deprivation' and so on. However, little work (if any) have been done to look at the impact of these rural infrastructures (more importantly to this study, rural electrification) on the welfare of rural households in Nigeria, especially in the south west geo-political zone of the country. This study would be of great importance to the researchers by filling the gap in literature and adding to the body of knowledge of existing literatures. Furthermore, the policy makers will benefit from the outcomes of the paper as it would provide clearer picture of the position of the various infrastructural projects if their projects being implemented is realizing the set goal or not. In other words, are the intended beneficiaries actually benefiting from the provision or not in terms of improving their welfare.

2. EMPIRICAL REVIEW OF LITERATURE

Various channels through which infrastructure can impact inequality and help reduce it have been highlighted, amongst others, by [9] and [10]. Essentially, infrastructure benefits underdeveloped regions as disadvantaged individuals gain access to productive opportunities by connecting them to core economic activities. A reduction in production and transportation costs as a result of easier accessibility through roads has been a key determinant of income convergence for the poorest regions in Argentina and Brazil [9].

In addition to the conventional channels through which infrastructure impacts the economy, some researchers have identified new channels like the beneficial impact of infrastructure development on human capital, which in turn increases job opportunities and productivity [11;12]. By investing in roads governments may not only reduce production costs for the private sector and hence stimulate investment, but also improve education and health, as it becomes easier for individuals to attend school and to seek health care. With their health improving, individuals not only become more productive, but also tend to increase their study. In turn, a higher level of education makes individuals more aware of potential risks to their own health and that of their family members. Moreover, investment in infrastructure can reduce uncertainty about longevity and the risk of death by improving

health and life expectancy, which increases the propensity to save. As a result of these various effects, the impact of infrastructure on income and welfare is compounded.

In the study of [13], an evidence on the direct and indirect contribution of road infrastructure to poverty alleviation was provided. He finds that the positive impact of roads on poverty reduction in Indonesia resulted from broader economic growth and in particular improved wages and employment of the poor. The author uses 1976–1996 Indonesian provincial level panel data and splits samples to examine cross-sectional differences between provinces with good and bad access to transportation infrastructure via an instrumental variable approach (where good access is defined as above average road density2 and bad access is defined as below average road density).

Adeoye et al. [14] examined rural infrastructure and profitability of farmers under Fadama-II project in Oyo State. The study made use of primary data collected from two hundred and sixty four (264) farmers through a multi-stage sampling technique. It compared the infrastructural development between Fadama II in the local government areas and non- Fadama II areas using infrastructural index and gross margin. The result showed that more than halve (59.1%) of the villages in Fadama-II local government areas have more infrastructures than non-Fadama II villages. Moreover, they were found to be significantly better-off in a number of areas including agricultural production, and household income. This implies that Fadama-II project has contributed significantly to the development of infrastructures in Oyo state.

Following review of several studies on the subject matter, it was concluded that infrastructure has the potential of affect economic well-being and productivity of the rural households. The review of literature also provided a valid information the various approaches that can be used to estimate the relationships that exist between infrastructures, economic well-being food security.

However, the literature on this topic has not been unanimously supporting the argument of infrastructure development leading to a reduction in inequality and poverty. The study by by [15] found that government spending on infrastructure increased regional disparities within Europe. In a similar vein, for India, [16] analysed the impact of accessibility to infrastructure services on the distribution of income and showed that these two are positively related, i.e. the benefits of infrastructure services were mostly accrued in higher income groups as opposed to benefitting the poor. The study by [17] found that expanding paved roads had a limited distributional impact on income in rural Bangladesh.

Furthermore, it was found that there is little or no literature on the impact of rural infrastructural development on food security especially in Rural Nigeria. Most existing studies in Nigeria capture infrastructural development in an area using access dummy. But in doing so, the impact of individual infrastructure is not well reflected and not well quantified. This study proposes to bridge this gap not filled by the past studies by gauging the impact of individual infrastructure and not just of an aggregate index.

Based on the aforementioned, the study tends to give answer to the following research questions:

➢ Does the poverty status among rural households who has access to rural infrastructure differ from households who do not in the study area?
➢ What are the current infrastructural facilities available in the study area and how are they distributed?
➢ Does infrastructure induced income growth affect poverty in Nigeria?
➢ To what extent has infrastructure development shifted the poverty (a measure of welfare) of rural household in the study area? What are major infrastructures that could cause these shifts?

The general objective of this paper is to assess the impact of rural infrastructure on poverty status of rural households in Oyo State, Nigeria. This general objective will be achieved via the following specific objectives:

➢ To profile the socioeconomic characteristics of the rural households.
➢ To identify the infrastructural facilities available by poverty status in the study area.
➢ To examine the impact of access to infrastructural facilities on poverty status of rural household.

3. MATERIALS AND METHODS

3.1 Scope of Study

The study was carried out in Akinyele Local Government area of Oyo state, Nigeria. Akinyele local government area occupies a land area of 464,892 square kilometers with a population density of 516 inhabitants per square kilometer. Using 3.2% growth rate from 2006 census figures, the 2010 estimated population for the Local Government is 239,745.Oyo State is located in the South Western part of Nigeria and has 33 Local Government Areas with estimated population of 6,617,720. The Local Government Area has her large proportion constituted of the rural areas. The study will focus mainly on the rural areas where majority of the settlements are still faced with intense infrastructural challenges. The people are predominantly small scale farmers. They also engage in trading while few rear livestock. In addition, a lot of local processing of agricultural products takes place in the study area.

3.2 Sampling Technique

A multi-stage sampling method was used in sampling the respondents. The first stage involved the purposive selection of communities that are predominantly classified as rural in the local government area based on World Bank definition of rural [6]. These communities include Ikereku, Olanla, Idi-Iroko, Alabata and Olorisa-Oko. In the second stage, households were randomly selected and interviewed. Data on socioeconomic characteristics and infrastructural facilities available were collected using structured questionnaires which were distributed based on sizes proportionate to the number of inhabitants in the different communities. The distribution will be as follows: Ikereku(72), Olanla(57), Idi-Oro(49), Alabata(44) and Olorisa-Oko(41). About 263 rural household heads were sampled in total.

3.3 The Conceptual/Analytical Framework

We assumed that the basic infrastructural facilities that are available to the respondent are roads, schools (educational facilities), primary health centers, agro-processing centers, potable water, electricity and public markets. Further to this, access to these infrastructures was used as proxy for infrastructural development status of the study area which was defined in terms of the distance of households to these infrastructures. We also assumed that the accessibility or in
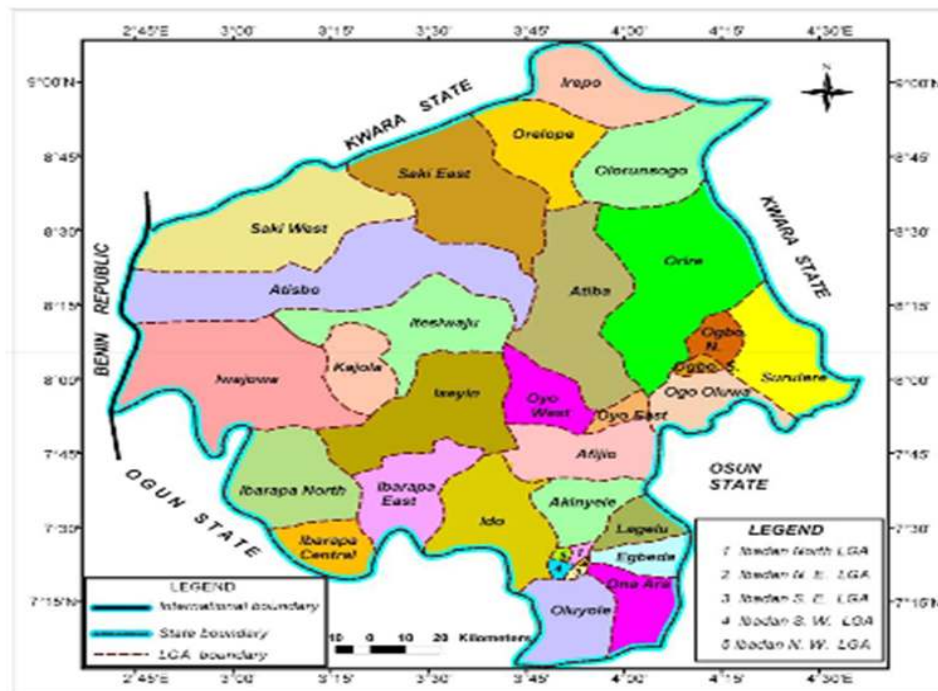

Fig. 1. The map of Oyo State, Nigeria showing the 33 local government area of the state
Source: Google Earth, 2015

accessibility of the households to any of these infrastructural facilities will have either direct impact or indirect impact on the expected utility on their livelihood activities. A household is likely to have an improved welfare that living above the poverty line, if the expected utility derived from access to infrastructures is greater than the expected utility from non- access to these facilities.

Conditional on cross-sectional data availability, we estimated poverty level of rural households based on their access to certain infrastructural facilities. The data obtained were subjected to descriptive and inferential statistical analysis. Descriptive statistics for this study include frequency tables, percentages and means. The inferential analyses adopted for the study are FGT (1984) poverty index measurement and probit regression model. The use of probit model in economics is based on random utility theory [18]. Households are assumed to choose the alternative(s) that maximize their utility subject to a set of constraints [18,19]. Indirect utility, the basis for this analysis, measures the maximum utility that a household achieves subject to some constraints [19]. According to the random utility theory, indirect utility has both a deterministic component and a random (unobservable) component.

3.4 Model Specification for Analysis of Research Objectives

3.4.1 Descriptive analysis

Descriptive analysis such as frequency distribution tables, mean and cross-tabulations were used to analyse the socioeconomic characteristics of the household heads and the distribution of infrastructural facilities in the study area.

3.4.2 Poverty analysis

Poverty analysis was used to classify the households according to their poverty status using the food security. The analysis of poverty was based on P-alpha (α) measure proposed by [20]. The use of FGT class of measure requires the definition of poverty line, which was calculated on the basis of disaggregated data on per capita monthly consumption expenditure on both food and non-food items following [21].

The FGT measure was based on a single mathematical formulation as follows:

$$P_\alpha = \frac{1}{N} \sum_{i=1}^{q} \frac{(Z - Y_i)^\alpha}{(Z)}$$

(1)

Where,

z = The poverty line obtained as 2/3 mean per capita monthly total expenditure

q = The number of individuals below poverty line

N = The total number of individual in reference population.

Y_i = The monthly per capita expenditure of household i and,

α = The degree of poverty aversion; ($\alpha = 0$ measures the incidence of poverty. $\alpha = 1$ measures the depth of poverty. $\alpha = 2$ measure the severity of poverty).

In this study we only look at the poverty incidence among the rural households in the study area (that is when $\alpha = 0$).

The poverty line is a predetermined and well-defined standard of annual income or value of consumption. In this study, the poverty line was based on the monthly expenditure of the households. Two third of the mean per capita annual expenditure (2/3 of MPCHE) was used as the moderate poverty line. Respondents above this value are classified as nonpoor (those spending greater than 2/3 of MPCHE) and those below it as poor.

3.4.3 Probit regression

The probit regression model was used to analyse impact of access to infrastructures on the poverty status of the rural households in the study area. The probit model which is based on the cumulative probability function was adopted because of its ability to deal with a dichotomous dependent variable and a well-established theoretical background. Probit regression, according to [4] is a uni/multivariate technique which allows for estimating the probability that an event will occur or not through prediction of a binary dependent outcome from a set of independent variables. The model is specified following the welfare impact of adoption of agricultural technology on poverty reduction [22].

A household - level regression model is estimated thus:

$$\text{Prob}(Yi=1) = f(bkXk + biXi + ui) \qquad (1)$$

Where *Yi* is the dummy variable for house hold poverty status(1= poor; 0=Non-poor). *Xk and Xi are* vectors of exogenous variables affecting households' poverty status. Also, *bk* and *bi* are vectors of parameters to be estimated, *ui* is a zero-mean error term, and *f*(.) is a probit or logit function. [23] argues that in most applications, both probit and logit models are quite similar. The main difference however, is that the conditional probability Pi approaches zero or one at a slower rate in logit than in probit. He concludes that there is no compelling reason to choose one over the other, and in practice, the choice depends on the ease of computation, which is not a serious problem with sophisticated statistical packages that are now readily available. The model estimates are in 0-1 range and these probabilities are non-linearly related to the explanatory variables. In this paper, the probit model is employed to estimate the parameters of the model. Variables included in the model are presented as follows:

Y = Poverty status of the ith household (1 = poor, 0 if otherwise)

3.4.4 Explanatory variable

X_i- Socioeconomic Variables

- X_1 = Age in Years
- X_2 = Household size (in numbers)
- X_3 = Primary occupation (1, farming, 0, if otherwise)
- X_4 = Year of working experience (in years)
- X_5 = Livelihood diversified (1, If diversified, 0, If otherwise)

X_{ii} – Access to Infrastructure Variables

- X_6 = Access to road networks (1 if yes, 0,if no)
- X_7 = Access to potable water (1 if yes, 0 if no)
- X_8 = Access to schools (1,if yes,0,if no)
- X_9 = Access to health care facilities (1, if yes,0, if no)
- X_{10} = Access to public markets (1, if yes,0, if no)
- X_{11} = Access to agro-processing center (1 if yes, 0, if no)
- X_{12} = Access to electricity (1 if yes, 0 if no)

4. RESULTS AND DISCUSSION

4.1 Socioeconomic Characteristics of Respondents

This section was analysed using the descriptive statistics such as frequency distributions, percentages, minimum and maximum to provide information on some of the social and institutional variables as they relate to the rural household. As shown in Table 1, majority of the households (67.3%) were males and 32.7% were females. Male respondents are dominants among the respondents could be the result of males having greater access to farm land than females. It could also be the result of the tedious nature of activities engaged by rural dwellers such as farming which is their main occupation. This implies that the main occupation, farming, in the study area is mostly done by male farmers who have and could have access to land resource. This contradicts the findings of [24] who asserted that women are the backbone of agricultural sector and agricultural production. The age distribution of the respondents revealed that 8.8% were aged between 21–30 years while 66.2% were aged between 31-50 years, while 10.6% of the respondents were above 60 years. This implies that majority of the households heads are in their economic active years, with an advantage of transferring innovations that enhance productivity in their respective activities. The household size was relatively high; with 75% of the farmers having household size that ranged between 1–5 members and 5–6 members (23%) while 2% had household members that are above 11. This has tendency of contributing to the welfare status of the households since having large household size brings an opportunity of expanding farm or firm size, generating more revenue and meeting the welfare need of the households., therefore, commanding infrastructural development in the area. The educational background of the respondents revealed that 15.6% had never been to school, 41.6% had at least primary education, 38.0% attempted secondary school education while only 4.6% had primary education. This implies on the aggregate that the majority of the households had one form of education or the other, and thus had the advantage of adopting innovation, since education helps in improving ones investments and adopting improved agricultural technologies as observed by [25]. Majority of the respondents (69.6%) have farming as their primary occupation while only 30.4% did not.

Table 1. Rural households socioeconomic characteristics of respondents

Variable	Frequency (n=263)	Percentage (%)	Minimum	Maximum	Mean
Gender					
Male	177	67.3			
Female	86	32.7			
Age(years)					
21- 30	23	8.8	23	73	43
31- 40	97	36.9			
41-50	77	29.3			
51-60	38	14.4			
60 and above	28	10.6			
Household size					
1-5		75.0			
6-10		23.0	1	12	4
11 and above		2.0			
Education(years)					
No formal	41	15.6			
Primary	110	41.8			
Secondary	100	38.0			
Tertiary	12	4.6			
Main occupation					
Agricultural	183	69.6			
Non-agricultural	80	30.4			

Source: Field survey, 2015

4.2 Expenditure Profile and Poverty Status of Respondents

This section focuses on household expenditure on both food and non-food items (a proxy for household level of nominal income), the estimation of food poverty line and distribution of rural households by their poverty status. Per capital expenditure can be used as measure of well-being and can reveal the can reveal a lot about the living conditions of the rural households [22]. From Table 2, the estimated monthly household expenditure on food consumed and non-food items were ₦3626.00 and ₦5234.00 respectively summing up to the total monthly household expenditure of ₦8860.00 while the mean per capita household food expenditure (MPCHHE) was ₦1772.00. The poverty line was computed for respondents using the two-thirds MPCHHE, the poverty line was calculated as ₦1187.20 per month based on the 2008 World Bank revised purchasing power parity (PPP) figure of $1.25 [1,2,3].

Table 3 profiled the rural households into poor and non-poor groups based on their per capita expenditure. The poverty line defined as two-third of the mean per capita expenditure of the total households studied. The food insecurity line for the study is calculated as N 1187.20 per month. Household whose per capita expenditure falls below N 1187.20 are categorized as being poor while households whose mean per capita food expenditure equals or greater than the poverty line (N1187.20) are non-poor. The result presented in Table 3 shows that about 77.19% of the surveyed households are poor, while the remaining 22.81% are non-poor.

Table 2. Monthly household food and non –food expenditure profile

Variable item	Average monthly expenditure (Naira)
Food expenditure	3626.00 (25$)
Non-Food expenditure	5234.00(35$)
Total Monthly Expenditure per head	8860.00(60$)
Mean per capita household expenditure (MPCHE)	1772.00 (9$)
Poverty line (2/3rd of MPCHHE)	1187.20 (7.8$)

Source: Field survey, 2015

Table 3. Households poverty status of the rural households in Oyo state

Households poverty status	Frequency	Percentage (%)
Poor	203	77.19
Non-poor	60	22.81

Source: Field survey, 2015

4.3 Households' Access to Physical and Social Infrastructure and Poverty Status

The infrastructures surveyed in the study include access to roads, health centers, markets, potable water, electricity supply, agro-processing centres and educational institutions. Access to infrastructural facilities is key to improving the productive outcomes from livelihood activities of rural households. A well-endowed household in terms of social and physical infrastructure is assumed to be have a better well-being compared with households are less endowed [26]. This is because access to infrastructure provides a platform that enhances productive activities successful for instance, access to good roads enhances market access to the farmers. Also, the health status of a rural dweller is a proxy for measuring his/her agility and ability to partake in agriculture.

A comparison of access to infrastructure was made between poor and non-poor rural households. This was done with a view to examine if access to infrastructure has any effect on households' poverty status. The result of the analysis is presented in Table 2. In the pooled sample, more than half of the sampled households of the respondents have access to potable water, good roads and schools while less than 40% of the households have access to agro-service centers, health care center, public market and electricity. This suggests that access to potable water; roads and schools are not constraints in the study area.

Infrastructures considered in this study are both the physical and social infrastructure which has a latent potential of influencing the welfare of rural dwellers. Among the infrastructures considered is potable water access point which is health and productivity of inhabitants of the study area [27]. The results showed that 74.9% of households that are living below the poverty line do not have access to and or could not afford potable water. This signifies that these household depend on water source that are not hygienically reliable.

Another infrastructure considered was market. Markets locations in the rural areas are exchange points where products are being exchange for money. Without the market facilities, it will be difficult to trade their profitably. The market places help rural dwellers who were majorly farmers sell their goods at reasonable prices. Public markets are not accessible to some of the respondents in the study area due to distance; therefore, they only trade their products in small markets around which might reduce the selling price in these markets compared to the price traded for them in the bigger public/ government constructed market. As shown in the Table 2, about 36.5% of the categories of households that are poor have access to public market compared with non-poor category with about 75% having access to public markets.

All indications from the results presented in Table 2 shows that majority of households that fell in poor category do have access to infrastructural facilities in the case of potable water, good roads, agro service centers, health care center, public market and electricity. Infrastructural facilities such as good

Table 4. Distribution of access to rural infrastructural facilities by poor and non-poor households

Access to rural infrastructural endowment	Pooled	Poor households	Non-poor households
	n=263	n= 203	n=60
Have access to potable water	197(74.9)	59(29.1)	31(51.7)
Have access to good roads	194(73.8)	61(30.0)	46(76.7)
Have access to Agro-service center	64(24.3)	55(27.1)	51(85.0)
Have access to schools	202(76.8)	156(76.9)	46(76.6)
Have access to health care center	109(41.4)	94(46.1)	45(75.0)
Have access to public market	89(33.8)	74(36.5)	45(75.0)
Have access to electricity	82(31.8)	69(34.0)	47(78.0)

Legend: Values in parentheses are percentage of the total observations, Source: Authors' editing, 2015

roads, agro service centres, public market and schools are vital in linking rural dwellers who are farmers to the potential final consumers of their products who will not buy their products at farm gate price but at a reasonable amount that will be profitable for the farmers.

Among the poor households, only 30.0%, 27.1%, 46.1%, 36.5%, 34.0% while among the non-poor households, only 76.7%, 85.0%, 76.6%, 75%, 75.0%, 78% have access to good roads, agro-service center, health care center, and electricity respectively. However, taken average of the percentages of the two categories it was found that only 40% of the poor households have access to both social and physical and social infrastructures leaving the remaining 60% dearth of infrastructural facilities.

4.4 Impact of Access to Infrastructural Facilities and Socioeconomic Factors on Poverty Status among Rural Households

Table 5 presents the estimated coefficients of the explanatory variables (socioeconomic factors and infrastructures) and their marginal effects of a unit change in these variables on the probability of households' poverty condition. The diagnostic statistics reveals that the chi square value for the model is significant at the 1% level which means that the explanatory variables jointly influence households' poverty condition. The signs show the direction of change in the

probability of the households being poor given the change in the explanatory variables. A positive sign shows increase in the probability of being poor while a negative explains the converse.

The results showed that respondents' age, household size, primary occupation, access to potable water and access to schools do not significantly influence the probability of household's being poor. However, seven variables were found to significantly influence their household poverty status. These are years of work experience, livelihood diversified, access to road, access to health facilities, access to public market, access to agro-processing center and access to electricity.

4.4.1 Years of work experience

This is a socioeconomic variable, negatively signed and it was found to significantly influence the poverty status of rural households at 1% level of significance. It has a marginal effect of 0.118 meaning that a unit increase in years of work experience will reduce the probability of household being poor or living below the poverty line by 11.8%. This is consistent with the findings of [28] who found the years of farming experience as a significant factor that influence households' welfare. This could be due to the mastery of the households' livelihood activities, there, resulting, in improved productivity implying improved welfare in the study area.

Table 5. Probit regression output of the impact of access to infrastructural facilities and socioeconomics factors on poverty status

Variable	Coefficient	P (Z/Z)	Marginal effect
Socioeconomic factors			
Age	0.017	0.276	0.006
Household size	0.534	0.719	0.099
Primary occupation	0.399	0.365	0.457
Years of work experience	-0.060***	0.004	-0.118
Livelihood diversified	1.138*	0.083	0.049
Infrastructures variables			
Access to road	-0.531***	0.001	-0.068
Access to potable water	-0.359	0.211	-0.047
Access to schools	-0.574	0.141	-0.506
Access to health facilities	-0.575**	0.013	-0.229
Access to public market	-0.003**	0.022	-0.002
Access to agro-processing center	-0.534***	0.002	-0.117
Access to electricity	-0.306*	0.063	-0.060

Number of observations =263, Pseudo R^2= 0.416, LR chi square(13) = 117.5
Prob > chi2 = 0.000, Log likelihood = -82.46
***Significant at 1%level, ** Significant at 5%level, *Significant at 10%

4.4.2 Livelihood diversified

This is another socioeconomic variable. The emergence of this occurrence can be reason out due to the fact that as livelihood is been diversified, resources are also diversified alongside. Thus, there is low concentration on major livelihood source and result in the likelihood of being poor. However, a unit increase in the rate of diversification by rural households in the study area will increase the likelihood of households being poor by 4.9% at 10% level of significance.

4.4.3 Access to roads, access to health facilities, access to public market, access to agro-processing center and access to electricity

These are infrastructure variables that significantly impact the poverty status of rural households in the study area.

4.4.1.1 Access to good roads

Access to good roads was found to be significant and negatively signed. This explains that access to good roads could reduce the probability of households being poor. Good transportation facilities and network is key to improving market linkages and also enhancing improvement of private investments in the local community therefore, improving the livelihood of the rural poor. This conforms to the findings of [28]. Improved welfare was significantly influence by the transport infrastructure.

4.4.1.2 Access to health facilities

Access to health facilities was found to be significant, negatively signed and has a marginal effect of -0.229 implying that access to health facilities reduced the probability of rural households falling below the poverty line (being poor) by 22.9%. The lack of direct access to primary health facilities subject rural dwellers to both direct cost and indirect cost as a result of health risk and transaction cost to receive health care service, therefore, causing a leakage to economic prosperity of the local community [29] The findings of [29] supports the result that access to health facilities is key to improving rural households' welfare.

4.4.1.3 Access to public market

Access to public market was found to be significant, negatively signed has a marginal

effect of -0.002 implying that access to public market reduced the probability of rural households falling below the poverty line (being poor) by 0.2%. Access to public market is pertinent to providing a platform for getting reasonable prices for products; therefore accruing increased revenue stream and helping inhabitants in the rural areas in Nigeria scale the poverty line.

4.4.1.4 Access to agro-processing center and access to electricity

Access to agro-processing center and access to electricity were found to be significantly influence the poverty status of rural households. They are negatively signed and have marginal effects of -0.117 and -0.060 respectively. This explains that access to agro-processing center and access to electricity reduced the likelihood of rural households falling below the poverty line (being poor) by 11.7% and 6% respectively. Processing creates value addition to primary products, reduces post-harvest loss and also creates more opportunities for rural economy therefore increasing the family income streams.

It is noteworthy to state that access to schools and potable water was not significant infrastructural facilities that influenced poverty status in the rural area. This can be adduced to that both are not directly related to productive activities, however, in descending order access to health facilities, agro-processing center, roads, electricity and public market influence the welfare of rural households in the study area.

5. CONCLUSION

The provision of rural infrastructures is basic to rural economic development which encompasses improving the welfare and well-being of rural households.

The development of rural infrastructure for poverty reduction in the past or presently is major emphasis of the rural development programmes in Nigeria. Regrettably, little less than nothing has been achieved due to faulty implementation [30]. This has made rural areas subject to poverty and other economic crisis. This study assessed the impact of rural infrastructure on poverty reduction among rural households.

In the study area, few infrastructural facilities are available and their impacts have been highlighted. It was found that access to

infrastructural facilities has the potential of improving the household livelihood, well-being and or reducing the household poverty incidence in Nigeria. However, these impacts have not met the desires and the aspiration of the majority of the people of the study area as a result of low infrastructural development therefore resulting in widespread of poverty.

For poverty to be reduced to its minimum through facility provision in the rural areas of Nigeria, a number of policy related issues have been raised by this research. The government has to put in place a number of policies in order to improve the rural infrastructures to promote rural households welfare in Nigeria. Further to this, the following recommendations were suggested:

There should a balance in the pattern of infrastructural development. Attention should be given to this by adopting a discriminate investment in infrastructural facilities in favour of under-privileged areas.

The existing facilities can be expanded to accommodate the increasing demand for services. More road network should be built, the primary health care centers can have annexes in some of the localities while more public markets and many more in the study area. By these, facility services will not only be functioning, the impacts of infrastructure location will be accelerated.

Rural development plans and come out with a more viable and formidable programme which entertains the entire needs of the rural people. This programme should be genuinely set and governments at the various levels should be involved in the operationalization and implementation for improved standard of living of the rural people.

In as much as infrastructural development leads to improvement in households' welfare, the quest to eradicate poverty among the rural dwellers in Nigeria should incorporate strategy of educating rural household on best practices of livelihood diversification.

Another policy implication of this study is that the Nigerian government needs to devote a substantial proportion of its budgetary allocations and spending to the development of social infrastructure, which comprises investment in education and health. Since investment in education and health contributes greatly to the development of human capital, increasing social

infrastructure can help to improve the welfare of people in the rural areas.

There should be reforms in the policies of rural development to contain rehabilitation and maintenance of exiting infrastructures. This will enable and facilitate rural environment for the spread of diverse rural economy.

There is need for private organizations to recognize the need for investment in sustainable infrastructural development to complement government efforts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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