



## EMPIRICAL ANALYSIS OF THE IMPACT OF ROAD TRANSPORTATION ON POVERTY REDUCTION IN THE RURAL AREAS OF THE FEDERAL CAPITAL TERRITORY OF NIGERIA

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**ABSTRACT:** *The main objective of this study sought to proffer policy recommendations through which road transportation can be used positively to improve the standards of living and well-being of the rural populace in the study area. The study utilised primary data from four hundred and twenty respondents, using well-structured questionnaires on household heads in ten villages/settlements from five of the six Area Councils in the FCT, using the Statistical Package for Social Science (SPSS) software, version 25. The study employed descriptive and other quantitative techniques in the analysis and employed the Ordered Logistic (OL) model to test the hypotheses. The test of hypotheses of the impact of the independent variables on the dependent variables revealed that the null hypotheses were rejected in all the two tests carried out and the alternative hypotheses were accepted, meaning that the state of road transportation impacted on the literacy level and health conditions of rural dwellers in the Federal Capital Territory of Nigeria, with the level of impact however differing, depending on the variables being examined. The study recommended that there should be encouragement in the provision of financing for the acquisition of motorcycles and three-wheelers that are mostly appropriate for rural roads. The Area Councils are to improve and rehabilitate rural roads by improving the earth and gravel-coated ones that are predominant in their respective Area Councils and residents should also be encouraged and supported by the appropriate offices of the Area Councils to establish Development Associations and Cooperatives to spearhead community self-help.*

**KEYWORDS:** Road Transportation, Rural Roads, Ordered Logistic (OL) Model, Area Councils, Federal Capital Territory of Nigeria.



## INTRODUCTION

Transportation is a key component of infrastructure and it is regarded as the backbone of the economic, cultural, social and industrial activities of every nation. One of the pioneer studies that investigated the nexus between transportation and economic development was conducted by Aschauer (1989). He investigated the impact of public capital on private sector productivity and his results showed that the elasticity of private sector productivity with respect to public capital was positive, meaning that infrastructure had a positive impact on private sector productivity.

Transportation is vital to the prosperity of regions as it links residents with employment, public services, shopping or social networks, and businesses to labour, consumers, and suppliers (Badalyan, Herzfeld & Rajcaniova, 2014). A major contribution of transport to economic performance relates to what the literature generally terms as 'transport-induced agglomeration effects.' Agglomeration economies occur when economic agents (firms, workers) benefit from being close to other economic agents (Graham, 2007).

Even though road transportation is critical to the development of the economy, unlike the other modes of transport, such as rail, water and air, the flexible and ubiquitous nature of road transportation facilities confer on it a pride of place among the various modes. They enhance economic performance towards poverty reduction, improving the mobility and standard of living of the masses (Prud'homme, 2005; Siyan, Eremionkhale & Makwe, 2015).

Roads have been known to eliminate rural isolation, transform urban development patterns, open up new forms of recreation and change people's behaviour and lifestyle. There is a general belief that there is a strong relationship between transportation, underdevelopment, poverty and rurality, as identified by Ogunsanya and Ojetola (1993), who argued that the greater the degree of rurality, the lower the level of transport development. Chambers (1983) went further to list isolation as one of the five key factors that contribute to the deprivation trap in most rural settings, others being: powerlessness, vulnerability, poverty and physical weakness among others.

In very recent times, three critical factors appear to be further impacting negatively on the poverty situation in the rural areas of Nigeria. These are banditry and terrorism, climate change issues and the recent Corona Virus Disease 2019 (COVID-19 pandemic). The growing risk of banditry to rural agricultural livelihoods has further increased the rate of rural-urban migration, which could exacerbate the existing challenges arising from climate change (especially incidences of drought, deforestation, desertification, land and water use challenges and aridity) already being experienced, especially in the Northern part of Nigeria (Egwu, 2015; Gadzama, Saddiq, Oduehie & Dariya, 2018). Since many of the new poor, especially those affected by the economic impacts of the above challenges, are likely to be engaged in agricultural activities, food security is further put at risk (World Bank, 2020).

In Nigeria, not much emphasis has been placed on rural roads by policymakers, as most of these roads are in poor condition, and impose significant costs on the rural economy and agricultural activities (Ugwu, Agunbiade & Auta, 2025). Even though the Nigerian government initiated several projects to improve the quality and quantity of road infrastructure in the rural areas over time, the impact of such programmes on the lives of many rural people in the country is still considered to be limited (Ale, Abisuwa & Ologunagba, 2011). Available evidence points



to the fact that these initiatives, though worthwhile, were not sustained by the various successive governments.

The twin phenomena of poor transportation and increasing poverty in Nigeria have become very challenging and intractable for policy makers, government and donor agencies in recent times. Economic growth, as measured by increased Gross Domestic Product (GDP), has not translated to poverty reduction in the country. Contrary to the neo-classical economists' belief that the trickle-down effects of GDP increase will ultimately lead to poverty reduction, the poverty situation and inequality continue to worsen in Nigeria. It therefore becomes imperative to re-examine how to resolve this situation, in order to improve the lives of ordinary Nigerians.

Estimates reveal that only about 10% of the rural population have access to rural roads that are motorable all year round (Federal Republic of Nigeria, 2015). Given this current level of rural accessibility, the nearest road for more than 30 million rural Nigerians is more than 2 kilometers away (World Bank, 2012). Even more worrisome is the neglect of these roads in terms of rehabilitation and maintenance. It appears that the inadequacy of the transportation system, particularly road transportation, to serve the rural areas, has accentuated chronic poverty, serious unemployment and poor standards of living of rural dwellers in Nigeria. A key problem that this study seeks to address is to assess the impact of rural road system on the incidence of poverty in the rural areas of Nigeria and proffer ways of ameliorating the situation.

This study seeks answers to the following research questions:

1. What is the impact of road transportation on the literacy level of rural dwellers in the Federal Capital Territory of Nigeria?
2. What is the impact of road transportation on the health conditions of rural dwellers in the Federal Capital Territory of Nigeria?

The overall objective of this study is to critically examine the impact of road transportation on poverty reduction in the rural areas of the Federal Capital Territory of Nigeria, while the specific objectives of the study are to:

1. Examine the impact of road transportation on the literacy level of rural dwellers in the Federal Capital Territory of Nigeria.
2. Evaluate the impact of road transportation on the health conditions of rural dwellers in the Federal Capital Territory of Nigeria.

Based on the above objectives, the following hypotheses are expressed in Null form:

1. **H<sub>01</sub>:** Road transportation has no significant impact on the literacy level of rural dwellers in the Federal Capital Territory of Nigeria.
2. **H<sub>02</sub>:** Road transportation has no significant impact on the health conditions of rural dwellers in the rural areas of the Federal Capital Territory of Nigeria.

This research is therefore an empirical analysis of the impact of road transportation on poverty reduction in the rural areas of the Federal Capital Territory (FCT) in Nigeria. The study is reinforced by the undeniable fact that poverty is local or micro, since poverty needs to be understood as a specific and contextual experience.



## LITERATURE REVIEW AND THEORETICAL FRAMEWORK

### Conceptual Review

Road transportation consists of two distinct segments: road transport services and road transport infrastructure (Adetola, 2014). Road transport services serve the public or commercial customers directly, and are in most cases privately owned and operated (e.g., commercial vehicles, buses, cabs/taxis, and tricycles). On the other hand, road transport infrastructure consists of the fixed installations used by the road transport service providers (i.e., road network, terminals and nodes). Road transportation has a trip origin and destination through terminals where passengers can embark, or where goods and services can be loaded or off-loaded in urban areas (Kendrick, Copson, Beresford & McCormick, 2004).

Road network is a framework of functional relations of road patterns in a particular territory (Borruso, 2003; Daful & Oluwole, 2016). The entire world is virtually connected as the road network continuously keeps on expanding on every continent. On its part, network connectivity denotes multiple linkages of roads over a place, which create interconnection that yields a web-like system of roads (Levinson, 2012). The major cities in Nigeria, including the 36 state capitals and the Federal Capital Territory (FCT), are fairly well-connected to each other by a network of highways, even though the road network in the South-Western and South-Eastern parts of Nigeria are much denser than others in the rest of the country, possibly due to higher population densities (Ubogu, Ariyo & Mamman, 2011). Also, Nigeria has the largest road network in West Africa and the second largest in sub-Saharan Africa, after South Africa (Mostafa, 2018).

The word 'poverty' has its origin in the French word *poverté* and from the Latin word *paupertas*, from *pauper*, meaning poor (Aidelunuoghene, 2014; Westover, 2008). The father of modern economics, Adam Smith, defined poverty as "the inability to purchase necessities required by nature or custom" (Smith, 1776, cited in Davis & Sanchez-Martinez, 2014). This definition portrays the sociological and psychological aspects of poverty identified much earlier by Classical economists. Karl Marx was more explicit on the context-specific and relative dimension of the notion of poverty. Even though he did not mention an absolute measure, he was quoted as saying: "Our needs and enjoyments spring from society; we measure them, therefore, by society and not by the objects of their satisfaction. Because they are of a social nature, they are of a relative nature" (Marx, 1976).

It is a deprivation in assets and entitlements essential to life, and a susceptibility to periodic physical and economic shocks, and seasonal crises (African Development Bank, 2002). It further describes a state of voicelessness and an inability to influence the structures, institutions, and processes that shape livelihoods. This definition definitely inherently adopts a capital assets-based approach. Poverty has a strong correlation with income, although the use of income alone to measure poverty has been in serious dispute for some time (Bak & Larsen, 2015). For instance, Olutayo and Liadi (2019) believe that in the rural areas of Africa, particularly in Nigeria, access to adequate food for the family and communal land for farming determine the level of poverty of people.

For this study, we believe what has been consistently occurring in Nigeria were instances of poverty alleviation measures adopted by successive governments, but with poor results. This approach does not attack the root causes of poverty in the rural areas—lack of capability, poor education, lack of access to credit, poor access to information, etc. Evidence abounds that much



of the financial handouts to the rural populace are politically-motivated, and in the majority of the cases, they do not reach the intended beneficiaries (Ewurudjakpor, 2008).

## Theoretical Review

### Lucas Dynamics of Transport Theory

Lucas (2012) identifies the main elements related to conditions of transport and social disadvantages, which include, on the transport side, limited access to travel, prohibitive fare costs, and limited or non-existent information. Similarly, on the social side, she identifies elements that influence conditions of disadvantage, like lack of jobs and qualifications, poor housing and low income, which can adversely affect the ability of poorer people to access opportunities. The relationships between these types of disadvantages are straightforward and show that a lack of assets can be worsened by poor transport provision, increasing barriers to access activities and leading to processes of social exclusion. Conditions of social vulnerability force people to live in less attractive areas, with no access to jobs and poor transport provision.

### Spatial Mismatch Theory

Spatial mismatch was first proposed as a theory in a seminal article by Kain (1968) where he hypothesised that black minority workers in the United States of America (USA) resided in segregated zones that are distant and poorly connected by transportation facilities to major centres of development and employment. The phenomenon therefore had many implications for inner-city residents who are dependent on low-level entry jobs. Thus, distance from work centres led to increased unemployment rates and further increased deprivation in those regions in the USA, thus bringing to the fore the critical importance of affordable transportation. Even though that original article did not specifically use the term "spatial mismatch," later theorists (Wilson, 1987) ascribed the theory to Kain.

### Frischmann's Transportation Infrastructure Theory

The economic theory of infrastructure and commons management was popularised by Frischmann (2005). It provides a theoretical foundation for analysing the contribution of a country's road network to economic growth and development and the resulting social implications in developing economies. Frischmann (2005) argues that allowing the public open access to infrastructure, such as a network of roads, would create an economic return for the society and thereby lead to social change. The central premise behind this theory is value creation. Frischmann proposes that open access to a network of roads for the public can create significant positive results for society. Since analysis of transportation investment and its relationship to economic performance is multidimensional, many researchers have posited that such an analysis must encompass many performance components, including GDP, population size, degree of urbanization, traffic density, human well-being, and level of economic development.



## Empirical Review

The effect of road transportation on poverty, particularly rural poverty, has been a major area of concern amongst scholars and donor agencies in South-East Asia. Inthakesone and Kim (2016) studied the impact of public road investment on poverty in rural Laos using the Difference-in-Differences (DD) method. The data utilised for the study was sourced from the Laos Expenditure and Consumption Survey (LECS). They found out that connecting to roads provides market access opportunities, develops market linkage, and improves farm production through technology improvement. The results further confirmed that the villages with road access may increase their total income by around 14.9% compared to the ones without road access. They therefore suggested that the government should incorporate the connection of the rural road plan into the national development strategy to allow the rural communities to have easy access to the main infrastructure.

In a landmark study, Porter (2014) reviewed transportation services and their impact on rural development and growth in sub-Saharan Africa by using innovative participatory approaches such as mobile interviews and co-investigation with communities. Her study was conducted against the background that adequate provision of rural transportation is germane to improved well-being, while emphasis should be on the implications for vulnerable groups. Her study recommended that there should be more use of participatory techniques in gender and age-disaggregated data collection and associated engagement of communities. Also, attention was drawn to the potential of recent developments, notably connectivities associated with motorcycle taxis and the rapid expansion of mobile phones.

Abur, Ademoyewa and Damkor (2015) studied the impact of rural road transportation on productivity and income of household farmers in rural North Central Nigeria covering six (6) states. A 3-stage random sampling technique was employed to select 720 farming households in the study area. The study employed descriptive statistics, Cobb-Douglas production function and multiple regression models to analyse the data collected. The study found out that cost of inputs, farm size, access to inputs and access to good roads were the significant factors influencing farmers' output and income. The study concluded that rural road transportation impacts productivity and income of farmers that translate to employment generation and better welfare of the rural citizens.

Dakyes and Ogbuli (2012) examined the impact of transportation on the socioeconomic development of rural areas of Gwagwalada Area Council in the Federal Capital Territory of Nigeria by using systematic sampling technique and descriptive statistics on a combination of open- and close-ended questionnaires. They found out that most of the journeys made by the rural poor are for subsistence tasks and access to local facilities, and the primary transport network was critical during times of need. They recommended that the government should improve the primary network of paths, tracks, culverts and access routes, and that market roads should be designed to follow the Christaller's traffic principle to pass through the largest possible number of villages.

Olorunfemi (2020) conducted a study of rural areas in Ondo State to examine how rural road infrastructural challenges have impeded the development of agriculture in Idanre Local Government Council Area of the state. Using structured questionnaires that were purposively and randomly administered to collect data from 20 villages in the study area, the researcher utilised descriptive statistics and stepwise regression analysis to test the hypothesis. His



findings showed that a high cost of transportation and irregular transport services as a result of the poor state of the roads in the study area hindered effective agricultural development. Results also indicated that motorcycles were the dominant means of transportation in the area, which led to a high rate of post-harvest losses because of the restrictive capacity of motorcycles and high cost of transportation. The study recommended the construction and rehabilitation of dilapidated roads to enhance agricultural development in the study area.

## Theoretical Framework

The theoretical framework for this study is derived from the growth model of Barro (1990), where infrastructure capital is factored as an input into the aggregate production, but with it coming in at the cost of reduced investment in other types of capital. Relying on this framework, there is an optimal level of infrastructure, which maximises the economy's growth rate, such that if infrastructure levels are set too high, they divert investment away from other capital to the point where income growth is reduced. Thus, the Barro model can be used to derive a reduced form relationship between income per capita (as measure of well-being) and infrastructure stocks per capita. Below the growth maximizing infrastructure level, positive shocks to infrastructure tend to increase the level of output, while above the optimal level, positive infrastructure shocks tend to reduce the level of output.

## METHODOLOGY

### Research Design

We have adopted experimental research design for this study. Experimental research is a study that strictly adheres to a scientific research design as it comprises an hypothesis, a variable that can be manipulated by the researcher, and variables that can be measured, calculated and compared (Babbie, 1998). Also referred to as hypothesis testing or deductive research method, experimental research involves the researcher collecting data and analysing them, with results in either supporting or rejecting the hypothesis (Babbie, 1998).

The study area is the Federal Capital Territory (FCT), which is located almost in the centre of Nigeria in the northern part of the confluence of Rivers Niger and Benue. It is bordered in the West and North by Niger State, in the North-East by Kaduna State, in the East by Nasarawa State and in the South-West by Kogi State. It occupies a land area of about 7,315 km<sup>2</sup> and is located between latitudes 8°30' and 9°20' North of the equator and longitudes 6°45' and 7°39' East of Greenwich Meridian. In terms of population, the FCT had a population of 1,406,239 as per the 2006 national census (National Population Commission, 2009). The city officially became Nigeria's capital on 12 December, 1991 when the then military administration relocated the capital from Lagos to Abuja.

This study uses as its population the Area Councils in the FCT, Abuja. The projected population of the six (6) Area Councils in FCT in 2016 was 3,564,126 according to the National Bureau of Statistics (2017). Using an average growth rate of 3.2% per annum, as adopted by the National Bureau of Statistics (2017), the estimated population in 2020 should be 4,042,703.



## Sample Size and Sampling Techniques

The sample size for this study represents the selected sample on whom we administered the questionnaires. The size of the sample was determined by a combination of several factors: our research objectives, population size, nature of the area, population, logistic issues as well as human and financial considerations (Obasi, 1999). In selecting our sample, we noted that Abuja Metropolitan Area Council (AMAC) is mostly urban and our interest is focused on rural areas in the Federal Capital Territory, as defined earlier in Section 2. This is because most of what could be regarded as rural settlements in AMAC are in reality, urban slums, or urban sprawl, as defined by UN-Habitat Urban Secretariat & Shelter Branch (2002).

We therefore selected our samples from the other five (5) Area Councils: Abaji, Bwari, Gwagwalada, Kuje and Kwali, as shown in Table 3.1 below:

**Table 3.1 Projected Rural Population per Area Council**

S/No	Area Council	2020 Population (Projected total)	2020 Population (Projected rural population @ 49.66%)
1	Abaji	168,559	83,706
2	Bwari	659,151	327,334
3	Gwagwalada	455,995	226,447
4	Kuje	279,496	138,798
5	Kwali	247,735	123,025
<b>Total</b>		<b>1,810,936</b>	<b>899,310</b>

**Sources:** Computed by Authors from data from National Population Commission (2009), National Bureau of Statistics (2017) and <https://www.citypopulation.de/php/nigeria-admin.php?adm1id=NGA015>

In selecting our respondents from the sampled villages, we used the Yamane (1967) methodology. According to the methodology, the formula for selecting the sample was as follows:

$$n = \frac{N}{[1 + N(e^2)]}$$

where:  $n$  = sample size required

$N$  = number of people in the population

1 = constant

$e$  = margin of allowable error in %, which in this instance we have assumed to be 5%

Therefore:

$$\begin{aligned}
 n &= \frac{400,000}{[1 + 400,000(0.05)^2]} = \frac{400,000}{[1 + 1,000]} \\
 &= \frac{400,000}{1,001} = 399.6 = 400 \text{ Approximately.}
 \end{aligned}$$

Using this formula resulted in a sample size of 400 residents for this study. To ensure that the objectives of this study are met, we made provision for additional 20 samples. This was done just in case some survey instruments are rejected or not useful for analysis for one reason or the other, thus totaling 420 respondents that were selected. We adopted proportional random sampling technique in order to identify the respondents, who are household heads from among each village population. Proportional random sampling technique is a sampling method in which the researcher divides a population into subpopulations in proportion with the total population, and then applies random sampling techniques to each subpopulation (Salkind, 2010).

We utilised primary data for this study. The primary data used consisted of structured, close-ended, face-to-face questionnaires and interview guides which were administered on respondents and government officials in the study area. Kothari and Garg (2014) defined a questionnaire as consisting of a number of questions printed, typed or online, in a definite order on a form or set of forms, for administration on selected respondents. Questionnaires are considered as an efficient method for data collection considering the advantages they offer in terms of efficiency in time, energy and cost (Sekaran & Bougie, 2013).

## Model Specification

The model for this study was adapted from the work of Gachassin, Najman and Raballand (2010) in their study of the impact of roads on poverty reduction, using Cameroon as a case study. In adapting the work of Gachassin *et al.* (2010) for our model, we selected two key determinants, dimensions or variables; we used these as proxies for poverty and these are Education/Literacy and Health/Wellbeing. They were selected because of their importance or relevance to our study area. Following from Gachassin *et al.* (2010), the first transmission channel of roads' impact is to facilitate provision of basic needs to the poor, such as health and education. This is because a common feature of poor people is that they suffer from inadequate access to some human capital facilities that are essential to escape from poverty. To capture this transmission, impact or channel, we formulated the following two functional equations:

$$\text{HEA} = f(\text{RC, TT, COT, TOT, DMA}) \dots \quad 3.4$$

where:

1. EDU = Education (Human Capital Impact – Dependent Variable)
2. HEA = Health (Human Capital Impact – Dependent Variable)
3. RC = Road Condition (Road Variable – Independent Variable)

4. TT = Travel Time (Road Variable – Independent Variable)
5. COT = Cost of Transport (Road Variable – Independent Variable)
6. TOT = Type of Transport (Road Variable – Independent Variable)
7. DMA = Distance to Major Activities (Road Variable – Independent Variable)

From the above, we thereafter formulate the following econometric model:

where:

$\mu$  represents the error terms which are normally and randomly distributed, with expected value of zero and constant variance.

$\alpha_0$  to  $\alpha_5$ ,  $\beta_0$  to  $\beta_5$  are parameters to be estimated.

Also,  $\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$ ;  $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 > 0$

This means that all the explanatory variables are expected to have positive relationships with the independent variables. This study utilised the Ordered Logistic (OL) model to test the hypotheses. This model was selected because it was the most appropriate for the type of dataset we used in order to achieve our research objectives. It enabled our dependent variables to be measured on the ordinal level, by using variables designed on the Likert scale. Most of the questionnaire questions were set up on the 5-point Likert scale that allowed a range of responses which allow flexibility, but at the same time are contained within a specific gamut for easy analysis.

## DISCUSSIONS AND INTERPRETATION OF RESULTS

## **Distribution of Respondents According to Level of Education**

Figure 4.1 presents the analysis of the distribution of respondents according to their level of education. From the figure, 47 respondents account for 11.2% of the total respondents who are uneducated. Also, 191 respondents, depicting 45.5% of the total respondents, stated that they have primary/secondary school certificates. The number of NCE/ND/HND/University certificate holders are 155, and they represent 36.9% of the total respondents. Among the total respondents, 19 claim they have a postgraduate certificate, and they represent 4.5% of the total respondents. Lastly, 8 respondents say they have professional qualifications, and they represent 1.9% of the total respondents. Moreover, the cumulative percent shows that the distribution is statistically reliable, as the last value of the cumulative percent equals the total percent. A further presentation of the percentage distribution of the respondents based on the level of education is shown in Figure 4.1.

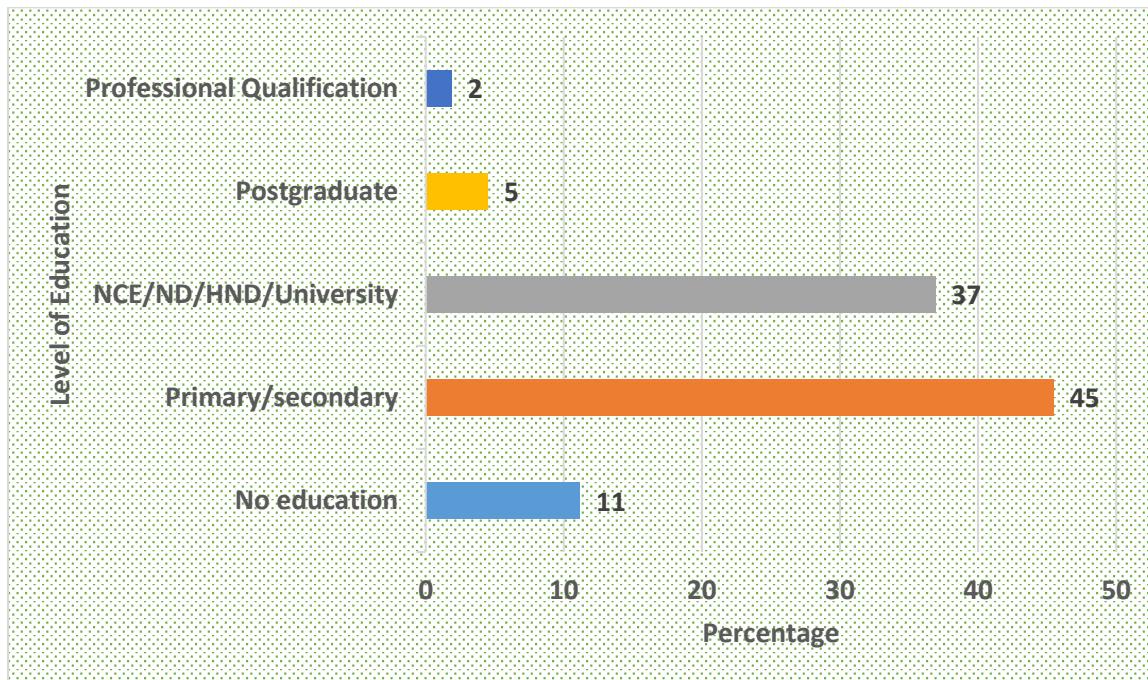
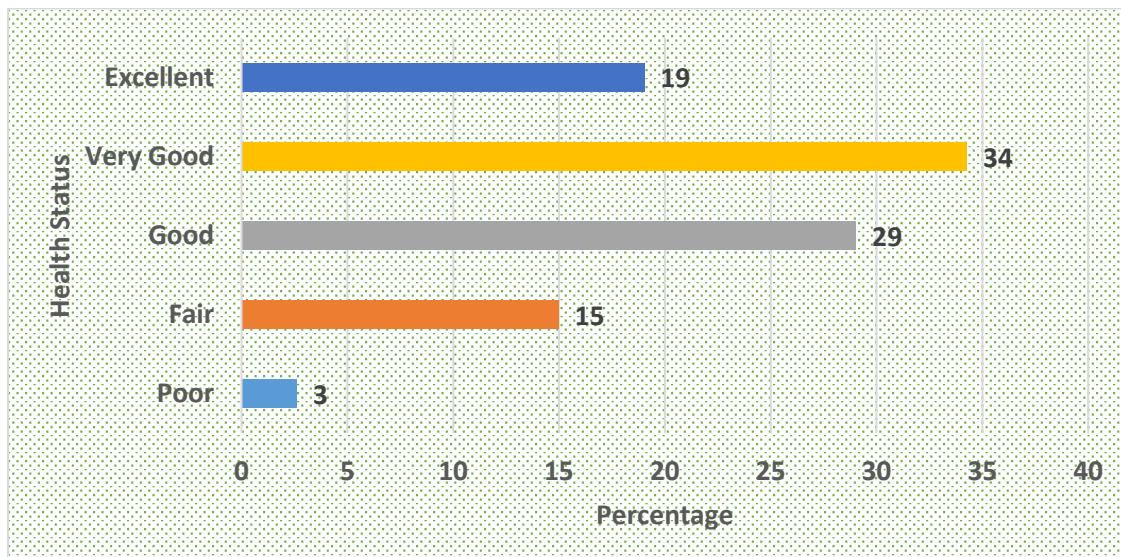
**Figure 4.1: Level of Education****Distribution of Respondents According to Health Status**

Figure 4.2 presents an analysis of the distribution of respondents according to their health status. From the Figure, 11 respondents, who represent 2.6% of the total respondents, say their health status is poor. Accordingly, 63 respondents, 122 respondents, 144 respondents, and 80 respondents, who represent 15%, 29%, 34.3% and 19%, respectively, of the total respondents describe their health status as fair, good, very good, and excellent, respectively. The cumulative percent also shows the reliability of the percentage distribution as its last value equals the total percentage. Meanwhile, the percentage distribution of the respondents' description of health status is further shown in Figure 4.2.

**Figure 4.2: Health Status**

## Test of Hypotheses

*H<sub>01</sub>: Road transportation has no impact on the literacy level of rural dwellers in the Federal Capital Territory of Nigeria.*

**Table 4.1: Impact of Road Transportation on the Literacy Level of Rural Dwellers**

Variable name	Coefficient	Odds ratio	Educational Level				
			Level 1	Level 2	Level 3	Level 4	Level 5
			Marginal effect				
Road condition	-0.130 (0.137)	0.878	0.011 (0.013)	0.020 (0.021)	-0.025 (0.026)	-0.005 (0.005)	-0.002 (0.002)
Travel time	0.222 (0.167)	1.249	-0.020 (0.015)	-0.034 (0.026)	0.043 (0.032)	0.008 (0.006)	0.004 (0.003)
Cost of transport	-0.173 (0.167)	0.841	0.016 (0.015)	0.026 (0.026)	-0.033 (0.032)	-0.006 (0.006)	-0.003 (0.003)
Type of transport	0.465 (0.087)	1.593	-0.043*** (0.010)	-0.071*** (0.015)	0.089*** (0.018)	0.017*** (0.005)	0.008*** (0.003)
Distance	0.145 (0.114)	1.156	-0.013 (0.011)	-0.022 (0.018)	0.028 (0.022)	0.005 (0.004)	0.002 (0.002)
Expected prob.			0.10	0.47	0.37	0.04	0.02
No. of observations	420						
LR test ~ Chi <sup>2</sup>	151.666						
Prob. Chi <sup>2</sup>	0.000						

\*\*\* *p* < 0.01; \*\* *p* < 0.05; \* *p* < 0.1

In the regression result above, the dependent variable (Education) takes one of five values: No Education (level 1), Primary/Secondary (level 2), NCE/ND/HND/University (level 3), Postgraduate (level 4), or Professional Qualification (level 5). The likelihood ratio test indicates that the null hypothesis of all coefficients being equal to zero is rejected at a 1% level of significance. Table 4.24 presents the estimated coefficients, odds ratios, marginal effects, and corresponding expected probabilities. The last row shows the expected probabilities and sum to one as expected (probability cannot exceed one).

The coefficients for road condition, travel time, cost of transportation, and distance are not significant at the conventional levels. This result suggests that these factors are not important in using education as a form of human capital for poverty alleviation. However, the coefficient of type of transportation is positively and significantly impacted on education at the 1% level and this suggests that it is an important determinant of poverty alleviation through education. The odds ratio is 1.593, indicating that a one-level increase in the available types of transportation increases the odds of being in the high education category by 59%. This suggests that type of transportation is an important variable in attaining literacy in the study area.

Additionally, it can be observed that type of transportation significantly predicts all the levels of education; it reduces the log of odds of having no education and having secondary education, but increases the log of odds of having a higher education. In other words, a one-level increase in the available types of transportation reduces the chance of having no education and having secondary education, but increases the chance of having a higher education.

The expected probabilities show that the rate of those with primary/secondary education is very high with 47% probability, followed by those who have NCE/ND/HND/University Education, with a 37% probability. The probability of those with no education is low (10%) and the category of those who fall in the postgraduate and professional levels are very low (4% and 2% respectively).

*H<sub>02</sub>: Road transportation has no impact on the health conditions of rural dwellers in the rural areas of the Federal Capital Territory of Nigeria.*

**Table 4.2: Impact of Road Transportation on Health Conditions of Rural Dwellers**

Variable name	Coefficient	Odds ratio	Health Status				
			Poor	Fair	Good	V. Good	Excellent
Road condition	-0.310*** (0.1120)	0.733	0.007** (0.004)	0.037** (0.014)	-0.033** (0.014)	-0.031** (0.013)	-0.046*** (0.018)
Travel time	0.286* (0.151)	1.331	-0.007* (0.004)	-0.034* (0.018)	-0.031* (0.017)	0.028* (0.016)	0.043* (0.023)
Cost of transport	-0.086 (0.159)	0.918	0.002 (0.004)	0.010 (0.019)	-0.009 (0.017)	-0.009 (0.016)	-0.013 (0.024)
Type of transport	0.253** (0.010)	1.288	-0.006** (0.003)	-0.030** (0.012)	-0.027** (0.011)	0.025** (0.011)	0.038** (0.015)
Distance	0.250** (0.111)	1.285	-0.006* (0.003)	-0.030** (0.013)	-0.027** (0.012)	0.025** (0.012)	0.037** (0.017)
Expected prob.			0.02	0.15	0.30	0.35	0.18
No. of observations	420						
LR test ~ Chi <sup>2</sup>	120.503						
Prob. Chi-square	0.000						

\*\*\* *p* < 0.01; \*\* *p* < 0.05; \* *p* < 0.1

In the regression result above, the dependent variable (Health Status) takes one of five values: Poor, Fair, Good, Very Good, or Excellent. The likelihood ratio test indicates that the null hypothesis of all coefficients being equal to zero is rejected at a 1% level of significance. Table 4.2 presents the estimated coefficients, odds ratios, marginal effects, and corresponding expected probabilities. The last row shows the expected probabilities and sum to one as expected (probability cannot exceed one).

As a result, the coefficient of road condition negatively and significantly impacted on health status and this suggests that it is an important determinant of poverty alleviation through health.



The odds ratio is 0.733, indicating that improvement in the road condition reduces the odds of being healthier by 27%. Also, the coefficient of travel time positively and significantly impacted on health status and this suggests that it is an important determinant of poverty alleviation through health. The odds ratio is 1.331, indicating that a one-level increase in the travel time (maybe in minutes) increases the odds of being healthier by 33%.

Likewise, the coefficient of type of transportation positively and significantly impacted on health status and this suggests that it is an important determinant of poverty alleviation through health. The odds ratio is 1.288, indicating that a one-level increase in the available types of transportation increases the odds of being healthier by 29%. In the same manner, the coefficient of distance positively and significantly impacted on health status and this suggests that it is an important determinant of poverty alleviation through health. The odds ratio is 1.285, indicating that a one-level increase in the distance (in kilometer) increases the odds of being healthier by 29%.

The expected probabilities of those with good health and very good health statuses are very high with 30% and 35% probabilities. Eighteen out of a hundred (18%) however have an excellent health system. Those with poor and fair health status constitute just about 17% of the sample.

## IMPLICATIONS OF FINDINGS

### Literacy Level

Our research into the impact of road transportation on the literacy level of rural dwellers in the Federal Capital Territory of Nigeria (FCT) revealed that road condition, travel time, cost of transportation, and distance are not significant in explaining the impact of road transportation on the level of literacy in the area of study, even though type of transportation positively and significantly impacted on education at 1% level. We suggest that rural dwellers in Nigeria are generally confronted with several accessibility restrictions, the major one being access to schooling facilities as a result of types of transportation available in their various rural communities.

This invariably has direct consequences for the quality of life and the structural, long-term consequences for the country's wealth. Despite the clearly stated right to basic education in the 1999 Constitution of the Federal Republic of Nigeria (as amended), rural children in the Federal Capital Territory (FCT) still do not have access to various means of transportation and other types of infrastructure that will lead to easy accessibility. This result of this study seems to agree with the research conducted by Aderamo and Magaji (2010), who maintained that the poor-quality rural roads led to the lack of educational and other facilities in Edu Local Government Area of Kwara State. Also, in the case of the Federal Capital Territory, Dakyes and Ogbuli (2012), while examining the impact of transportation on the socio-economic development of rural areas of Gwagwalada Area Council, came to the conclusion that inadequate transportation is the main cause of lack of presence of educational and other social facilities in the area. Other factors that may impair accessibility to education in the study area include the dispersed nature of rural school structure, lack of public transportation within the rural areas and from rural to urban areas, and the economic, social and political conditions of rural populations, which induce early entry of children into the job market and early marriages.



Rural children typically leave the school system after primary or secondary school, unlike the much longer period of education enjoyed by urban children.

### Health Situation

The outcome of the impact of transportation on health status has revealed that transport costs to and from health facilities in the area of study are very high, as the physical locations of health facilities do not meet households' needs. This means that distance is a major obstacle to the rural population in accessing health facilities. Most households find it difficult to travel to access healthcare and other facilities because of the presence of a few health facilities, poor roads, and high transport costs. Even where motorable roads exist, transport services are unreliable and infrequent; where available, such services are for hire and the majority of rural inhabitants cannot afford them.

This also has great implications for health workers as they also suffer before getting transportation to convey them to their places of work, which makes them tired, irritated, and not motivated adequately to do their best on duty. Similarly, road transportation is a major constraint that hinders health workers from embarking on outreach programmes because of inadequate transport infrastructure and service. The outreach programmes are usually for critical pre-natal, ante-natal and neo-natal periods; preventive and curative services; and they also support health advice on livelihoods and hygiene.

This study's findings conform with the results from the study carried out by Gbadamosi and Olorunfemi (2016), who identified poor rural road transportation as an impediment to health care delivery in the rural areas of Kogi State. Likewise, Usman and Sulyman (2013) confirmed that poor transportation negatively affects travel time to rural health centres in Kwara State.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

The study has revealed that roads, especially rural roads, are indispensable in reducing poverty in the rural areas as they link villages with markets and towns, provide access to farms and places of employment and productivity, recreation/tourist centres and social events, etc. The type of road transport impacts the literacy level in the study area, implying that the needs of the rural populace in terms of road transportation are not being met. Even though education is a basic statutory right of Nigerians, the situation is dire in the area of study. Rural dwellers in Nigeria, as shown in the study, are generally confronted with several accessibility restrictions, the major one being access to schooling facilities as a result of types of transportation available in the various rural communities. However, against all odds, Nigerians still find a way to be educated having known the importance of education in the present world.

Another key conclusion drawn from this study is the negative impacts of the high cost of road transportation on health status, as well as the long distance involved in accessing healthcare. Transport costs to and from health facilities in the area of study are very high, as the physical locations of health facilities do not meet households' needs. This means that distance is a major obstacle to the rural population in accessing health facilities. Most households find it difficult to travel to get to healthcare and other facilities because of the presence of a few health

facilities, poor roads, and high transport costs. Even where motorable roads exist, transport services are unreliable and infrequent; where available, such services are for-hire and the majority of rural inhabitants cannot afford them. This also has great implications for health workers as they also suffer before getting transportation to convey them to their places of work, which makes them tired, irritated, and not motivated adequately to do their best on duty.

## Recommendations

Based on the results of this research, this study recommends the following:

- i. One of the conclusions of this study is that the type of transport impacts the level of literacy. It is recommended that Area Councils in the affected areas institute appropriate ways to meet the needs of the rural populace in this regard. There should be encouragement in the provision of financing for the acquisition of motorcycles and three-wheelers that are appropriate for rural roads to ease movement. This could be done through improved access to co-operative institutions and microfinance institutions.
- ii. Concerning the high cost of transportation and the long distance in accessing health facilities, adequate efforts should be made by the Area Councils to improve and rehabilitate rural roads to ease movement, thereby reducing the cost of transportation. There should be focus on improving the earth- and gravel-coated roads that are predominant in the Area Councils. These involve regular repairs, including maintaining the shoulders, patching repairs, renewals (putting fresh coat on the surface) and repairs of bridges and culverts. Also, the Area Councils should ensure that health facilities are brought nearer to the people by establishing mobile clinics that can be available on market days or specific days in the week to cater for the health needs of the people.
- iii. Residents of the study area should also be encouraged and supported by the appropriate offices of the Area Councils, to establish Development Associations and Co-operatives. These groups will spearhead community self-help by assisting in giving feedback to government on development issues, being involved in self-improvement efforts, maintaining and safe-guarding rural infrastructural assets against spoilage and vandalism, and so on.

All the above will ensure that there is complementarity in the relationship that will exist between improved rural roads, promotion of employment opportunities, empowerment of rural youths and stemming the ever-increasing rural-urban migration, and engendering rural security through rural development, thereby reducing poverty.



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