

**EFFECT OF TRANSIT ROAD ROUTES ON PRODUCTIVITY AND QUALITY OF LIFE OF PERI-URBAN CROP FARMERS IN NORTH CENTRAL NIGERIA**

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**ABSTRACT**

The research was carried out to assess the effect of transit road route on productivity and quality of life of peri-urban crop farmers in north central Nigeria. A multistage sampling technique was used to sample 152 peri-urban crop farmers. Data collection was done through well-structured questionnaire/interview schedule. The collected data were analysed using descriptive and inferential statistics such as; tables, frequencies, percentages, Likert scale fashion, means, multiple linear regression and multinomial logistics regression. The result for the socio-economic characteristics for Peri-urban crop farmers revealed that, a good proportion of sampled respondents 43.4% fell within the age brackets of 36-45years., 59.9% were male, 55.9% had secondary education, 58.6% had household size of 5-8persons, 86.8% peri-urban crop farmers indulged only in farming activity., 45.4% had annual income of ₦251,000-₦351,000., 74.3% had farm size of 1-3ha. The result for effect of transit road routes on productivity of peri-urban crop farmers revealed that, farm size ( $\beta=.085$ ,  $t=2.626$ ) and quantity of herbicide used ( $\beta=.268$ ,  $t=8.289$ ) were positive and statistically significant predictors of productivity of peri-urban crop farmers. While, transit road routes, labour employed, quantity of fertilizer used and quantity of seed used were all statistically non-significant predictors of productivity of peri-urban crop farmers. The result of multinomial logistic regression for the effect of transit road routes on quality of life of Peri-urban crop farmers in north central Nigeria revealed that, nature of the transit road route (categorical variable) show a statistical significance value for peri-urban crop farmers in moderate quality of life category. But, not for nature of transit routes for peri-urban farmers in the good quality of life category. This suggests that, there is a statistical significant association between nature of transit routes and quality of life of peri-urban crop farmers in moderate quality of life category compared to those in the poor quality of life category (reference category). While, there was no statistical association for nature of transit road route on crop farmers in good quality of life compared to peri-urban crop farmers in poor quality of life. The coefficient for transit road routes for peri-urban crop farmers in moderate quality of life revealed that a statistical significant relation exists ( $p =.038$ ) for crop farmers in moderate quality of life category. On the other hand, the coefficient of transit road routes for peri-urban crop farmers in good quality of life category revealed a statistical non-significant relation exists ( $p =.309$ ) for crop farmers in good quality of life category. Based on this finding from the research, the study therefore recommends that, Government should maintain a balance distribution of transit road of the geographical zones in the country from state down to the local government areas. There is need for increase funding for road development and plan for continuous improvement of existing roads for enhanced development and transcendental uniform distribution of improved productivity and quality of life in the peri-urban communities in Nigeria.

**Keywords:** Transit roads routes, Crop Farmers, Quality of life, productivity, and peri-urban.

## 1. INTRODUCTION

### 1.1 Background to the Study

Transit road routes can be described as a fundamental basics or requirements of all activities of an organized society in both social and economic dimension. These facilities enhance the quality of life/standard of living of peri-urban famers (Onwuemenyi, 2008). It is the basic physical and organizational structure needed for the operation of public transportation systems as such, it is a critical substructure whose development has direct bearing on the overall growth of any nation. Transit road routes serve as a major tool for improvement of quality of life and increased productivity of farmers through easy access to farm site, improvement of quality life through easy access to social infrastructure, bring about regional integration, dissemination of information, easy access to agricultural input markets, social inclusion, and easy access to markets which tend to reduce travel time and transportation cost i.e. These facilities enhance the quality of life/standard of living of rural famers (Onwuemenyi, 2008).

The importance of transit road routes has long been recognized as crucial to promoting growth and development. This is obvious considering its wide range of influence and increase productivity, generation of income and improved quality of life. However, this role depends largely on the extent to which road infrastructure are adequately provided, distributed over space and maintained (Adefila and Bulus, 2014).

Nigeria has the largest road network in west Africa and the second largest to South Sahara with approximated 200,000km of surfaced roads as estimated (Filani, 1999). Currently, road system is about 208,200km with estimated 28,980km paved and 179220km unpaved (Federal Ministry of Work Bulletin, 2012). According to National integrated infrastructure master plan (2013), Nigeria has a national Transit road routes (TRR) of about 202,000km. of this total, federal roads routes account for 18% (35,000km), state roads routes account for 15% (17,000km), and local government roads routes accounted for 67% (150,000km), with most local government roads being unpaved/un-surfaced.

According to Tunde and Adeniyi (2012) Transit road route (TRR) improves the accessibility to both geographical and economic regions, in peri-urban areas particularly where the major source of income for residents is farming, it also facilitates the transfer of farm produce to the markets, encourages increased production, distribution, marketing and improvement in the quality of livelihood of the local farmers (Ajiboye and Afolayan, 2009). Following this, one could presume the overwhelming importance transit road route (TRR) plays in the growth and development of a socioeconomic system in peri-urban communities in developing and developed economies, since it is considered as a key stimulant to agricultural development and growth all over the world particularly Nigeria. It is also, the only means by which food produced at farm site is moved to different homes as well as markets, therefore increasing interactions among geographical and economic regions by opening up new areas to economic benefits leading to economic development through the linkages of area of production with area of consumption [(Tunde and Adeniyi, 2012) and (Abegunde *et al.*, 2005)].

Paul *et al.*, (2009), pointed out the three (3) effect of transit road routes (TRR) on productivity and income in Nigeria as; First, the agricultural sector accounts for a large share of

gross domestic product (GDP) in most Sub-Saharan countries. Second, poverty is concentrated in rural and Peri-urban areas. Finally, the relatively low levels of transit roads routes and long average travel time's result in high transaction costs for sales of agricultural inputs and outputs, and this limits agricultural productivity and growth.

## Statement of the Problem

It is obvious that, transit road routes play an important role in peri-urban development as it provides means and avenue which peri-urban communities can access the basic opportunities and necessities that enhances their productivity and quality of life of farming households in Nigeria and particularly north central Nigeria. undoubtedly, transit road routes also support family and community development by providing the necessary access to gathering (social) markets, farm suppliers, education, health, easy access to farm site, linkage with other developed region, bring out exchange of information, bring about employment opportunity, reduction of travel time and cost among others. These in turn, enhances productivity and quality of life of peri-urban crop farmers in north central Nigeria.

Paradoxically, in spite of this universally acknowledged attribute of transit road routes to improvement of quality of life and productivity, its development has been faced with plethora of problems; No and low budgetary allocation on transit road development, uneven distribution of transit road width, no transitory routes passage, poor or no accessibility and connectivity of farmer's household with externalities, uneven transit road routes distribution by zones/localities. These problems have made it difficult, expensive and more odious to move products and services from point of production to that of consumption, farm produce from rural to urban centres, which often leads to low productivity, low income and poor quality of life of peri-urban crop farmers.

Even though a lot has been brought to focus by earlier scholars, on the need for continuous and consistent effort towards providing good transit road routes in peri-urban communities like [Yakubu, H, (2016); Abur *et al.*, (2015); Erma, *et al.*, (2015); Ighodaro, (2009); Majumdar, (2002); Inoni and Omotor, (2009); Olubumetin, (2012);] quantitative empirical support data has been lacking or illusive. It is on this background that, the study is conceived in north central Nigeria to assess the effect of transit road routes on productivity and quality of life of peri-urban crop farmers.

## Research question

The following research questions were formulated to guide objective investigation into specific issues surrounding transit road routes development and it's on productivity and quality of life of peri-urban crop farmers in north central Nigeria;

- i. What are the socioeconomic characteristics of peri-urban crop farmers in north central Nigeria?
- ii. What is the effect of transit road route on productivity of peri-urban crop farmers in north central Nigeria?
- iii. What is the effect of transit road route on quality of life of peri-urban crop farmers in north central Nigeria?

## Objectives of the Study

The broad objective is to assess the effect of transit road route on productivity and. While, the specific objectives are to;

- i. What are the socioeconomic characteristics of peri-urban crop farmers in north central Nigeria;
- ii. What is the effect of transit road route on productivity of peri-urban crop farmers in north central Nigeria;
- iii. What is the effect of transit road route on quality of life of peri-urban crop farmers in north central Nigeria;

### **Statement of the Hypothesis**

- i.  $H_{01}$ : transit road route does not have significant relationship with productivity of peri-urban crop farmers in north central Nigeria.
- ii.  $H_{01}$ : transit road route does not have significant relationship with quality of life of peri-urban crop farmers in north central Nigeria.

### **Significance of the study**

The findings of this study will be beneficial in the following ways:

- i. It will contribute meaningfully to the existing literature in the infrastructural sector and also serve as a vital tool to guide policy makers in formulation of policies that pertains to transit road routes development.
- ii. the study will also serve as reference point to other researchers and policy makers in the agricultural sector of the need for a well development and articulated transportation systems.

### **Scope of the Study**

The scope of the study was sub-divided into the following;

#### **i. The geographical scope**

The study was carried out in north central Nigeria.

#### **ii. Element in the focal organization**

The participatory respondents for this study were specifically crop farmers in peri-urban communities in north central Nigeria.

#### **iii. Variable scope**

The variable scope consists of dependent variable which is;

- i. Productivity
- ii. Quality of life

#### **iv. Period of study**

The time scope from 2021 – 2023.

## **2. METHODOLOGY**

### **Research design:**

The study utilized descriptive research design, in the form of a cross sectional survey design to describe certain characteristics of respondent, estimate the population with certain characteristics and make predictions allowing the researcher collect data from relatively large samples.

**Study area:**

The study area for this research is north central Nigeria. Nigeria comprises of six (6) geopolitical zones and north central Nigeria is one among the six zones loosely known as middle belt and composed of the following state; Benue, Kogi, Kwara, Nassarawa, Niger, Plateau and Federal Capital Territory. The Location is North central Nigeria which is geographically located between latitude 8<sup>0</sup> N – 10<sup>0</sup>N and longitude 3<sup>0</sup>E – 10<sup>0</sup> E (Balogun, 2009). It is located in the middle belt region of Nigeria spanning from the west, around the confluence of river Benue and river Niger. The vegetation of the zone consists of forest savannah mosaic, southern guinea savannah, and the northern guinea savannah. The region itself is rich in natural land features, boost some Nigeria’s most exciting scenery. The soil resources of the area are either friable, porous, coarse-grained sandy or lateritic usually grey or reddish in colour, generally low in fertility. The vegetation supports a very wide variety of crops species including cereals such as maize, rice, millets and sorghum.

The north central Nigeria is characterized by a tropical continental climate mark by wide variation of annual temperature regime and a restricted rainfall, with a temperature and rainfall varying with location and period of the year. The mean temperature ranges from 24 °C to 37 °C while mean annual rainfall is between 100 and 200cm<sup>3</sup>. Weather and climatic condition of north central Nigeria is characterized by two distinct seasons which is raining and dry seasons. Raining season extends from April to October, and dry season which start in December and last till March.

The main occupation and inhabitants of the people in north central Nigeria is farming ranging from crops, livestock production and Mining (which is an old industry). The inhabitant are predominately farmers and miners with few civil servants. The state in north central Nigeria are; Benue state, Nassarawa state, Kwara state, kogi state, Niger state and Plateau state respectively including Abuja the federal capital territory.



**Figure 1:** Map of Nigeria Showing North Central Zone in dark background

Source: [www.naijahomebased.com](http://www.naijahomebased.com) (retrieved on 27<sup>th</sup> October, 2019)

**Target population for the Study:**

The targeted population were 3040 peri-urban crop farmers in north central Nigeria (Preliminary field survey, 2021).

**Sample size and sampling techniques:**

The study employed a multistage random sampling technique for the selection of respondents, for data collection. In the first stage there was purposive selection of two (2) states based on homogeneity from seven (7) state in north central Nigeria namely; Benue state and Nassarawa states. The second stage, involved random selection of 3 LGA's from each state selected in stage one above using balloting techniques to give each and every sample equal opportunity to be chosen, the selected LGA's are; Makurdi LGA, Konshisha LGA and Otukpo from Benue state as well as Lafia LGA, Akwanga LGA and Keffi LGA from Nassarawa state. The third stage was random selection of two (2) peri-urban communities each from the LGA's in stage two above. The selected peri-urban villages were; Agan and Apir from Makurdi LGA; Achoho and Abagi from Konshishi and Ewolu and Eketete from Otukpo LGA, Umbi I and Umbi II from Lafia, Gudi and Nunku from Akwanga and finally Sabon gari and Sabon gai from Keffi. These selections were due to; non homogeneous in structure and pattern of development, but area characterized by market-led medium density, sporadic housing developments, sporadic demographic changes, lacking in basic infrastructural facilities, employment opportunities and are poorly linked to the main town by transit roads. The fourth and final stage of selection was the extraction of 5% sampling proportional from 3040 peri-urban crop farmers to obtain a sample size of 152 peri-urban crop farmers.

**Table 2: Sample size selection and Sampling plan of 5% (0.05 sampling proportion)**

State	LGA	Peri-urban villages	Sampling frames	Sample size
			Peri-urban villages	Peri-urban villages
Benue State	Makurdi	Agan	278	14
		Apir	270	14
	konshisha	Achoho	257	13
		Awaji	225	11
	Otukpo	Eketete	216	11
		Ewulo	235	12
Nassarawa state	Lafia	Umbi I	239	12

	Umb II	243	12
a	Akwang Gudi	267	13
	Nunku	242	12
Keffi	Sabon gari	289	14
	Sabon gai	271	14
<b>Total</b>		<b>3,040</b>	<b>152</b>

**Source: preliminary investigation, 2021**

**Method of Data Collection:**

The method used in collecting information for the study were structured questionnaire, physical observation and interview schedule.

**Measurement of variable/ Model Specification**

Variables	Definition	Measurement(s)
Age	The length of time that a farmer has lived	Years
Gender	Refers to the characteristics of women, men, girls and boys that are socially constructed.	1= male 0= female
Marital status	One's situation with regard to whether one is single, married, separated,	1=married 2=single 3= separated 4= widow/widower
Educational level	Is the highest level of education that a crop farmer has completed	Years
Household size	This is the total number of household's members residing, or that will be legally residing in a dwelling unit.	Number
Major occupation		1=trading 2=farming 3=trading and farming
Annual income	Total gross income obtained by farmers from a particular crop enterprise.	Naira
Farm size	This is the proportion of land use for the production of a particular crop.	Ha.
Nature of transit road route	This means the classification of road types	1=bush path 2=unsurfaced 3=surfaced.

Labour use	This is the type of physical effort exerted to produce a particular crop by the farmer.	Man-day/ha
Quantity of herbicide employed	this is chemical product use in fighting weed on the farm by the farmers to optimize yield/ha of crop planted during a production process.	Litres/ha
Quantity of fertilizer employed	This is the rate of fertilizer of the farm for optimized productivity.	Kg/ha
Quantity of seed planted	The is the quantity of seeds planted per unit of land use.	Kg/ha
Transit road routes	This are roads, street or highway use in the operation of public transportation systems measures as an index score.	Index score.
Quality of life	This is the general perception of wellbeing of an individual farmer as regards it satisfaction with life and other socioeconomic amenities. Measured on a nominal scale.	Good QOL=3; Moderate QOL=2; Poor QOL =1.

**1. Procedure for model development: Transit road routes development score (TRRDS)**

This model was adopted from [Marshal, (2005); Xie and Levinson, (2006), (Cole and king, 1968; Hay, 1973; Hodder and Pierie (1979) and Kwan (1998); Lee, 1982; Rallis, 1988)] and modified by the researcher to obtain the following model;

$$TRR = f(\sum_{j=1}^n TRR_{ij}) = TA_i + TC_i + TW \text{ routes} + NTRI. \text{-----}$$

------(1)

Where;  $f(\sum_{j=1}^n TRR_{ij})$  = summation of transit road routes indices

- i.  $TA_i$  = total accessibility score measured as shortest distance use to reach the i crop household in km (1.....nkm)
- ii.  $TC_i$  = total connectivity score is the ratio of links to node with a community;  
 $TC_i = \frac{\text{links}}{\text{node}} \text{.....(2)}$

Where;  
 Nodes (vertex) are streets intersections and cul-de-sac head within a development measured in numbers  
 Links (edges) are stretches of roadway that connect nodes measured in numbers

- iii. TW routes = total width of road is the length and expansion of transit road routes, measured as; single lane (1) equivalent to 3.5m, double lane (2) equivalent to 7m.
- iv. NTRI (number of transitory routes) = this is the number of transit road routes passing through a community, measured on a scale of; (1-----nTR).

**ii. Procedural for measuring quality of life**



Quality of life (HQOL) is measured on quality of life index score;  

$$QOLIS = \sum \frac{(D1 + D2 + D3 + D4 + D5)}{5}$$

--(3)

Where;

D<sub>1</sub> = nutrition and health domain questions is assigned a score of (1-7).

D<sub>2</sub> = household living condition question is assigned a score of (1-4).

D<sub>3</sub> = infrastructural services question is assigned a score of (1-5).

D<sub>4</sub> = housing sleeping density question is assigned a score of (1-3).

D<sub>5</sub> = defecation status question is assigned a score of (1-3).

To obtain the index for the various domain, the following formula was used;

$$D_n = \frac{\text{sum of scores obtained} - \text{sum of maximum scores}}{\text{sum of maximum score} - \text{sum of minimum score}} \times 100\% \text{-----(4)}$$

The sum of weighted score obtained from each domain is fitted into the formula above with their respective sum of minimum and maximum values assigned to each indicator captured in their domains. Sum of score is obtained by summing up all weighted values assigned to all indicators in a particular domain X<sub>j</sub> number of respondents to rate *i*. where, *i* = is assign a weighted value of 1-----n depending on the domain.

The overall index scores from all the domains were furthers transformed into a categorical scale using the various boundaries: Poor QOL (0-33.33); moderate QOL (33.34-66.67) and Good QOL (66.67-100) after normalizing since index start from 0-100. These were then coded as; Good QOL =3, moderate QOL =2 and poor QOL=1.

Typical way to obtain value boundaries

Domain	Indicators	Values assigned	Minimum value	Maximum value	Value bounds
Quality of life domain	Q <sub>1</sub>	1,2,3	1	3	100/3 =33.33
	Q <sub>2</sub>	1,2,3	1	3	100/3=33.33
Index boundaries					66.66/2 =33.33

Each domain of quality of life has different indicators which are assigned values; (1,2,3). 100 is then divided by the sum value assigned to an indicator in a particular domain to obtain index bounds. 0-33.33 (poor); 33.34-66.67 (moderate); 66.68-100 (good) because index start with zero and end with 100.

**Model Specification:**

**1. Multiple regression estimation techniques for effect of transit roads routes (TRR) on productivity of rural and peri-urban crop farmers:**

**Implicit form:**  $Y = f(X_1 + X_2 + X_3 + X_4 \dots\dots b_6X_6)$  -----  
 -----(i)

**Explicit form:**  $Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + ei$  -----  
 -----(ii)

**Peri-urban crop farmers**

**Linear function**

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + ei \text{ .....}$$

..... (iii) **Semi-log**

$$Y = b_0 + Inb_1X_1 + Inb_2X_2 + Inb_3X_3 + Inb_4X_4 + Inb_5X_5 + Inb_6X_6 + ei \text{ .....}$$

.....(iv)

**Double-log**

$$LogY = Inb_0 + b_1 InX_1 + b_2 InX_2 + b_3 InX_3 + b_4 InX_4 + b_5 InX_5 + b_6 InX_6 + ei \text{ .....}$$

..... (vi)

**Exponential function**

$$LogY = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + ei \text{ .....}$$

..... (vii)

**Y** = average yield of crop farmers measured in (kg/ha)

**X<sub>1</sub>** = Transit road routes development score (TRRDS) measure as (index score)

**X<sub>2</sub>** = farm size in (ha);

**X<sub>3</sub>** = amount of family and hired labour used measure in (man-day/ha)

**X<sub>4</sub>** = quantity of fertilizer used in (₦/ha)

**X<sub>5</sub>** = quantity of herbicides used (litre/ha)

**X<sub>6</sub>** = quantity of seed planted in (kg/ha)

**e<sub>i</sub>** = random error

**2. Multinomial logistic regression model for the effects of transit roads routes on quality of life of rural and peri-urban crop farmers in north central Nigeria:**

Multinomial logistic regression (linear predictor function):

**Implicit Model**

$$F(k,1) = \beta_k * X_i \text{ .....}$$

..... (i)

Where

$\beta_k$  = is a set of regression coefficient associated with observation *i*

**Explicit Model**

$$F(k,1) = \beta_{0,k} + \beta_{1,k}X_{1,i} + \beta_{2,k}X_{2,i} + \beta_{3,k}X_{3,i} \text{ .....}$$

.....(ii) *F(k, i)* to predict the probability that observation *i* has outcome *k*, of the following;

Where,  $\beta_{m,k}$  is a regression coefficient associated with the *M<sub>th</sub>* explanatory variable and *K<sub>th</sub>* outcome.

Where;

**Y** = quality of life measured on a nominal scale (1=Poor QOL,2=Moderate QOL,3=Good QOL) generated from overall quality of life index after normalization.

**X<sub>1</sub>** = Transit road routes (TRR) was measured as (index score).

**X<sub>2</sub>** = type of transits roads measured as; (bush path =1, unsurfaced =2, surfaced =3).

**Data Analysis Techniques**

The data collected for this study were analysed using descriptive and inferential statistics. Descriptive statistics such as table, Percentages, Frequency distribution, Mean, standard

deviation; objectives (i), multiple regression was used to analyse objective (ii) and objective (iii) was analysed using multinomial logistic model. while Hypotheses testing was done using repeated measure of analysis of variance (ANOVA) for objective (i) and Hosmer and Lemeshow chi-square test for hypothesis (ii).

### **3. RESULT AND DISCUSSION**

#### **3.1. Socio-economic characteristics of peri-urban crop farmers in north central Nigeria**

Table 2 shows the result of socio-economic characteristics of Peri-urban crop farmers in north central Nigeria. The distribution of age, revealed a mean age for Peri-urban crop farmers as  $\bar{x}$ = 42.09 indicating that, majority 66(43.4%) of peri-urban crop farmers were within the age brackets of 36-45years, 37(24.3%) were between the age bracket of 46-55years, 36(23.7%) were between the age bracket of 26-35years, 11(7.2%) were between the age bracket of 56-65years, and 2(1.3%) were within the age bracket of 66years and above. This result is in consonance with Umeh and Attaboh, (2006), that most farmers are still in their youthful age full of energy to make meaningful impact in agricultural production.

The gender distribution of peri-urban crop farmers in North central Nigeria revealed that, majority 91(59.9%) were male. While, 59.9(40.1%) were female. This result may be attributed to the fact that, men are known to transverse their geographical location using available transit road routes in search for livelihood opportunities and other resources that will help promote the welfare of their family members, while the female counterparts are meant to stay at home to take care of immediate domestic activities. This finding agrees with chancha *et al.*, (2020) that, majority of household farmers were males.

Distribution of marital status of Peri-urban crop farmers in North central Nigeria revealed that, majority 85(55.9%) were married, 32(21.1%) were single, 20(13.2%) were either widow/widower and 15(9.9%) were either divorced/separated. These high percentages of married crop farmers may be as a result of access to maternity centers due to transit road routes connectivity between regions thereby boosting the labour force of the household. This result is in consonance with Onuche, (2010) that, farm families in Nigeria are polygamous by nature with high tendency to having more children to assist them in farming and other agricultural activities such as processing and marketing using available transit roads routes available in their respective geographical areas leading to markets centers and other infrastructural facilities.

The findings for educational level for peri-urban crop farmers revealed a mean educational level of  $\bar{x}$  = 8.04 Indicating that, majority 52(34.2%) had secondary education, 37(24.3%) had primary education, 33(21.7%) had no formal education and 30(19.7%) had tertiary education. This finding implies that, Peri-urban crop farmers in North central were literate and could read and write. This result is in agreement with chancha, *et al.*, (2020), that road infrastructure was mostly preferred by crop farmers as it links rural areas to educational centers since it plays an indispensable role in the socio-economic placement as such it instigates rural and peri-urban crop farmers on the benefit of transit road routes in agricultural production circle

The distribution of household size of peri-urban crop farmers revealed that, the mean household size was  $\bar{x}$  = 5.74 Indicating that, majority 89(58.6%) had household size of 5-8persons, 46(30.3%) had household size of 1-4persons, 15(9.9%) had household size of 9-12persons, 2(1.3%) had household size of above 13persons. This result is backed by the highest number of

married couples above on marital status it evident in peri-urban environment where agriculture is the main economic activity, the size of household plays a very important role in the supply of family labour for agricultural activities [(Adeoye *et al.*, 2011) and Ogundele and Okoruwa, (2006)] posit that, family labour constitutes the major proportion of aggregate labour force used on the farm for agricultural activities.

The distribution of major occupation of peri-urban crop farmers in North central Nigeria revealed that, majority 132(86.8%) indulged only in farming activities as their major occupation while, 20(13.2%) indulged in farming and trading as an occupation.

The distribution of annual income of peri-urban crop farmers revealed a mean annual income of  $\bar{x} = \text{₦} 333,916.69$  indicating that, 69(45.4%) had annual income of ~~₦251,000-₦351,000~~, 36(23.7%) had annual income of ~~₦352,000-₦452,000~~, 29(19.1%) had annual income of ~~₦150,000-₦250,000~~, 14(9.2%) had annual income of ~~₦453,000-₦551,000~~, 3(2.0%) had annual income of ~~₦552,000-₦652,000~~, 1(0.7%) had annual income of above ~~₦653,000~~. This implies that, majority of Peri-urban crop farmers focus largely on farming as their livelihood enterprise in North central Nigeria therefore using the available types of transit road routes as a means of harnessing agricultural opportunities to boost income through easy access to markets.

Finally, the distribution of farm size cultivated by Peri-urban crop farmers in North central Nigeria revealed a mean farm size of  $\bar{x} = 2.79\text{ha}$  indicating that, majority 113(74.3%) had farm size of 1-3ha. While, 39(25.7%) had farm size of 4-6ha. The mean farm size of less than 3 indicates that, peri-urban crop farmers are small scale farm holders. This support the assertion of Delebarre and Serier, (2000), that most Nigeria farmers operate on less than 3ha on an average.

**Table 2 Showing Result for the Distribution of Socio-economic Characteristics of peri-urban crop farmers in north central Nigeria**

Socioeconomic characteristic	Frequency (F)	Percentages (%)	Mean ( $\bar{X}$ )
<b>Age</b>			
26-35	36	23.7	42years
36-45	66	43.4	
46-55	37	24.3	
56-65	11	7.2	
>66	2	1.3	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Gender</b>			
Male	91	59.9	
Female	61	40.1	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Marital status</b>			
Married	85	55.9	
Single	32	21.1	
Widow/widower	20	13.2	
Divorced/Separated	15	9.9	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Educational level</b>			
No formal education.	33	21.7	8
Primary Education.	37	24.3	
Secondary education.	52	34.2	
Tertiary education.	30	19.7	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Household size</b>			
1-4persons	46	30.3	6person
5-8persons	89	58.6	
9-12person	15	9.9	
Above 13persons	2	1.3	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Major occupation</b>			
Farming.	132	86.8	
Trading and farming	20	13.2	
<b>Total</b>	<b>152</b>	<b>100</b>	
<b>Annual income</b>			
₦150000-₦250000	29	19.1	₦333,916.69
₦251000-₦351000	69	45.4	
₦352000-₦452000	36	23.7	
₦453000-₦551000	14	9.2	
₦552,000-652,000	3	2.0	
Above ₦653,000.	1	0.7	
<b>Total</b>	<b>152</b>	<b>100</b>	

<b>Farm size</b>			2.79ha
1-3ha	113	74.3	
4-6ha	39	25.7	
<b>Total</b>	<b>152</b>	<b>100</b>	

Sources:(Field survey, 2021).

#### 4.2 Multiple Linear Regression Estimate for Effect of effect of transit road routes on productivity of Peri-urban Crop Farmers in North Central Nigeria

Table 3 below shows the result for multiple linear regression estimation for effect of transit road routes (TRR) on productivity of Peri-urban crop farmers in north central Nigeria. The Cobb- Douglas model also known as log-log model was fitted for analysis. The result of the regression shows that, the coefficient of determination ( $R^2$ ) was .678 implying that, 67.8% variance in productivity was due to explanatory variable(s) not included in the model or other uncontrolled factors faced by rural crop farmers which ordinary enhance productivity ( $R^2 = .678$ ,  $F(6, 152) = 50.458$ ,  $p < .01$ ). The F-statistics of 50.458 was highly significant at 1% probability level indicating goodness of fit for the model. Therefore, the null hypothesis which states that, transit road routes have no significant effect on productivity of peri-urban crop farmers in north central Nigeria is rejected and alternative hypothesis accepted since the F-calculated (50.458) > F-critical @=0.1%.

Specifically, the coefficient farm size ( $\beta = .085$ ;  $t = 2.626$   $p < .010$ ) this coefficient indicates the elasticity of farm size and was positive and statistically significant at 1% probability level implying that, a unit increase in farm size will increase productivity by 8.5%. This positive and significance sign of farm size might be due to its importance in determining the farmer's ability to farm productively. As such it is expected to be positive on agricultural production. These findings corroborate with earlier result of Ndumiso, (2018).

In addition, quantity of herbicide used ( $\beta = .268$ ,  $t = 8.289$ ,  $p = .000$ ) was positive and statistical significant at 1% probability level implying that, a unit increase in quantity of herbicide used will increase productivity of peri-urban crop farmers by 26.8%. This positive and significant effect of quantity of herbicide on productivity might be due to timely access to inputs such as herbicide and agro-services which is been influenced by available transit road routes which are well accessible and connected to input markets. This finding corroborate with Fourie, (2006) argued that, improvement in road infrastructure is a contributive factor to productivity of inputs used e.g. herbicide.

Furthermore, the coefficient of labour uses ( $\beta = -.051$ ,  $t = -1.572$   $p = .118$ ) was negative and non-significant. implies that, labour use is a function of labour cost as such most farmers find it difficult using hired labour rather they concentrate on family labour. This finding is in agreement of Aburr, *et al.*, (2015) which revealed a negative effect of labour used on productivity.

Finally, the coefficient of transit road routes ( $\beta = .116$ ;  $t = 1.612$ ,  $p > .109$ ), quantity of fertilizer used ( $\beta = .022$ ;  $t = .675$   $p > .501$ ) and quantity of seed planted ( $\beta = .025$ ;  $t = 1.188$   $p > .237$ ) were positive and non-statistically significant. These implies that, transit road routes, fertilizer used and seed planted does not significantly predict productivity of peri-urban crop farmers in north central Nigeria.

**Table 3 Showing the Multiple Linear Regression Effect of Transit Roads Routes On Productivity of Peri-Urban Crop farmers in North Central Nigeria**

Variable	Linear	Semi-log	Cobb-Douglas +	Exponential
Constant	141.624 (.352)	-3037.596 2.176***)	2.105 (7.760***)	2.884 (33.561***)
Transit Road routes Development (score)	16.927 (1.449)	452.503 (1.219)	.116 (1.612)	.004 (1.599)
Farm size (ha)	180.018 (3.012***)	387.771 (2.330***)	.085 (2.626***)	.041 (3.205***)
Labour used (man-day/ha)	-56.855 (-2.124**)	-268.555 (-1.603)	-.051 (-1.572)	-.010 (-1.670)
Quantity of fertilizer used (kg/ha)	.003 (.013)	20.884 (.123)	.022 (.675)	1.658E-005 (.394)
Quantity of herbicide used (litre/ha)	139.575 (10.081***)	1426.870 (8.583***)	.268 (8.289***)	.025 (8.307***)
Quantity of seed planted. (kg/ha)	.415 (.681)	125.488 (1.179)	.025 (1.188)	8.988E-005 (.691)
R- square	.671	.667	.678	.615
Adjusted R-square	.657	.653	.664	.598
F- statistic	48.839	48.108	50.458	38.264
Durbin- Watson	1.392	1.331	1.345	1.419

**Significant at \*\*\*1% \*\* 5% and \*10%. + Indicate Lead model. Figures in parenthesis are t-values.**

**Source: (Field survey,2021)**

### 4.3 Multinomial Logistic Regression Estimate of Effect of Transit Road Route on Quality of Life of Peri-urban Crop Farmers in North Central Nigeria

Table 4 shows result of multinomial logistic regression (Two Logit) for the effect of transit road routes on quality of life of peri-urban crop farmers in north central Nigeria. The traditional .05 criterion of statistical significance was employed for all the tests. The model fitted information revealed that, the full model ( $X^2 (6, N=152) = 6.814, p = .014$ ) for peri-urban crop farmers statistically and significantly predicted the dependent variable (quality of life) better than the intercept-only model. The Pearson  $X^2 (274) = 269.864, p = .559$  and Deviance  $X^2 (274) = 153.339, p = 1.000$  for peri-urban crop farmers both show non-significance, indicating the goodness of fit of the model. The pseudo R-square for peri-urban crop farmers .066 (6.6%)

(Nagalkerke R<sup>2</sup>) explained the variance in quality of life of peri-urban crop farmers in north central Nigeria.

The parameter estimation of the effect of transit road routes on quality of life of peri-urban crop farmers revealed the coefficient for nature of the transit road route (categorical variable) show a statistical significance value for peri-urban crop farmers in moderate quality of life category. But, not for nature of transit routes for peri-urban farmers in the good quality of life category. This suggest that, there is a statistical significant association between nature of transit routes and quality of life of peri-urban crop farmers in moderate quality of life category compared to those in the poor quality of life category (reference category). While, there was no statistical significant association for nature of transit road route on crop farmers in good quality of life compared to peri-urban crop farmers in poor quality of life category.

The coefficient for transit road routes for peri-urban crop farmers in moderate quality of life revealed that a statistical significance ( $p = .038$ ) for crop farmers in moderate quality of life category, implying that, increase in transit road route by one score, the multinomial log odd of being in moderate quality of life compared to poor quality of life will increase by 1.032unit. on the other hand, the coefficient of transit road routes for peri-urban crop farmers in good quality of life category revealed a statistical non-significant ( $p = .309$ ). for crop farmers in good quality of life category. Implying that, increase in transit road routes by one point, the multinomial log odd of being in the good quality of life category compared to those in poor quality of life category would be expected to increase by 1.142unit.

**Table 4: Multinomial Logistic Regression Estimation of Effect of Transit Road Routes (TRR) on Quality of Life of Peri-Urban Crop farmers in North Central Nigeria**

Quality of life index	Variables	B	Wald	Sig.	Exp( $\beta$ )
<b>Moderate Quality of life</b>	Intercept	1.161	.180	.001	
	Transit road Routes Development (score)	.032	3.919	.038	1.032
	Unsurfaced road Routes 1	.523	3.213	.064	1.688
	Surfaced transit road Routes 2	.153	2.064	.053	1.166
<b>Good Quality of Life</b>	Intercept	-4.012	1.033	.309	
	Transit road Routes Development (score)	.132	1.212	.271	1.142



Unsurfaced road Routes1	-1.007	2.396	.465	.365
Surfaced Transit road Routes2	-.922	1.063	.302	.398
Model Fitting Information Final Model)	X <sup>2</sup> (6, N=152)= 6.814, p =.014			
Goodness-of-Fit Pearson	X <sup>2</sup> (274) =269.864; P>.559			
Deviance	X <sup>2</sup> (274) =153.339; P>1.000			
Pseudo R-Square (Nagelkerke R <sup>2</sup> )	.066 (6.6%)			

**Source: (Field survey, 2021). Reference category: poor quality of life domain**

**4.2 Test of Hypotheses**

**HO<sub>1</sub>: Transit road routes (TRR) has no significant effect on productivity of peri-urban crop farmers in north central Nigeria.**

Table 5 shows the result for analysis of variance for transit road routes (TRR) on productivity of peri-urban crop farmers in north central Nigeria. The result revealed that, the critical value of F-statistic with 6 and 144 degree of freedom at 1% level of significance is (7,144) =50.458 implying that, there is a significant effect of transit road routes on productivity of peri-urban crop farmers in north central Nigeria. Therefore, the null hypothesis which stipulates that, there is no significance effect of transit road routes on Productivity of peri-urban crop farmers is rejected and alternative hypothesis accepted.

**Table 5: Analysis of Variance Estimation for Effect of Transit Road Routes On Productivity of Peri-Urban Crop farmers in North Central Nigeria**

Settlement		Sum of squares	df	Means square	F	Sig.
Peri-urban	Regression	2.770	6	.462	50.458	.000
	Residual	1.317	144	.009		
	Total	4.087	150			

**Source: SPSS 20 Estimation.**

**HO<sub>2</sub>: Transit road routes (TRR) has no significant effect on quality of life of peri-urban crop farmers in north central Nigeria.**

Table 6 shows the result for chi-square from a multinomial logistic estimation of the effects of transit road routes on quality of life of peri-urban crop farmers. The result revealed a statistical significant relationship between transit road routes on quality of life of peri-urban crop farmers in north central Nigeria. X<sup>2</sup>(6, N=152) = 6.814, P=.014.

**Table 26 Chi-square Estimation for the Relation Between Transit Road Routes and quality of life of peri-urban crop farmers in north central Nigeria.**

<b>Model</b>	<b>Chi-square</b>	<b>Df</b>	<b>Sig.</b>
Final	6.814	6	.014

**Source: SPSS version 20 Estimation.**

#### **4. CONCLUSION AND RECOMMENDATION**

##### **Conclusion:**

Road development is a vital tool of any human settlement and it benefits to any society cannot be overemphasized. As such, it remains a vital component in socio-economic transformation of any nation. Thereby, the study concludes that, road development has a significant effect on productivity and quality of life of peri-urban crop farmers.

##### **Recommendation:**

Based on the findings from the research, the study therefore recommends the following;

1. Government should pay attention in developing roads that are well accessible and connected with urban cities so as to link less privilege localities with social infrastructure that enhances the quality of life of the peri-urban crop farmers in Nigeria particularly north central.
2. The government should diversify its objectives on provision of road transport infrastructures through partnership arrangements with private sectors on the public private partnership (PPP) to rehabilitate existing and construct new transit road.
3. Government should maintain a balance distribution of transit road by geographical zones down to their local government areas.
4. Government at Federal, State and Local Government levels through Ministry of Roads and transport should increase funding for rural and peri-urban roads and plan for continuous assessment of the effect of road on the peri-urban dwellers as they improve quality of life and farmer's productivity. This would guide them on the social-economic changes brought about by the transit road improvement to the peri-urban population.

##### **Contribution to knowledge**

- i. The study thereby established that increase government spending on transit road routes development will have both direct and indirect effect on productivity and improve quality of life of peri-urban crop farmers in north central Nigeria and the entire Nigeria as a country.

##### **Competing interests**

Authors have declared that, no competing interest exists from this research paper

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