



## COMPARATIVE EFFECT OF RURAL ROAD TRANSPORTATIONS ON CASSAVA PRODUCTION AMONG RURAL FARMERS IN ABIA STATE, NIGERIA

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### Abstract:

Comparative effect of rural road transportation on cassava production among rural farmers in Abia State was conducted in Abia State, Nigeria. A sample size of 144 respondents was realized, using multi-stage purposive and randomized methods. Data generated using questionnaire and participant observations were analyzed using descriptive statistics. Result revealed mean ages of 31.9, 32.7 and 33.1 years for Ohafia, Umuahia, and Aba Zones respectively. About 88.3, 70.8, and 87.5 % respectively of the respondents were married and 58.3, 37.5, and 54.2 % respectively were males. A mean farm-size of 1.87, 0.9, and 1.25 hectares respectively were recorded in the three zones. A monthly mean income of ₦30,208.33, ₦23,645.80, and ₦30,687.50 respectively were also recorded in the three Zones. Result equally revealed that trekking (100%) pick – up van (73.6 %), motor cycle (72.2%), cycling (66.7%), and bus (56.6%) respectively were the dominant modes of rural road transportation. Rural road transportation affected cassava production via sales of produce (2.40), ranked 1<sup>st</sup>. total income (2.33) ranked 2<sup>nd</sup>, storage (2.30) ranked 3<sup>rd</sup>, quality of produce (2.15) ranked 4<sup>th</sup>, and harvesting (2.13) ranked 5<sup>th</sup> respectively.  $H_{01}$  is accepted since  $Z_{TAB} (-418) > Z_{Cal} (-0.0324)$ , therefore, there was significant difference between the modes of rural road transportation in the three Zones.  $H_{02}$  was rejected since  $\Gamma_s = 0.928$  which implies that there was significant relationship between the three Zones. The study concludes that rural road transportation affected cassava production negatively when the roads are poor and modes of transportation slow and positively when the roads are good and modes of transport fast. The study recommends the re-introduction of Directorate of Rural Roads

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and Infrastructural (DIFFRR) as was the case in the 80s this will ensure the maintenance of rural roads and the evacuation of agricultural produce mostly in the study area.

**Keywords:** rural road transportation, cassava production, rural farmers

## 1. Introduction

Rural areas in Nigeria are the backbones for the production of food and fibre through agriculture and also sources for capital formation and principal market for domestic manufactures (Olayiwola and Adeleye, 2005). Similarly, about 70 % of Nigerians live and work in the rural areas, therefore, the rural areas engage in primary activities which form the foundation of any economic development (Ekong, 2010). In a related situation, Apu (2011) reported that socio-economic infrastructural facilities such as electricity, potable water, road, road network, transportation, education, and health care facilities were highly deficient in the rural areas of Nigeria.

On the other hand, Ajaero and Okafor (2011) described means of rural road transportation in Nigeria to include: (1) trekking, (2) beast of burden, (3) by bicycle, (4) motor cycle/ keke (5) bus, (6) lorry, (7) car, (8) trailer truck, (9) tipper truck, among others. In a related situation, Aderamo and Magaji (2010) reported that in Nigeria bush – paths link villages with farmsteads and that they are usually narrow, winding and sometimes overgrown by weeds especially during the rains. Ogunsanya (2009) noted that unsurfaced roads in Nigeria are hardly passable during the rains since vehicles would either get stuck in the mud or that the improvised bridges that were made of cut – free trunks would be swept off by flood. He further noted that these unpaved surface roads are narrow in width, clad with potholes or characterized with depressions and bumps. In addition, Tunde and Adeniyi (2012) noted that the importance of transport facilities in rural areas can be justified from both social and economic perspectives.

Socially, a significant proportion of Nigeria population lives in the rural areas and demands various forms of transport to facilitate socio- political interactions. Economically, the rural areas are indispensable in the supply of food, raw materials to urban centres and the country's economic growth as a whole therefore, the rural areas are indispensable in the supply of food, raw materials to urban centres. They argued that road transportation is one of the major means by which food produced at farm site is moved to different homes as well as markets. They equally, noted that road transport creates market for agricultural produce, enhances interaction among geographical and economic regions and opens up new areas to economic focus. Therefore, transport creates time and utilities and is one of the tools of development (Tunde and Adeniyi,

2012). Ajaero and Okafor (2011) equally, stated that lack of transport (immobility) perpetrates poverty while effective transportation eases accessibility to inherent potentials of rural areas which could be harnessed for development of its economy. World Bank (1977) cited in Apu (2011) equally reported that about 15 % of crop – produce was lost between the farm-gate and the consumer because of poor roads and inappropriate storage facilities. Therefore, road transportation plays an evitable role in everyday activity of the farmer. Consequently, Tunde and Adeniyi (2012) postulated that development of transport and communication infrastructure would enhance the mobility of people and information through reduction in cost and time. It was on that note, that Ogunsanya (2009) identified a strong relationship between transportation, under development and rurality. He argued that the greater the degree of rurality the lower the level of transport development. He further established that when the distance of farm to the market is far and the road is rough, perishable crops such as cassava may be destroyed and farmers may run at a loss.

### **1.1 Production Of Cassava In Abia State, Nigeria**

Abia State Agricultural Development Programme (ADP) (2006) reported that agriculture is the main occupation of the people and that cassava occupies about 68.7 % of the total annual farm holding per household in the state. Aniedu (2006) equally, reported that cassava crop was regarded as women’s crop and that 100 % of the female farmers in the South – Eastern Nigeria, cultivated cassava in addition to other crops in the farming system. Amazingly, the production of cassava crop in the state depends on rain – fed agriculture at a very high subsistent level. Cassava has been reported to be the 3<sup>rd</sup> most important sources of calories in the tropics after rice and maize (Obinna and Nwaobiala, 2015). The crop is very vital for both food security and income generation for small- scale farmers (FAO, 2008). It is also, recommended as a poverty fighter across Africa because of its importance in the livelihood of the people, that was why it was chosen as one of the crops under the Presidential Initiative in Nigeria (Obinna and Nwaobiala, 2015). Cassava, serves as a dual purpose crop among the Nigerian small-scale farmers as a food security crop and cash crop. Nweke (2004) and Nwakor and Nwakor (2012) have shown that cassava generates about 25 % of cash income from all food crops grown among farming households mostly in the Eastern part of Nigeria. It was against this background that the study sought to compare the effect of rural road transportation on cassava production among rural farmers in Abia State, Nigeria.

## 1.2 The Research Objectives

The following specific objectives guided the study. They included to:

- describe the socio – economic characteristic of the respondents;
- ascertain the dominant modes of rural road transportation in the different zones of the study area;
- determine the transportation charge for conveying 50Kg of cassava-tubers for a distance of 500 meters using the different modes of transport in the three zones; and
- ascertain the perceived effect of rural road transportation on cassava production in the different zones of the state.

## 1.3. The Hypotheses

H0<sub>1</sub>: There are no significant differences between modes of rural road transportation in the three Agricultural Zones of the State.

H0<sub>2</sub>: There is no significant relationship in effect of different modes of rural road transportation on cassava production in the three Zones of Abia State.

## 2. Methodology

### 2.1 The Study Area

The study area is Abia State, Nigeia. It is one of the 36 States of Nigeria located in the South- Eastern part of Nigeria. The state has a landmass of about 583377Km<sup>2</sup> (NPC, 2007) with a population of about 3,833,990 people with a density of 486 persons/ Km<sup>2</sup>. Abia people are predominantly Igbo race and about 49.3 % of them were actively employed out of which 42.6 % were in agriculture or agriculture related (Ekong, 2010). The State is located within Latitude 40 – 70° N of Equator and Longitude 7 – 8° E of Greenwich Meridian (NRCRI, 1990). The State is also situated in the rainforest belt of Nigeria with a temperature range of 20 – 30° Celsius with two earmarked seasons (dry and rainy) seasons (Abia ADP, 2006). The dry season starts from November and ends in March while the rainy season starts from April and ends in October (NRCRI, 1990). Crops cultivated include; cassava, maize, yam, vegetables, cocoyam, melon, garden eggs, rice, oil- pal, cocoa, rubber, cashew, and pears. They equally, engage in livestock productions such as sheep and goat, piggery, poultry, fishery, snailery, and apiculture, among others (Abia- ADP, 2006).

### 2.2 Sampling Procedures

The State is divided into three main Agricultural Zones by the Abia- ADP namely; Ohafia, Umuahia and Aba Agricultural Zones respectively (Abia – ADP, 2006). A total

sample size of 144 respondents was generated through multi stage and purposive sampling techniques. Firstly, the three Agricultural Zones of the State were purposively selected. Secondly; through a simple random method, 3 Agricultural Blocks were selected from each of the Zones. Thirdly, through another simple random method 4 cells were selected from each of the 3 blocks selected from the Zones to give a total of 12 Agricultural Cells. Fourthly; with the assistance of the Agricultural Extension Agents (EAs) in-charge of the areas four peasant arable crop farmers were randomly selected from each of the 12 Cells to give a total of 48 respondents from each of the 3 Agricultural Zones which gave in all, a total of 144 respondents that were administered with questionnaire.

### 2.3 Data Analysis

Data analysis was carried out using descriptive statistical tools such as percentages, frequencies, means, pooled means and Spearman’s rank order Coefficient of Correlation and Z-Test Analysis. The Formula for the Spearman Rank Order Correlation Coefficient is

$$r_s = 1 - \frac{6\sum D^2}{n(n^2 - 1)} \dots\dots\dots(1)$$

where:

$r_s$  = Spearman rank order Correlation Coefficient,

$\sum D^2$  = Squared differences between ranked pairs,

$n$  = number of observations

## 3. Results and Discussion

### 3.1 The Socio-Economic Characteristics of the Respondents

**Table 1:** Distribution of the Respondents According to Socio – Economic Characteristics

S/No	Variable	N = 48 Ohafia Zone		N = 48 Umuahia Zone		N = 48 Aba Zone	
		Frequency	%	Frequency	%	Frequency	%
01	<b>Age in Years</b>						
	≤ 25	10	20.8	8	16.7	10	20.8
	26 – 40	15	31.3	10	20.8	15	31.3
	41 – 55	15	31.3	20	41.7	15	31.3
	56 & above	08	16.7	10	20.8	08	16.7
	<b>Mean</b>		31.9 years		32.7 years		33.1 years
02	<b>Marital Status</b>						
	Single	04	8.3	10	20.8	6	12.5
	Married	40	83.3	34	70.8	42	87.5
	Separate/Divorced	2	4.2	3	6.3	-	-
	Widowed	2	4.2	1	2.1	-	-

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03	<b>Gender</b>						
	Male	28	58.3	18	37.5	26	54.2
	Female	20	41.7	30	62.5	22	45.8
04	<b>Household Size (no of persons)</b>						
	≤ 2	08	16.7	12	25.0	10	20.8
	3 – 4	15	31.3	15	31.3	14	29.2
	5 & Above	25	52.1	21	43.8	24	50.0
<b>Mean</b>			4 persons		3.8 persons		3.9 persons
05	<b>Farming Experience in years</b>						
	≤ 5	8	16.7	15	31.3	6	12.5
	6 – 10	12	25.0	18	37.5	15	31.3
	11 & Above	28	58.3	15	31.3	27	56.3
<b>Mean</b>			9.3 years		9.7 years		9.3 years
06	<b>Farm Size</b>						
	≤ 0.1	10	20.8	25	52.1	20	41.7
	1.1 – 2	18	37.5	18	37.5	18	37.5
	3 & above	20	41.7	5	10.4	10	20.8
07	<b>Monthly Income in Naira (N)</b>						
	≤ 18,000.00	15	31.3	10	20.8	12	25.0
	19,000.00 – 30,000.00	10	20.8	12	25.0	12	25.0
	31,000.00 – 42,000.00	10	20.8	12	25.0	12	25.0
	43,000.00 – 44,000.00	10	20.8	10	20.8	10	20.8
	45,000.00 & Above	3	06.3	4	08.3	2	04.2
<b>Mean</b>			30,208.33		23,645.33		30,687.50

**Source:** Field Survey 2016

Table 1 shows mean ages of 31.9, 32.7 and 33.1 years respectively for Ohafia, Umuahia and Aba zones. It equally shows that 83.3%, 70.8% and 37.55 respectively of the respondents were married. Also, about 58.3%, 37.5% and 54.2% respectively were males while 41.7%, 62.5% and 45.9 % respectively were females. This implies that more males were involved in farming in Ohafia and Aba zones than in Umuahia zone. This may be due to the fact that farm land scarcity is more pronounced in Umuahia zone than in the other two zones. Equally, a mean household size of 4, 3.8 and 3.9 persons respectively were recorded for the three zones which implies that there were no much difference in household sizes among the three zones. Also, mean years of farming experience of 9.3, 9.7 and 9.3 years respectively were recorded for Ohafia, Umuahia and Aba zones respectively. Result equally, shows that Umuahia zone has the least farm size of 0.9 hectares, as against 1.87 hectares and 1.25 hectares for Ohafia and Aba Zones respectively. This actually confirms the problem of farm land scarcity in Umuahia zone as earlier noticed. A mean monthly income of N30,208.33, N23,645.83 and N30,687.50

respectively was recorded for Ohafia, Umuahia and Aba zones respectively. This implies that farmers in Ohafia (N30.208.33) and Aba (N30.687.50) zones earned more monthly income than the ones in Umuahia (N23, 645.83) zone. This is also linked to the effect of land scarcity, in Umuahia zone which has resulted to farmers in the zone cultivating the little available land year in year out without much external input to replenish the nutrients that have been taken up and this has resulted to low yield and low income to farmers.

### 3.2 The Determination of Dominant Modes of Rural Road Transportation in the Study Area

**Table 2:** Distribution of the Respondents According to Dominant Modes of Rural Road Transportation in the Study Area

S/No	Modes of Rural Road Transportation	N = 48 Ohafia Zone		N = 48 Umuahia Zone		N = 48 Aba Zone		Mean %	Ranking
		Frequency	%	Frequency	%	Frequency	%		
01	<b>Trekking</b>								
	Yes	48	100.0	48	100.0	48	100.0	100	1 <sup>st</sup>
	No	0	0.0	0	0.0	0	0.0	0.0	
02	<b>Pick-up Van</b>								
	Yes	40	83.3*	36	75.0*	30	62.5*	73.6*	2 <sup>nd</sup>
	No	08	16.7	12	25.0	18	37.5		
03	<b>Motorcycle/Tricycle</b>								
	Yes	30	62.5*	34	70.3*	40	83.3*	72.2*	3 <sup>rd</sup>
	No	18	37.5	14	29.2	08	16.7		
04	<b>Cycling</b>								
	Yes	16	33.3	38	79.2*	42	87.5*	66.7*	4 <sup>th</sup>
	No	32	66.7	10	20.8	06	12.5		
05	<b>Bus</b>								
	Yes	42	87.5*	38	79.2*	28	58.3*	56.6*	5 <sup>th</sup>
	No	-	-	-	-	-	-		
06	<b>Taxi</b>								
	Yes	08	16.67	10	20.83	05	10.42	42.4	6 <sup>th</sup>
	No	40	83.3	38	79.17	43	89.58		
07	<b>Lorry</b>								
	Yes	12	25.0	10	20.8	18	37.5	27.8	7 <sup>th</sup>
	No	36	75.0	38	79.2	30	62.5		
08	<b>Beast of Burden</b>								
	Yes	-	-	-	-	-	-		
	No	48	100	48	100	48	100		

**Source:** Field Survey 2016

**N/B: \*Any Mean responses  $\geq 50\%$  was regarded as significant while any other positive responses  $< 50\%$  was adjudged not significant.**

Table 2 shows that 100% of the respondents agreed that trekking by foot through head portage, wheel-barrow and trucks was the dominant mode of transportation in the three zones with a grand mean of 100% and ranked 1<sup>st</sup>. It equally, shows that only 33.3% of the respondents in Ohafia Zone used cycling as a mode of rural road transportation as against 79.2% in Umuahia and 87.5% in Aba zones respectively with a grand mean of 66.7% and ranked 4<sup>th</sup>. This implies that cycling as a mode of rural road transportation is most dominant in Aba zone (87.5%) than in the other two zones. This may be due to the nature of terrain in Aba zone that is flat. The result equally shows that cycling as mode of rural road transportation ranked 4<sup>th</sup> position as the most dominant mode of rural road transportation in the study area. Table 2 further shows that beast of burden was not used as a mode of rural road transportation in any of the three zones, this may be due to the high infestation level of tse-tse fly that attacks animals such as horses, donkeys, cattle and camel in the area, coupled with the fact that the vegetation being a rain forest vegetation does not support much growth of grasses which the animals also depend on. Equally, about 62.5% of the respondents from Ohafia zone used motorcycle/keke as dominant mode of rural road transportation as against 70.8% from Umuahia and 83.3% from Aba zones respectively with a grand mean of 72.2% and ranked 3<sup>rd</sup>. Result further shows that 83.3% from Ohafia zone used pick-up van as against 70.8% and 83.3% in Umuahia and Aba Zones respectively, with a grand mean of 73.6% and ranked 2<sup>nd</sup> in the study area. About, 87.5% of the respondents in Ohafia zone used Bus as dominant mode of rural road transportation as against 79.2% and 58.3% from Umuahia and Aba zones respectively, with a grand mean of 56.6% and ranked 5<sup>th</sup>. This implies that the use of Bus as mode of rural road transportation was more pronounced in Ohafia and Umuahia zones than in Aba zone. About 25% of the respondents in Ohafia zone used Lorry as mode of rural road transportation as against 21% in Umuahia and 37.5% in Aba zone respectively with a grand mean of 27.8% and ranked 7<sup>th</sup>. Table 2 further, shows that only 16.7% of the respondents in Ohafia zone used Taxi as mode of rural road transportation as against 20.8% from Umuahia and 10.4% from Aba zones respectively, with a grand mean of 42.4% and ranked 6<sup>th</sup>. This implies that Taxi does not ply rural roads because of their bad conditions this corroborates Tunde and Adeniyi (2012) who reported that transporters preferred plying settlements that are well connected with good roads. They argued that cost of transportation of agricultural produce from the farm sites to the market has a great impact on production and income of farmers. This is because transportation charges in



agricultural production vary with type of crops, the efficiency of the transport and distance travelled.

### 3.3 Determination of Extent of Use of the Different Modes of Rural Road Transportation in Conveying 50 Kg Cassava- tubers at a Charge of one hundred Naira (₦100.00) through a distance of 500 Metres in the study area

**Table3:** Distribution of Respondents according to Transportation Cost of ₦100.00 for 50kg of Cassava-tubers for a Distance of 500 metres

S/No	Charge of N100 for 50kg of Cassava for 500metres	N = 48 Ohafia Zone				N = 48 Umuahia Zone				N = 48 Aba Zone				Grand mean	Ranking
		S/A	A	D	Mean	S/A	A	D	Mean	S/A	A	D	Mean		
01	Trekking	20	15	13	2.15*	25	15	08	2.46*	20	18	10	2.21*	2.27*	1 <sup>st</sup>
02	Wheelbarrow	18	20	10	1.79	15	20	13	2.25*	25	20	03	2.46*	2.17*	2 <sup>nd</sup>
03	Pick-up Van	20	20	08	2.25*	20	18	10	2.21*	15	15	18	1.93	2.13*	3 <sup>rd</sup>
04	Motorcycle	08	15	25	1.65	20	18	10	2.21*	30	08	10	2.42*	2.09*	4 <sup>th</sup>
05	Bicycle	10	08	30	1.58	15	10	28	1.94	30	10	08	2.46*	1.99	5 <sup>th</sup>
06	Taxi	10	08	32	1.63	15	08	30	1.90	30	08	10	2.42*	1.98	6 <sup>th</sup>

**Source:** Field Survey 2016

**NB:** S/A = Strongly Agreed, weighted and scored 3 points, A = Agreed, weighted and scored 2 points, and D= Disagreed, weighted and scored 1 point.

\*= Any mean scores  $\geq 2$  was adjudged significant, while any mean scores  $< 2$  was adjudged not significant.

Table 3 shows that trekking ( via head portage) to transport 50kg of cassava-tubers at a cost of ₦100.00 for distance of 500 metres scored a mean of 2.15 in Ohafia Zone as against 2.46 and 2.27 respectively in Umuahia and Aba Zones with a grad mean of 2.27 and ranked 1<sup>st</sup>. For the same quantity at the same cost of ₦100.00 through a distance of 500 metres using wheel barrow as a mode of transport scored a mean of 1.79 in Ohafia Zone as against 2.25 and 2.46 respectively in Umuahia and Aba Zones with a grad mean of 2.17 and ranked 2<sup>nd</sup>. Using pick up van to transport the same quantity of cassava tubers for the same cost and distance scored a mean of 2.25 in Ohafia Zone as against 2.21 and 1.93 respectively in Umuahia and Aba Zones with a grand mean of 2.13 and ranked 3<sup>rd</sup>. Table 3 further shows that using motor cycle/ tricycle to transport the same quantity of cassava for the same cost and distance scored a mean of 1.65 in Ohafia Zone as against 2.21 and 2.42 respectively in Umuahia and Aba Zones with a grand mean of 2.09 and ranked 4<sup>th</sup>. Equally, using bicycle for the same quantity, cost and distance scored a mean of 1.58 in Ohafia Zone as against 1.94 and 2.46 respectively in Umuahia and Aba Zones with a grand mean of 1.99 and ranked 5<sup>th</sup>. Finally, using taxi to transport the same quantity at the same cost for the same distance scored a mean of 1.63

in Ohafia Zone as against 1.90 and 2.42 respectively in Umuahia and Aba Zones with a grand mean of 1.98 and ranked 6<sup>th</sup>. The implications of the findings in Table 3 are that the road transport cost for the same quantity of cassava tubers for the same distance vary according to modes of transportation and Agricultural zones in the area of study. This may be due to the fact that each zone of the State is more adapted to some modes of road transportation than others and also, due to geographical location and conditions of the roads in such zones. This corroborate Tunde and Adeniyi (2012) who reported that the problems encountered by farmers in the process of transporting their produce from the farm to their homes and markets included bad roads, high cost of transportation, irregularity of vehicles, insufficient modes of transportation and long distance from farm to their homes as well as markets

### 3.4 Determination of Effect of Rural Road Transportation on Cassava Production in the Study Area

**Table 4:** Distribution of the Respondents According to Perceived Effect of Rural Road Transportation on Cassava Production

S/No	Effect of Road Transport On	Ohafia zone				Umuahia zone				Aba zone				Grand Mean	Ranking
		H	M	N/H	Mean	H	M	N/H	Mean	H	M	N/H	Mean		
01	Sales of Produce	30	12	06	2.5*	28	12	08	2.42*	26	10	12	2.28*	2.40	1 <sup>st</sup>
02	Total Income	32	10	06	2.54*	26	10	12	2.29*	28	10	10	2.17*	2.33	2 <sup>nd</sup>
03	Storage	24	20	04	2.46*	20	18	10	2.21*	22	15	11	2.25*	2.30	3 <sup>rd</sup>
04	Quality of Produce	25	20	04	2.46*	18	15	15	2.06*	15	14	19	1.92	2.15	4 <sup>th</sup>
05	Harvesting	20	18	10	2.21*	15	20	13	2.04*	20	15	13	2.15*	2.13	5 <sup>th</sup>
06	Procurement of cuttings & Inputs	10	15	23	1.71	5	10	33	1.48	04	12	32	1.42	1.54	6 <sup>th</sup>
07	Land Preparation	-	10	38	1.21	-	8	40	1.17	-	5	43	1.10	1.16	7 <sup>th</sup>
08	Yield	-	-	48	1.0	-	-	48	1.0	-	-	48	1.0	1.0	8 <sup>th</sup>

**Source:** Field Survey 2016.

N/B = H = High, weighted and scored 3points, M = Moderately, weighted and scored 2points, N/H = Not High, weighted and scored 1 point.

Decision Rule: Any mean score  $\geq 2.0$  was adjudged significant while any mean score  $< 2.0$  was adjudged not significant. Table 4 shows that rural road transport affected most, the sales of cassava- produce with a mean score of 2.5 in Ohafia Zone as

against 2.42 and 2.28 respectively in Umuahia and Aba Zones giving a grand mean of 2.40 and ranked 1<sup>st</sup>. Transportation cost affected total production income of cassava with a mean 2.54 in Ohafia Zone as against 2.29 and 2.17 respectively in Umuahia and Aba Zones giving a grand mean of 2.33 and ranked 2<sup>nd</sup>. It equally, affected the storage of cassava products with a mean score 2.46 in Ohafia Zone as against 2.21 and 2.25 Umuahia and Aba Zone. Others included quality of produce (2.46, 2.06 & 1.92 respectively) in the three zones with a grand mean of 2.15 and ranked 4<sup>th</sup>. Harvesting (2.21, 2.04 & 2.15 respectively) with a grand mean of 2.13 and ranked 5<sup>th</sup>. Procurement of agro- inputs (1.71, 1.48 & 1.42 respectively) with a grand mean of 1.54 and ranked 6<sup>th</sup>. Land preparation (1.21, 1.17 & 1.10 respectively) with a grand mean of 1.16 and ranked 7<sup>th</sup>. Finally, yield (1.0, 1.0 & 1.0 respectively) ranked 8<sup>th</sup> with a grand mean of 1.0.

**3.5 H0<sub>1</sub>: There are no significant differences between modes of rural road transportation in the three Agricultural Zones of the State; Calculation of the Z- Test Value for H0<sub>1</sub>**

**Table 5:** Calculation of the Z- Test Value

S/No	Variables	Sample Size		Standard Deviation	Z- Cal.	Z - Tab	Decision Rule
01	Modes of Transportation						
	Ohafia Zone	48	51.03	37.17			Since Ztab > Zcal.
	Umuahia Zone	48	55.7	36.1			Between Ohafia & Umuahia Zones, H0 <sub>1</sub> is Hereby Accepted
	Difference		- 4.7	1.07	-0.04140***	-418	
	Ohafia Zone	48	51.03	37.17			Since Ztab > Zcal.
	ABA Zone	48	54.9	36.4			Between Ohafia & Aba Zones, H0 <sub>1</sub> is Hereby Accepted
	Difference		-3.862	0.77	-0.0115***	-418	
	Umuahia Zone	48	55.7	36.1			
	ABA Zone	48	54.9	36.4			
	Difference		-0.8	- 0.3	-0.0444***	-418	Since Ztab > Zcal. Between Umuahia & Aba Zones, H0 <sub>1</sub> is Hereby Accepted

**Source:** Field Survey 2016.

\*\*\*Significant at 1% alpha level.

**3.6 Table 6, a, b and c: Calculation of Spearman Rank Order of Correlation Coefficient for H<sub>02</sub> that states that there is no significant relationship in effect of different modes of rural road transportation on cassava production between the three main Agricultural Zones of Abia State**

**Table 6 (a)**

S/No	Variables	Ohafia	Umuahia	Difference	D <sup>2</sup>	Decision Rule
		Ranks	Ranks			
01	Sales of Produce	2 <sup>nd</sup>	1 <sup>st</sup>	1	1	Since $\Gamma_s$ is equals to 0.964. It implies that $\Gamma_s$ is close to 1 therefore H <sub>01</sub> is hereby rejected and the alternative accepted, since there is high positive relationship between Ohafia & Umuahia Zones.
02	Total Income	1 <sup>st</sup>	2 <sup>nd</sup>	-1	1	
03	Storage	3 <sup>rd</sup>	3 <sup>rd</sup>	0	0	
04	Quality of produce	3 <sup>rd</sup>	4 <sup>th</sup>	-1	1	
05	Harvesting	5 <sup>th</sup>	5 <sup>th</sup>	0	0	
06	Procurement of Agro- inputs	6 <sup>th</sup>	6 <sup>th</sup>	0	0	
07	Land Preparation	7 <sup>th</sup>	7 <sup>th</sup>	0	0	
08	Yield	8 <sup>th</sup>	8 <sup>th</sup>	0	0	
					3	

**Table 6 (b)**

S/No	Variables	Ohafia	Aba	Difference	D <sup>2</sup>	Decision Rule
		Ranks	Ranks			
01	Sales of Produce	2 <sup>nd</sup>	1 <sup>st</sup>	1	1	Since $\Gamma_s$ is equals to 0.880. It implies that $\Gamma_s$ is close to 1 therefore H <sub>01</sub> is hereby rejected and the alternative accepted since there is high positive relationship between Ohafia & Aba Zones of the State.
02	Total Income	1 <sup>st</sup>	3 <sup>rd</sup>	-2	4	
03	Storage	3 <sup>rd</sup>	2 <sup>nd</sup>	1	1	
04	Quality of produce	3 <sup>rd</sup>	5 <sup>th</sup>	-2	4	
05	Harvesting	5 <sup>th</sup>	4 <sup>th</sup>	1	1	
06	Procurement of Agro- inputs	6 <sup>th</sup>	6 <sup>th</sup>	0	0	
07	Land Preparation	7 <sup>th</sup>	7 <sup>th</sup>	0	0	
08	Yield	8 <sup>th</sup>	8 <sup>th</sup>	0	0	
					10	

**Table 6 (c)**

S/No	Variables	Umuahia	Aba	Difference	D <sup>2</sup>	Decision Rule
		Ranks	Ranks			
	Sales of Produce	1 <sup>st</sup>	1 <sup>st</sup>	1	1	Since $\Gamma_s$ is equals to 0.940. It implies that $\Gamma_s$ is close to 1 therefore $H_{01}$ is hereby rejected and the alternative accepted since there is high positive relationship between Umuahia & Aba Zones of the State.
02	Total Income	2 <sup>nd</sup>	3 <sup>rd</sup>	-1	1	
03	Storage	3 <sup>rd</sup>	2 <sup>nd</sup>	1	1	
04	Quality of produce	4 <sup>th</sup>	5 <sup>th</sup>	-1	1	
05	Harvesting	5 <sup>th</sup>	4 <sup>th</sup>	1	1	
06	Procurement of Agro- inputs	6 <sup>th</sup>	6 <sup>th</sup>		0	Therefore grand mean of $\Gamma_s = 2.784/ 3 = 0.928$ between the three Zones. Since $\Gamma_s$ is close to 1, $H_{02}$ is in hereby rejected and the alternative accepted.
07	Land Preparation	7 <sup>th</sup>	7 <sup>th</sup>	0	0	
08	Yield	8 <sup>th</sup>	8 <sup>th</sup>	0	0	
					5	

**Source:** Field Survey 2016

$$\Gamma_s = 1 - 6 \times 3 = 18 / 8(8^2 - 1) = 1 - 18/504 = 1 - 0.0357 = 0.96$$

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