

IMPACT OF RURAL ROAD TRANSPORT ON AGRICULTURAL PRODUCTION IN KWARA STATE, NIGERIA

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ABSTRACT

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This study examines the impact of rural roads and transport services on agricultural production in Kwara State, Nigeria. Data for the study was derived from a total of 546 respondents from three Local Government Areas (LGAs) spread across the three senatorial districts in the state. Ten rural settlements were purposively selected from each of the three LGAs giving a total of 30 sampled settlements. The data collected through structure questionnaire was analysed using the stepwise multiple regression analysis and principal component analysis. The results show that farm size, distance to major market, farming experience, age and nature of transport services available are important in predicting agricultural production in the area. Rural settlements in Kaiama LGA which has vast agricultural lands and high agricultural production were found to be the most inaccessible in the State. Poor transportation restricts expansion of agricultural production in this area, due to the low farm-gate prices. It is therefore suggested that Interventions in the transport sector should not be limited to provision of roads alone but should include measures that will help improve vehicle supply in rural areas.

Keywords: Rural Roads, Transport Services, Poor Access, Agricultural Production,

INTRODUCTION

Rural transport is important for the evacuation and marketing of farm products and the delivery of farm inputs and extension services. It also aids innovation diffusion, expand production and raise incomes (Gannon and Liu, 1997; Olukotun, 2007). Improved transportation reduces travel time thereby, increasing the time available for economic and social activities while also promoting access to basic facilities. Households in remote areas have been associated with lower levels of consumption expenditure while the value of farm outputs is found to increase with road quality, frequency of transport services and proximity to commercial centres (Ahmed and Hussin, 1990; Carvero 1992; Barwell, 1996). In Bangladesh, Ahmed and Hussain (1990) reported that rural communities with better access to markets and basic services have lower poverty levels. Such communities had higher agricultural productivity, higher household incomes, better health and higher participation of women in economic production. For instance, household income was about 33 percent higher in the villages with better transport facilities. In these villages agricultural incomes were higher by up to 24 percent while, wages were higher by 100 percent in some areas compared to others. Similarly, in village level surveys carried out in Burkina Faso, Uganda and Zambia, Barwell (1996) observed positive relationship between level of access to roads and household income. He concluded that access to good roads raises the economic opportunities for people in rural Africa. Improvement in transport stimulates economic development in rural areas through the expansion of opportunities for income and employment. Jalan and Ravallion (1998) noted that in rural China, higher road density reduces the probability of households in the community falling into poverty. Similarly in rural Peru, access to roads and public facilities increased farm and non-farm incomes thus, helping to raise peoples welfare level (Escobal, 2001). Kwom (2001) also noted that roads have strong positive impact on income and agricultural productivity in rural Indonesia. Households in communities with better roads had higher farm productivity, better non-farm opportunities and higher incomes. However some studies have found no relationship between level of road access and agricultural production. For instance, Hine *et al* (1983) observed that, level of access has no effect on agricultural productivity in the Ashanti region of Ghana. They however discovered that the more accessible villages had better access to other sources of income.

According to World Bank (1989) road improvements in Nigeria has been associated with increased productivity and improvement in quality of life. This is by encouraging the movement of agricultural and non-agricultural consumption commodities and ensuring the personal mobility of rural households. Similarly, in a northern Nigeria study Yunusa *et al* (2002) established that road improvement in part of rural Kaduna State, led to significant increase in agricultural production, farm and non-farm employment and revitalization of economic activities in the area. While many studies like that of Ogunsanya and Ojetola (1993), Aderamo and Omolaran (2006) and Aderamo and Magaji (2010) focused on rural areas most road transport studies in Kwara State focused on the urban environment. All of these previous studies also depended on aggregate level data assuming that all individuals within a particular administrative unit have equal access to available transport facilities. Against this background, this paper seeks to examine the effect of roads and transport services on agricultural production in

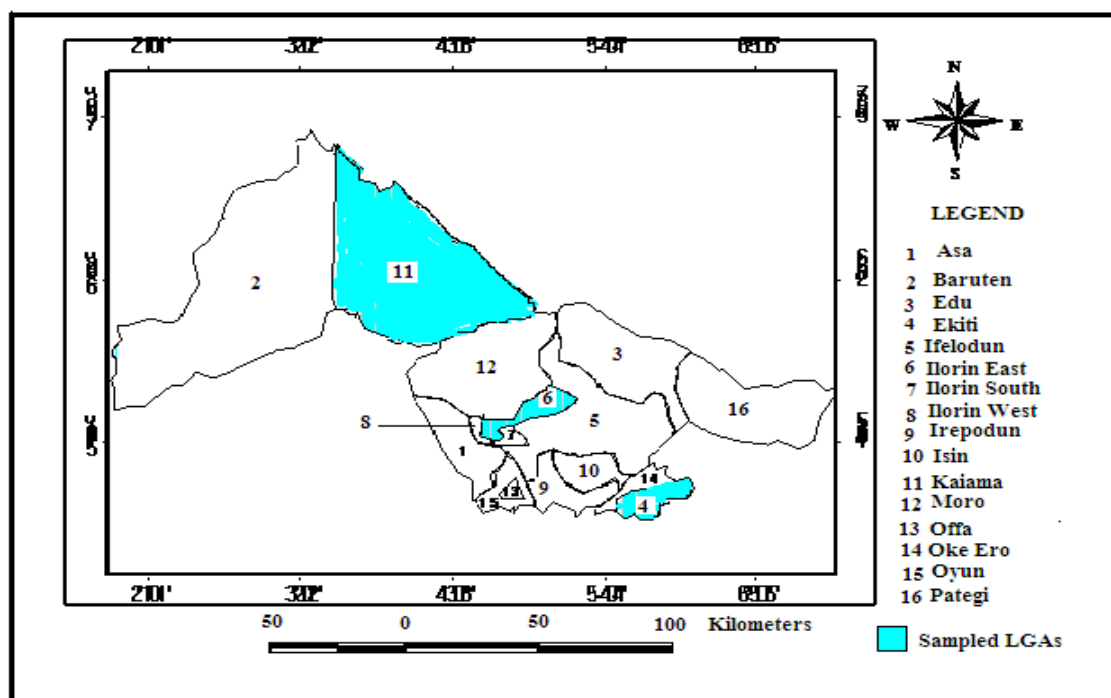
rural areas of Kwara state. Also, unlike earlier studies this present study depends on data collected at individual household level.

MATERIALS AND METHODS

Kwara State has an area of about 32, 500 square kilometres with an elongated shape running from west to east and has 16 Local Government Areas (LGAs). The state experiences two distinct seasons each lasting about six months. The rainy season lasts from around the end of March to October, while the dry season lasts from November to early March. The total annual rainfall ranges from about 800 mm to 1200 mm in north-west and 1000 mm to 1500 mm in the south-east. Agricultural products of the State include melon, pepper, groundnuts, sorghum, beans, cassava, rice, soyabean, maize, yams, sweet potatoes, cocoa, coffee, cotton, locust bean, Shea nuts, cashew, vegetables and fresh milk. More than 90% of the rural population engage in at least one form of agricultural activity (Ogunlade, 2009).

Aderamo (2007) put the total length of roads in the state at 11,651.3 kilometres. About 8,680 kilometres consists of gravel and earth roads, while the rest are bitumen covered. About 888 kilometres of roads are Federal roads, while the State and Local Governments control the remaining part. Offa Local Government Area has the highest road density network (2.2580 km per sq km). Edu, Pategi, Ekiti, Oke-Ero, Irepodun, Isin, Kaiama Moro and Oyun Local Government Areas have sparse road density (Aderamo, 2007). Most of the roads, especially those in the rural areas are in deplorable conditions, with serious adverse effects on the movement of people and goods in the state.

Data for the study was derived from a total of 546 respondents from three Local Government Areas (LGAs) spread across the three senatorial districts in the state. The sampled LGAs are Kaiama (Kwara North), Ilorin East (Kwara Central) and Ekiti (Kwara South) (Figure 1). A total of 30 rural settlements were used for the study. Ten rural settlements were purposively selected from each of the three LGAs whereby, the first ten settlements with population below 20,000 were used for the study. Five of the sampled settlements from each of the selected LGAs are located along a major road, while the other five settlements are located along the other roads in each LGA.



Source: Adapted from Kwara State Ministry of Lands and Housing, 2010

Figure 1: Kwara State showing sampled Local Government Areas

The analysis of the impact of road transport on agricultural production in the area was done with the stepwise multiple regression analysis. The independent variable is the monetary value of the total annual yield from farm. However, the 17 selected dependent variables were first subjected to principal component analysis procedure to

reduce them to a few orthogonal variables, later imputed into the regression model. The regression model is in the form:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_{17}x_{17} + e \quad \text{where}$$

Y = Total annual yield from farm (Monetary value in Naira)

x_1 = Farming Experience (FMEX) (in years)

x_2 = Age of respondent (AGE) (in years)

x_3 = Proximity of settlement to Main Road (PXMR) (In kilometres)

x_4 = Education level of household head (EDL)

(No formal education = 0, ... Tertiary education = 3)

x_5 = Ownership of Intermediate Means of Transport in household (IMT)

(Number of IMTs in the household)

x_6 = Vocational skill of household head (VOC) (No = 1, Yes = 2)

x_7 = Distance to Major Market (DSMM) (In Kilometres)

x_8 = Sex of household head (SEX) (female = 1, male = 2)

x_9 = Road Distance to LGA headquarter ((RDLG) (In Kilometres)

x_{10} = Category of Road to settlement (RDCR) (Route Access Index = 0 – 5)

x_{11} = Nature of Transport Service (NTSR)

(No transport service = 0, all five vehicle types = 5)

x_{12} = Means of transport to farm (MTFM)

(By foot = 1, public transport = 2, personal vehicle = 3).

x_{13} = Farm Inputs (None = 0, one input = 1, two inputs = 2, three inputs = 3).

x_{14} = Household size (HSZ) (Number of household members)

x_{15} = Farm size (FMSZ) (in hectares)

x_{16} = Transport cost to the farm (TCFM) (in Naira)

x_{17} = Distance to the farm (DSFM) (in Kilometres)

RESULTS AND DISCUSSION

Characteristics of the respondents

The distance covered by the respondents from home to their farms was examined. The mean distance to the farm in the study area is 2.4 kilometres. Kaiama has the highest maximum distance to farm (2.5km) among the sampled LGAs. When farms are located far from home, precious time and energy that could be used for productive activities are devoted to travelling. Many of the respondents (41.2 %) travel to the farm on foot while the remaining 59% travel to the farm with personal or commercial vehicles. Kaiama has the highest proportion of people travelling to farm by personal IMT (35.3%). This could be as a result of the very poor condition of road transport in the area forcing many people to depend on motorcycle and bicycle as means of transportation. Ownership of personal four wheeled vehicles is generally very low in the study area with only 1.1% of the respondents possessing such vehicles. This is in line with the findings of Starkey (2005) and Barwell (2006) who observed that, most rural dwellers in Africa depend more on IMT than motorized transport.

Only 15.4% of the sampled farmers have farms located less than 1Km to a motorable road. As high as 50% of the farms are located between 1 – 2Kms from a motorable road while, 2.4% of the farms are located more than 5Kms away from a motorable road. It was also discovered that 15% of the farms in Kaiama are located more than 4Kms away from the nearest motorable roads, as compared to 3.8% for Ilorin East and 1.4% for Ekiti LGAs. Just 1.1% of the respondents have farms less than 1 hectare in size. About 85% of the people have individual farms less than 5 hectares in size. Only 1.3% or 7 of the 546 respondents have farms above 6 hectares in size. This indicates that majority of the farming population in the area are small scale farmers. The greatest average farm size is found in Kaiama LGA (3.6 hectares) which also has highest maximum farm size of 8 hectares.

As high as 20% of the respondents earned less than ₦100,000 (average of ₦8,300/month) from their farms in the 2010/2011 farming season. On the other hand, 90% of the people did not make above ₦500, 000 from their farms throughout the season. Only 2 (0.4%) of the respondents made over ₦900,000 from their farms in the 2010/2011 farming season. The mean farm income is also highest in Kaiama (₦330, 000/ annum) and lowest in Ilorin East LGA (₦204, 910/ annum). This is not surprising since average farm size is greater in Kaiama than in the other sampled LGAs. The mean farm income is lowest in Ekiti LGA (₦ 219,830/annum).

Analysis of transport and agricultural production

The 17 identified variables were first subjected to principal component analysis after which five factors were extracted, all together accounting for 66.2% of the total variance in the selected variables (Table 1).

Table 1: Factors determining level of agricultural production in rural areas of Kwara State

Socio-economic variables	Factors				
	1	2	3	4	5
FMEX	-.014	.026	<u>.802</u>	-.131	-.207
AGE	.014	.051	.043	-.106	<u>-.778</u>
PXMR	.004	-.784	-.029	.323	.030
EDL	-.338	-.102	.194	-.058	.634
IMT	-.257	-.021	.761	.178	.247
VOC	-.246	.001	.738	.183	.146
DSMM	.158	<u>.790</u>	-.133	-.176	.014
SEX	-.404	.124	-.318	.091	-.065
RDLG	-.158	.772	.076	.149	-.127
RDCR	-.074	-.492	.009	.642	-.048
NTSR	-.063	.109	.033	<u>.820</u>	.156
MTFM	-.049	-.341	.090	.740	-.093
FMIP	.588	.211	-.106	-.136	.290
HSZ	-.395	.039	.291	-.101	.430
FMSZ	<u>.854</u>	.135	-.155	-.122	-.145
TCFM	.669	.226	-.198	-.105	-.143
DSFM	.709	-.023	-.076	-.028	-.187
Eigen Values	3.320	2.351	2.107	1.950	1.534
% Variance	19.527	13.831	12.393	11.471	9.024
% Cumulative Variance	19.527	33.358	45.751	57.222	66.246

Source: Computed from field data, 2011

As shown in Table 1, the first factor has the strongest loading on Farm Size (FMSZ). The second factor has its strongest loading on Distance to major market (DSMM). The third factor has its highest loading on Farming Experience (FMEX). The fourth component is most strongly loaded on Nature (Diversity) of Transport Service (NTSR). The fifth factor has the strongest loading on Age of Household Head (AGE). The result of the stepwise regression indicates that all the five variables can be used to predict agricultural production in the area. Therefore, as indicated in Table 2, x_{15} (Farm Size), x_7 (Distance to the Major Market), x_1 (Farming Experience), x_2 (Age of Household Head) and x_{11} (Nature of Transport Service) were found to be significant.

Table 2: Variables controlling level of agricultural production in rural areas of Kwara State

List of variables	Parameter estimate	Standard error	R	R ²	% contribution	% cumulative contribution
Intercept	257950.817	2540.518				
x_{15}	146343.878	2542.847	0.869	0.755	75.5	75.5
x_7	37995.972	2542.847	0.898	0.806	5.1	80.6
x_1	-33353.502	2542.847	0.919	0.845	3.9	84.5
x_2	-24090.764	2542.847	0.931	0.866	2.1	86.6
x_{11}	-17609.193	2542.847	0.936	0.877	1.1	87.7

Source: Computed from field data, 2011

It could be seen in Table 2 that Farm Size (FMSZ or x_{15}) is the best predictor of factors determining farm output in the study area. It has a correlation coefficient of 0.869 and coefficient of determination of 0.755. It implies that 75.5% of its variance is associated with agricultural production in the area. Distance to the Major market (DSMM or x_7) is the second most important predictor offering additional 5.1% contribution to the variance. The positive relationship with agricultural production suggests that agricultural production increases with distance to major market. This is contrary to what one would expect since it is normally assumed that remoteness from marketing facilities should have negative effect on agricultural production. However, evidence from the study area shows that, most of the large farms are located in very remote areas far from the main markets and motorable roads. The remote, sparsely populated areas are where people can get extensive land for large scale farming. Farming Experience (FMEX or x_1) with a correlation coefficient of 0.919 contributed additional 3.9% to the explanation. The negative relationship signifies that long period of farming experience is associated with lower farm

productivity in the area. A detailed study of the available data shows that those with greater number of years of farming experience happened to be the elderly farmers in the study area. These are people who are not as strong and active as the younger generation.

Age of the Head of Household (AGE or x_2) is also important with an additional contribution of 2.1% to the variance. The negative relationship with agricultural production suggests that the elderly are less productive than the younger farmers in the area. This result is in line with that of Oni and Yusuf (2007) who noted that the productivity level of rural household head and welfare level of the household increase with age of the household head only up to a certain level before they start to decline. The Nature of Transport Service (NTSR or x_{11}) is also negatively related to agricultural production in the study area with a joint correlation of 0.936 and R^2 of 0.877. This implies that better transport facilities are associated with lower agricultural production in the area. Evidence from the study area shows that, most of the large farms are found far from the motorable roads. This is especially the situation in Kaiama LGA which is arguably the main food basket in Kwara State. Remote settlements such as Olokotintin, Banni, Kanikoko and Kemenji all in Kaiama LGA are found to have the largest farms in the study area. This finding is in agreement with that of Hine *et al.*, (1983) who in a study in the Ashanti region of Ghana observed that the least accessible villages recorded higher agricultural output.

However, the implication of poor transportation is that it has the negative effect of restricting expansion of agricultural production. Due to poor transportation, agricultural produce attract very low farm-gate prices in the area. For instance, a 100 kg of dried yam tubers ("elubo") which cost N13, 000 at Kaiama market at the time of the survey (August 2011), attracted a price of about N18, 000 at Oke Oyi market, while it cost N20, 000 in Ilorin city at that time. Similar situations exist for other farm produce like maize, guinea corn and cassava. It is interesting to note that Kaiama to Ilorin is just a distance of about 112kms and the wide price differential is the result of the difficulties of transporting farm produce out of the area. As a result, some farmers in the area simply collect money below the market price and hand over their farms to middleman, who then harvest and transport the crops to far centres like Ibadan and Lagos. Implying that, most of the profit from farming accrues to traders, transporters and other middlemen to the detriment of the farmers. Since transport cost as a proportion of production costs, increases with distance between village and fields, high transport costs may force the farmer to limit his cultivations to fields closer to the village (Riverson and Carapetis, 1991). Many of the farmers confirmed their willingness to expand their production if they could find better opportunities of attracting higher prices for their farm produce. The relationship can thus be predicted with the following equation:

$$Y = 257950.877 + 146343.978FMSZ + 37995.972DSMM - 33353.502FMEX - 24090.764AGE - 17609.193NTSR$$

($R^2 = 0.887$, SE = 2540.5)

The equation shows that the level of agricultural output increases with farm size and remoteness of the farms. It however reduces with longer period of farming experience and old age. Also, areas with poor transport facilities are associated with higher agricultural production in the study area. Implying that, these areas have high agricultural potentials that could be adequately harnessed with improvement in transportation.

CONCLUSION AND RECOMMENDATIONS

This study examined the impact of roads and transport services on agricultural production in Kwara State. Farm size, distance to major market, farming experience, age and nature of transport services available were found to be important in predicting agricultural production in the area. Although, the nature of transport service available was found to be important, the negative relationship with agricultural production indicates that poor transport facilities are associated with high agricultural production in the area. Rural settlements in Kaiama LGA which has vast agricultural lands and high agricultural production are the most inaccessible in the State. Poor transportation restricts expansion of agricultural production in this area, due to the low farm-gate prices. This ensures that most of the profit from farming accrues to the traders and transporters rather than the producers. The high agricultural potential of the area could however be achieved with improvement in transportation. Provision of better transportation facilities will ensure higher farm-gate prices; encourage the farmers to increase their production and reduce spoilage and wastage of farm produce in the area. Interventions in the transport sector should not be limited to provision of roads alone. Rather, such measures that will help improve vehicle supply in rural areas should also be introduced. Solving rural transportation problem in Nigeria go beyond mere provision of roads because, transport services are as important as roads for ensuring mobility of people and goods.

REFERENCES

- Aderamo, A. J. and Omolaran, O. I. 2006. "Accessibility Problem and the Incidence of poverty in Nigerian Rural Environment: A Case of Offa Local Government Area of Kwara State". *Geostudies Forum*, 3 (2): 45-56.
- Aderamo, A. J. and Magaji, S. A. 2010. "Rural Transportation and the Distribution of Public Facilities in Nigeria; A Case of Edu Local Government Area of Kwara State". *Journal of Human Ecology*. 29 (3):171-179.
- Ahmed, R. and Hussain, M. 1990. *Development Impact of Rural Infrastructure in Bangladesh*. Research Report, No. 83. International Food Policy Research Institute. Washington, DC.
- Barwell, I. 1996. *Transport and the Village: Findings from African Village Level Travel and Transport Surveys and Related Studies*. World Bank Discussion Paper, no. 344. The World Bank. Washington, DC.
- Carver, R. 1992. "Accessibility and Third World Rural Development: A Case Study of Rural Sumatra". *Review of Urban and Regional Development Studies*. 2: 125-138.
- Escobar, J. 2001. "The determinants of Non-farm Income Diversification in Rural Peru." *World Development*. 29 (3): 497-508.
- Gannon, C. and Liu, Z. 1997. *Poverty and Transport*. World Bank Discussion paper, TWU-30. World Bank. Washington, DC.
- Hine, J., Riverson, J. D. N. and Kwakye, E. A. 1983. *Accessibility and agricultural Development in the Ashanti Region of Ghana*. TRRL Supplementary Report 791, Transport Research Laboratory, Crowthorne.
- Jalan, J. and Ravallion, M. 1998. *Determinants of Transient and Chronic Poverty: Evidence from Rural China*. World Bank. Washington, DC.
- Kwom, E. 2001. *Infrastructure, Growth and Poverty Reduction in Indonesia: A Cross-Sectional Analysis*. Asian Development Bank. Mimeo. Manila.
- Ogunlade, I., Oladele, O. I. and Babatunde, A. O. 2009. Farmers' Attitude to Beneficiary Funding of Extension Services in Kwara State, Nigeria. *Journal of Human Ecology*, 26 (3): 215-220
- Ogunsanya, A. A. and Ojetola, W. 1993. "The transport factor in rural development: The Case of Kwara State". *Research for Development*. 10 (1 & 2): 145-161.
- Olukotun, G. A. 2007. The Role of Local Government in Rural Transport Finance. *Journal of Social Sciences*, 15 (2):147-152.
- Oni, O. A. and Yusuf, S. A. 2007. Determinants of expected poverty among rural households in Nigeria. www.csae.ox.ac.uk/conferences/2007-EDiA-LaWBiDC/papers/434-Oni.pdf
- Starkey, P. 2005. *Methodology for the Rapid Assessment of Rural Transport Services*. Seminar on Sustainable Access and Local Resource Solution, 28th- 30th November, 2005, Bangkok. <http://www.docstoc.com/doc/43488005/26-paul-starkey>
- World Bank 1989. *The Rural Road Question and Nigeria's Agricultural Development*. Managing Agricultural Development in Africa (MADIA), Discussion Paper No. 10. World Bank. Washington, DC.
- Yunusa, M., Shaibu, I. Ambi, Y. A., Yusuf, A. and Abdulkarim, B. 2002. "Road Rehabilitation: The Impact on Transport and Accessibility." In Fernando, P. and Porter, G. (eds.) *Balancing the Load: Gender, Women and transport*. Zed Books. London.