

GENDER DIFFERENTIALS IN MARKET PARTICIPATION AMONG SMALL-HOLDER CASSAVA FARMERS IN SOUTH-EASTERN NIGERIA: A DOUBLE HURDLE MODEL APPROACH

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ABSTRACT

The study analysed gender differentials in market participation among small-holder cassava farmers in south-eastern Nigeria by the use of a multistage randomised sampling procedure from 360 farmers. The results show that important variables directly related to participating and level of sales in cassava markets were extension contact at 5% level, access to communication facilities, personal means of transportation, and yield at 1% level each. The coefficient for age had an indirect relationship with participation and level of sales at 10% level as well as distance from the farm to the market at 1% level. The results showed that the female farmers participated and sold more cassava in the market than their male counterparts. The results call for policies aimed at improving rural infrastructure like access roads that would facilitate faster delivery of farm produce especially perishable commodities such as cassava to urban consumers.

Keywords: Gender, Market Participation and Double Hurdle

INTRODUCTION

Cassava is the most important source of dietary carbohydrates for millions of people in sub-Saharan Africa (Udensi et al., 2011). It is most important for human consumption in the tropics after rice and maize. It is an important food and cash crop in several tropical African countries, especially, Nigeria, where it plays a principal role in the food economy (Agwu and Anyaeche, 2007). In Nigeria, as in most African countries, cassava is becoming an important cash crop that has high potential for use as an industrial raw material to manufacture starch and flour (Nweke and Enete, 1999).

Cassava is used mainly for two main purposes in Nigeria: 90% as human food and only 5-10% as secondary industrial material (used mostly as animal feed). About 10% of Nigeria's industrial demand consists of HQCF used in biscuits and confectioneries, dextrin pre-gelled starch for adhesives, starch and hydrolysates for pharmaceuticals produces and as seasonings. 70% of cassava processed as human food is gari. Other common cassava products human foods are lafun and fufu/Akpu. Processed products can be classified into primary and secondary products. The former, e.g., garri, fufu, starch, chips, pellets are primary products which are obtained directly from raw cassava roots, while the latter are obtained from the further processing of primary products (e.g. glucose syrup, dextrin, and adhesive are obtained from starch). Among all the products of cassava, garri is the favoured derivative as it has a longer shelf-life than the other processed products. According to Ezedinma et al. (2006), 70% of the labour involved in the production and processing of cassava in Nigerian is done by women in rural areas.

Smallholder farmers in most developing economies find it difficult to participate in markets because of numerous constraints and barriers (Pingali et al., 2005). Farmer market access is a vital component of market participation. A smallholder farmer can access the market either by selling to a buyer at the

farm gate or physically transporting the produce to the market place using available means. A number of scholars have studied about what drives farmers' market access and much has been revealed, for example, Jari and Fraser (2009) and Ruijs et al., (2004) found that good road condition and access to information positively influenced farmer participation and access to markets due to their effect on reduction in transaction costs. Ferris et al., (2001), Nkonya and Kato (2001) and Aliguma et al., (2007) found that the low crop yields were attributed to farmers' failure to use improved inputs leading to lack of competitive production and low market participation. Okoboi (2001) noted that small plots of land and high costs of inputs had limited the potato yields in Uganda and hence limiting the profits of smallholder producers. World Bank (2008) noted that especially for seed and fertiliser, market failures continue to be pervasive in Sub-Saharan Africa because of high transaction costs, risks and low economies of scale.

Gender has often been misunderstood as being about the promotion of women only. However, gender focuses on the relationship between men and women, their roles, access to and control over resources, division of labour and needs. Gender relations determine household security, well-being of the family, planning, agricultural production and many other aspects of rural life (Frischmuth, 1997). Women are generally looked upon as the providers of food, i.e., source of food security to the families (Khan, 2002). Recent studies have confirmed that women are involved in many activities that can improve their well-being and families (Ajiboye, 2000 and Hashim, 2002). In Sub Saharan Africa, women grow 80% of the food destined to the kitchen (Mamman, 1994). Durno and Stuart (2005) and FAO (2004), noted that women produce the bulk of basic food for household consumption and sale. The objective of this paper is to provide a basis for equitability, effective and better allocation of institutional and infrastructural facilities between male and female cassava farmers for increased access to the markets.

METHODOLOGY

The Data

The South East Agro Ecological Zone of Nigeria was our main focus. A multi-stage randomised sampling procedure was used to collect cross sectional data to identify factors of market participation among cassava producing households. At the second stage two agricultural zones per state were randomly selected. In the third stage, two LGAs were randomly selected from each zone given a sample of 12 LGAs. In the fourth stage, three communities were selected randomly from each Local Government Area given a sample of 36 communities. In the last stage 10 household producers were randomly selected, giving a total of 360. Data were collected by means of structured questionnaire.

Double-Hurdle

This study will employ the model similar to the "double hurdle" model proposed by Cragg. The double-hurdle model, originally formulated by Cragg (1971), assumes that households make two decisions with regard to purchasing an item, each of which is determined by a different set of explanatory variables. In order to observe a positive level of expenditure, two separate hurdles must be passed. A different latent variable is used to model each decision process, with a probit model to determine participation and an ordinary least square model to determine the level of sales following (Blundell and Meghir, 1987). This is modeled simultaneously by the use of the Heckman selectivity model.

Heckman Selectivity Model

The Heckman correction (the two-stage method, Heckman's lambda or the Heckit method) is any of a number of related statistical methods developed by James Heckman in 1976 through 1979 which allow the researcher to correct for selection bias (Heckman, 1979). Selection bias problems are endemic to

applied econometric problems, which make Heckman's original technique and subsequent refinements by both himself and others, indispensable to applied econometricians. Suppose a researcher wants to estimate the determinants of level of market participation for cassava, but only has access to observations of those who participate, since people who choose to participate are selected non-randomly from the population, estimating the determinants of level of participation from the sub-population that choose to participate may introduce bias. The Heckman correction takes place in two stages. First, the researcher formulates a model, based on economic theory for the probability of participation. The first step (or stage) of the procedure involves establishing the probability of participation in the output market by estimating a probit model.

Analytical Procedures

The market participation equation was modeled by the use of probit following Takeshima, (2008) and the level of sales simultaneously by the Heckman selectivity model following Makhura, (2001). The models are specified as follows;

$$\text{Probit}_i \text{ (1= participating in the market, 0=not participating)} = a_0 + a_i X_i + u_i \dots\dots(1)$$

$$\text{Cassava value (participants)} = \alpha_0 + \alpha_i X_i + u_i \dots\dots(2)$$

Where;

- Probit_i = Probit (participants= 1 and 0= non-participants)
- Cassava value_i = Value of cassava sold in naira for participants in the market
- a₀ = constant probit equation
- α₀ = constant for level of participation equation
- X_i = is a vector of functions of variables
- a_i = is a vector of parameters to be estimated for probit type
- α_i = is a vector of parameters to be estimated for level of sales
- u_i = error term

Explicitly the market participation equation was modeled as follows;

$$\text{Probit}_i = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_8 + b_{11} X_{11} + b_{12} X_{12} + b_{13} X_{13} + b_{14} X_{14} + b_{15} X_{15} + u_i \dots\dots (4)$$

Where;

- X₁ = Number of extension contacts/year
- X₂ = Membership of cooperatives (dummy variable; 1=member, 0=non member)
- X₃ = Access to communication facilities (dummy variable; 1=yes, 0=no)
- X₄ = Level of education (in years)
- X₅ = Age of household head (in years)
- X₆ = Farming experience (in years)
- X₇ = Personal means of transportation (dummy variable; 1=yes, 0=no)
- X₈ = Distance from the farm to the market (km)
- X₉ = Marketing Experience (in years)
- X₁₀ = Transportation costs (Naira/tonne)
- X₁₁ = Household size
- X₁₂ = Road conditions to nearest town (dummy variable; 1=good, 0=bad)
- X₁₃ = Farm income in naira
- X₁₄ = Cassava yield (kg/ha)
- X₁₅ = Gender (dummy variable; 1=male, 0=female)

b₁ - b₁₅ = Coefficients estimated

u_i= error term

The next procedure identified factors that influence the level of cassava sold. These models were estimated using the second stage of selectivity (Heckman) model and involves inclusion of a variable to absorb selectivity bias (Makhura *et al.*, 2001). The aim of the study was to look at factors that increase the level of participation in the market. Ideally, the OLS model is applicable when all households participate in the market. In reality not all households participate. Some households may not prefer to participate in a particular market in favour of another, while others may be excluded by market conditions. If the OLS regression is estimated excluding the non-participants from the analysis, a sample selectivity bias is introduced into a model. Such a problem is overcome by following a two-stage procedure as suggested by Heckman (1979) or Tobit procedures.

Explicitly the Level of participation equation for cassava sellers is modeled as follows;

$$\text{Cassava value}_i = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \alpha_5 X_5 + \alpha_6 X_6 + \alpha_7 X_7 + \alpha_8 X_8 + \alpha_9 + X_9 + \alpha_{10} X_{10} + \alpha_{11} X_{11} + \alpha_{12} X_{12} + \alpha_{13} X_{13} + \alpha_{14} X_{14} + \alpha_{15} X_{15} + u_i \quad \dots\dots (5)$$

Where;

$X_1 - X_{15}$ = Variables as modeled in equation (4)

$\alpha_1 - \alpha_{15}$ = Coefficients estimated

u_i = error term

RESULTS AND DISCUSSION

Average statistics of Cassava Producers

The results in Table 1 show the characteristics of cassava producers in South-Eastern Nigeria. Among the 360 cassava producing households were 212 (72 males and 140 females) were participants in the market. The empirical results support a generally held belief that transaction costs are a significant deterrent to market participation by agricultural households (Renkow *et al.*, 2004). This, by itself, is not surprising, and can be inferred by simply noting the substantial number of households in the sample that neither purchased nor sold cassava.

The male participants had more number of extension contacts (5.81) compared to their female (3.72) counterparts with the least (2.15) for the non-participants. About 43.83% and 28.22% of the female and male participants respectively belong to cooperatives with 33.14% of the non-participants. Most (80.55%) of the female participants had access to communication facilities, as well as males (61.32%) and non-participants (59.52%). The male and female participants had about 6.32 and 7.11 number of years of education as well as 6.82 for non-participants. The male and female participants were about 52.68 and 48.02 years old. The non-participants were more aged (61.14yrs).

Jensen (2007) noted, prior to the availability of mobile phones that the cost of information was so high that agents were not able to engage in optimal arbitrage. Alene *et al* (2008) studying the maize market in Kenya found that access to communication assets had turned out to have positive but insignificant effects on market participation. Higher educational experience generates additions to the intellectual capital stock which may, in turn, lead to increased potential for skills acquisition during participation (Lapar *et al.*, 2003). The prevalence of social networks and organizations may substantially reduce transaction costs (Okoye *et al.*, 2013).

The results show that they were all highly experienced in production (24.94 for male participants, 20.51 for female participants and 38.77 for non-participants). The female participants had more years of marketing experience (20.07) than their male (15.63) counterparts. The male participants had more means of transportation (59.04%) than their female (37.92%) counterparts. The distance from the farm

to the market was 5.10km for male participants and 5.52km for females. The non-participants had the largest household size of about 14persons followed by 7persons for the male participants and 5persons for the female participants. About 33.92% and 48.21% of the male and female participants respectively indicated that the road condition to the nearest town was good as well as 27.50% for the non-participants. The yield for the male participants (12.72) was higher than their female (10.81) counterparts. The non-participants had a much lower yield (5.08).

Table 4.1: Average Statistics of Survey Households, by Market participation Status

Variable Description	Participants		Non Participants
	Male	Female	
Number of Observations	72	140	148
Frequency of Extension Contact	5.81	3.72	2.15
% Membership of Cooperative Society	28.22	43.83	33.14
% Access to Communication facilities	61.94	80.55	59.52
Education in years	6.32	7.11	6.82
Age in years	52.68	48.02	61.14
Farming Experience in years	24.94	20.51	38.77
Marketing Experience in years	15.63	20.07	
% that have personal means of transport	59.04	37.92	20.04
Distance from the farm to market	5.10	4.35	
Household Size	6.92	5.52	13.82
% of Road conditions to the nearest town is good	33.92	48.21	27.50
Farm income (N)	259,116.90	323,024.35	
Yield (kg/ha)	12.72	10.81	5.08

Survey Results, 2010

The level of Cassava Sales

The second stage of the selectivity model (heckit or OLS accounting for bias) was estimated to determine factors influencing the level of off-farm cassava sales. Table 2 presents the results of the determinants regarding the level of cassava sales. The χ^2 was highly significant at 1.0% level of probability. The inverse mills ratio (lambda) for the level of cassava sales was significant, implying that a sample selection bias would have resulted if the level of sales in cassava had been estimated without taking into account the decision to participate in the cassava market. Heckman selection model allows us to use information from non-market participants to improve the estimates of the parameters in the regression model. The Heckman selection model provides consistent, asymptotically efficient estimates for all parameters in the model.

Heckman estimated ρ (rho) as 0.8351, the correlation of the residuals in the two equations and sigma ($\sigma = 7.5435$), the standard error of the residuals of the equation. In this case we can reject the null that $\rho = 0$, so indeed we should be using a sample selection model on this data. Seven and eight of the fifteen variables had coefficients significantly different from zero in the level of sales and participation equations respectively, implying that the factors were important in the participation in the market and level of cassava sales.

The coefficient for frequency of extension contacts was positively related to level of cassava sales at 5% level. This implies that any increase in the number of extension contacts will lead to a 0.31% increase in the probability of participating in the market. Contact with extension officers tends to improve farmers' access to information (Lapar et al., 2003). The coefficients for membership of social organization were positively signed and highly significant at 1% level. This implies that any increase in membership of social organization will lead to a 0.57% and 1.83% increase in probability of participating in the market and level of cassava sales respectively. Membership of an association is an

additional channel of relevant information for increased returns to crop production and marketing, although membership in an association might be viewed as a club good rather than a public good (Boughton, 2007).

Table 2: Factors Influencing the Level of Cassava Sales: Heckit Results

Variable	Probit	Level of sales
Frequency of Extension Contact (X ₁)	0.3156(2.581**)	1.5915(1.601)
Membership of Cooperative/Social Organisation(X ₂)	0.5712(3.391***)	1.8347(3.559***)
Access to Communication facilities (X ₃)	0.1718(2.691**)	0.7531(2.485**)
Level of Education (X ₄)	0.0635(0.119)	0.0212(1.471)
Age (X ₅)	-0.0313(2.061*)	-0.0491(-2.301*)
Farming Experience (X ₆)	-0.1003(-0.391)	-0.4924(-0.825)
Personal means of transport (X ₇)	0.2006(2.716**)	0.4257(2.651**)
Distance from the farm to the market (X ₈)	-0.0381(-3.281***)	-0.0731(3.519***)
Marketing Experience (X ₉)	0.0563(1.290)	0.0915(0.403)
Cost of transportation (X ₁₀)	-0.0039(-0.157)	-0.0072(-0.924)
Household Size(X ₁₁)	0.6119(1.306)	0.8114(0.280)
Road conditions to the nearest town is good (X ₁₂)	0.9115(0.068)	1.7512(0.147)
Farm income (X ₁₃)	0.00007(1.115)	0.00004(0.101)
Yield (X ₁₄)	0.0062(2.721**)	0.0813(2.361**)
Gender (X ₁₅)	-1.2751(-3.619***)	-0.5311(-3.100***)
Constant	2.0612 (18.2915***)	10.5571 (6.8513***)
ρ	0.8351	
λ (Mills' ratio)	6.3015 (5.257***)	
χ^2	0.00001	
σ	7.5435	
Number of Observations	212 participants and 148 non- participants	

***, ** and *** = Significant at 10%, 5% and 1% respectively. Figures in parenthesis are t-values**

The coefficients of access to communication facilities had a positive relationship with the level of cassava sales and were significant at 5.0% level of probability. This result suggests that increased access to communication facilities will increase participation by 0.17% and level of sales by 0.75%. It appears that the use of telephones has an important effect on market participation behaviour since most of the respondents had access to telephones. This follows the findings of Chowdhury, (2002) in his study on access to information and factor market participation in Bangladesh. The coefficients for age were negatively signed and significant at 10% level. This implies that any increase in age will lead to a decrease in participation and level of sales by 0.03% and 0.04% respectively. This is expected because the younger farmers are stronger and may participate and sell more cassava than their aged counterparts

The coefficients for personal means of transportation were significant and positively associated with participation and the level of cassava sales at 5% each. The results suggest that an increase in personal means of transport by 1.0% will lead to an increase of about 0.20% and 0.40% in participation in the market and level of cassava sales for those who are already selling respectively. These results might provide a motivation to increase sales as a result of reduction in variable transaction costs (Okoye et al., 2013).

The coefficients for distance from the farm to the market were significant and negatively related with participation and the level of cassava sales at 1% level each. The results suggest that an increase in distance from the farm to the market by 1.0% will lead to an increase of about 0.03% and 0.07% in participating in the market and level of cassava sales respectively. The location of farmers in respect of potential markets is an important factor in encouraging farmers to increase their sales (Makhura, 2001). The coefficients for yield were significant and positively related with participation and the level of cassava sales at 5% level each. This implies that an increase in yield by 1.0% will lead to an increase of about 0.006% and 0.08% in participation in the market and level of cassava sales respectively. Higher market participation could drive productivity by providing infrastructural incentives; information, accessible road networks and cash flow for working capital, while higher productivity could drive market participation since households with higher productivity were more likely to have crop surpluses above their immediate consumption needs (Rios et al., 2008).

The coefficients of gender had a negative relationship with the level of cassava sales and were significant at 5.0% level of probability. This result implies that an increase in the number of female farmers will increase participation by 1.27% and level of sales by 0.53%. Female-headed households have a greater likelihood of participation in cassava markets than male-headed households. This follows the study of Arega et al., (2007) on maize markets in Kenya and Makhura, (2001) on livestock markets in South Africa. When a female heads the household, this tends to increase the chance of selling cassava by greater margins than other factors did. This implies that women were more inclined to sell their cassava than men. These results were in contrast with the expected outcomes. Possibly because better sales bargain are made by women. The sex of the head of the household reflects the fact that female farmers will face lower transaction costs since they tend to have more credibility.

CONCLUSION

The study analysed gender differentials in market participation among small-holder cassava farmers in south-eastern Nigeria by the use of a double hurdle model approach. Using data from a household survey, the results identified important variables influencing participating in the market and level of participation as; gender, extension contact, membership of social organization, access to communication facilities, age, distance from the farm to the market, personal means of transportation and yield. The results therefore call for policies aimed at establishment of more market outlets (e.g., assembly or bulking facilities) closer to farms in order to minimize transportation difficulties and wastage. Rural infrastructure investments play a crucial role in inducing farmers to move toward a commercial agricultural system. Accessible and cost-effective communication systems such as mobile telephones can help generate information and other market-related services. There is also need for policies aimed at encouraging women to increase their level of participation in the market.

REFERENCES

- Agwu, A. E. and Anyaeche, C. L. (2007). Adoption of improved cassava varieties in six rural communities of Anambra State, Nigeria. *Africa Journal of Biotechnology* 6:089-098.
- Ajiboye, B.P. (2000) Relationship between Poverty and Natural Resource Use among Women in Birnin Gwari Villages: Implications for Sustainable rural Development. M.Sc Thesis. Ahmadu Bello University Zaria.
- Alene, A.D., Manyong, V.M., Omany, G., Mignouma, H. D., Bokanga. M., Odhiambo, G (2008). Smallholder Market Participation under Transactions Costs: Maize supply and Fertilizer Demand in Kenya. *Food Policy* 33: 318-328
- Aliguma, L., Magala, D. and Lwasa, S. (2007) Uganda: Connecting Small-Scale Producers to Markets: The Case of the

- Arega, D.A, Manyong V.M., Omany G., Mignouna, H.D., Bokanga M., Odhiambo,G.D (2007). Smallholder Marketed Surplus and Input Use under Transactions Costs: Maize Supply and Fertilizer Demand in Kenya. AAAE Conference Proceedings pp125-130
- Blundell, R. and Meghir, C (1987). Bivariate Alternatives to the Univariate Tobit Model, *Journal of Econometrics*, 34:179-200.
- Boughton, D., Mather, D., Barrett, C.B., Benfica, R., Abdula, D., Tschirley, D and Cunguara, B (2007). Market Participation by Rural Households in a Low Income Country: An Asset Based Approach Applied to Mozambique, Michigan State University working paper.
- Chowdhury, S.K. (2002). Institutional and Welfare Aspects of the Provision and Use of Information and Communication Technologies in Rural Areas of Bangladesh and Peru, Lang: Frankfurt.
- CIP, PRAPACE, CGIAR and ASARECA at the Government of Uganda's Conference on Competitiveness of Selected Strategic Exports.
- Cragg, J (1971). "Some Statistical Models for Limited Dependent Variables with Application to the Demand for Durable Goods." *Econometrica* 39:829-44.
- Durno, J. and Stuart, R. (2005) "Gender Issues in Sustainable Agriculture" in Overholt, C et al., (eds) Gender Roles in Development Projects. New Delhi: Fox Publications.
- Ezedinma, C., Dixon, A. G. O., Sanni, L., Okechukwu, R., Akoroda, M., Lemehi, J. Ogbe, F. and Okoro. E. (2006). Trends in Cassava Production and Commercialization in Nigeria. International Institute of Tropical Agriculture.
- Ferris, R.S.B., Okoboi, G., Crissman, C., Ewell, P. and Lemaga, B. (2001) Uganda's Irish Potato Sector. IITAFOODNET,
- Food and Agricultural Organization (2004) Concept paper- The International Year of Rice 2004, Rome.
- Frischmuth, C. (1997). Gender is not a Sensitive Issue: Institutionalising a Gender-Oriented Participatory Approach in Savionga, Zambia. Gatekeeper Series no. 72. International Institute for Environment and Development (iied). Sustainable Agriculture and Rural Livelihoods programme, 1997.
- Heckman, J (1979) Sample Selection Bias as a Specification Error. *Econometrica*, 47, 153–61.
- Jari, B and Fraser, G.C.G. (2009) An Analysis of Institutional and Technical Factors Influencing Agricultural Marketing amongst Smallholder Farmers in the Rift Valley, Eastern Cape Province, South Africa. *African Journal of Agricultural Research*, 4, 1129-1137.
- Jensen, R (2007). The Digital Divide: Information (Technology), Market Performance, and Welfare in the South Indian Fisheries Sector. *Quarterly Journal of Economics*. 122 (3): 879-924
- Khan, C. (2002) Women in Sustainable Development. A World Summit Publication. National Population Commission (NPC) (1991). The 1991 National Population Census, Lagos.
- Lapar, M. L., Holloway, G. and Ehui, S (2003). Policy Options Promoting Market Participation among Small-Holder Livestock Producers: A Case Study from Philippines. *Food Policy* 28:187-211
- Makhura, M.T (2001). Overcoming Transaction Costs Barriers to Market Participation of Smallholder Farmers in the Northern Province of South Africa. A PhD Dissertation submitted to the Department of Agricultural Economics, Extension and Rural Development Faculty of Natural and Agricultural Sciences University of Pretoria, Pretoria. 182pages
- Mamman, M. (1994) "Population and Women in Food Production" in Adetunbem, J.O. (ed), Food Crisis in Nigeria. Abstract of papers presented at the 7th Annual Conference of Nigerian Geographical Association held at Ondo State College of Education, Ikare-Ekiti 5-8 April 1994. Pp. 109-113
- Nkonya, E. and Kato, E. (2001) Agricultural Input Marketing in Uganda International Food Policy Research Institute (IFPRI). *The IFPRI Policy Workshop*, Kampala, 25-26 June 2001.

- Nweke, F. I. and Enete, A. A. (1999). Gender Surprises in Food Production, Processing and Marketing with Emphasis on Cassava in Africa. COSCA Working Paper No. 19. Collaborative Study of Cassava in Africa, IITA, Ibadan, Nigeria.
- Nyabyumba United Farmers Group in Kabale District. Regoverning Markets Innovative Practice series, IIED, London.
- Okoboi, G. (2001) The Marketing Potential of Potatoes in Uganda and Market Opportunities for Rwanda. International Institute of Tropical Agriculture, Ibadan.
- Okoye, B.C., Onyenweaku, C.E., Ukoha, O.O., Okoye, A.C and Ukpebor, P.O. (2013). Hekit Model Analysis of Proportional Transaction Costs of Market Participation among Cassava Producers in South-Eastern Nigeria. *Nigerian Journal of Farm Management* Vol 14(1)40-43
- Pingali P, Meijer M, Khwaja Y (2005). Commercializing small farms: Reducing transaction costs; 2005. Available: www.ifpri.org/events/seminars/SmallFarms/ Accessed 10 March 2014.
- Renkow, M., Hallstrom, D.G and Karanja, D.D (2004). "Rural Infrastructure, Transactions Costs and Market Participation in Kenya." *Journal of Development Economics* 73:349–367.
- Rios, A.R., Masters, W.A and Shively, G.E (2008). Linkages between Market Participation and Productivity Results from a Multi-Country Farm Household Sample. Prepared for Presentation at the American Agricultural Economics Association Annual Meeting, Orlando, Florida, July 27-29, 2008. 34pp
- Ruijs, A., Schweigman, C. and Lutz, C. (2004) The Impact of Transport and Transaction-Cost Reductions on Food Markets in Developing Countries: Evidence from Tempered Expectations for Burkina Faso. *Elsevier Agricultural Economics*, **31**, 219-228. <http://dx.doi.org/10.1016/j.agecon.2004.09.009>
- Takeshima, H (2008). Behaviour of Subsistence Producers in response to Technological Change-The Elasticity of Cassava Production and home consumption on Benin. Selected Poster prepared for presentation at the American Agricultural economics association Annual Meeting, Orlando, FL, July 27-29, 2008.
- Udensi, U. E., Tarawali, G., Favour, E. U., Asumugha, G., Ezedinma, C., Okoye, B. C., Okarter, C., Ilona, P., Okechukwu, R. and Dixon, A. (2011). Adoption of selected improved cassava varieties among smallholder farmers in South-Eastern Nigeria. *Journal of Food, Agriculture and Environment* 9(1):329-335.
- World Bank (2008) World Development Report, Agriculture for Development. The World Bank, Washington DC.