RESEARCH ARTICLE **(Open Access)**

A Gender based Economic Analysis of Cassava Production in North Central Nigeria: Implication for Poverty Alleviation in Nigeria

ENIOLA OLUWATOYIN OLORUNSANYA

Department of Agricultural Economics and Extension Services, Ibrahim Badamasi Babangida University, Lapai, Niger State, Nigeria

Abstract:

This study carried out a gender based economic analysis of cassava production with implication for poverty reduction among rural farm households in north central Nigeria. Two hundred and ten representative farm households were used for the study. Descriptive statistics, budgetary analysis and multiple regression model were the analytical tools for the study. The results of the descriptive statistics show that the female-headed households had lower access to productive resources than their male-headed counterparts. The budgetary analysis shows that cassava production was a profitable enterprise in the study area with net-farm income of ₦73,100 and ₦58,035 and capital turn-over of 1.50 and 1.46 for the male and female-headed households respectively. This also suggests a lower level of welfare for the female-headed households. The production function estimates show farm size in hectares, family labour in mandays, cassava stem in tonnes and fertiliser in kilograms were the significant variables explaining the variation in cassava output in the study area. The efficiency ratio analysis indicates that cassava stems were under-utilised while other significant variables were over-utilised. The study recommends that cassava production be used as a crop for poverty reduction among farm households in the study area judging from its profitability. The farm households were also advised to cut down on over-utilised resources and increase usage of under-utilised ones for optimal efficiency in production.

Keywords: Cassava production, economic analysis, resource-use efficiency, gender, Kwara State.

Introduction

Though Nigeria's economy is dominated by oil, agriculture is still the major employer of labour and presently contributes over forty percent of her Gross Domestic Product [6]. The importance of agriculture could not be over emphasised judging from the inclusive nature of its growth and development. The rural farm households who engage in agricultural production and processing however currently produce at sub-optimal level and are thus susceptible to poverty [10]. Though agricultural output has been on the increase over the years, the increase in population has made it impossible for supply to meet up with demand for both human and industrial uses. Illiteracy, low level of technology and high incidence of poverty dominate the agricultural sector making it impossible for consideration by the youth. The policy makers are currently focussing on agriculture as a potential major driver of the Nigeria's economy in the present millennium. Cassava (*Manihot esculenta), a* widely produced and consumed root crop in Africa is a potential food crop for poverty reduction because of its diverse uses. Nigeria presently is the leading producer of cassava in the world and any improvement in its production, marketing and processing would go a long way to alleviate poverty and bring succour to rural and urban dwellers in the country. Female-headed households have also been found to be heavily represented among the poor [7, 5]. This is largely due to the lack of access to productive and economic resources which limits their ability to compete favourably with their male-headed counterparts [4]. Bringing parity to access to productive resources has been suggested as a panacea for reduction in the level of poverty of this category of households [10]. This study therefore examines the economic analysis of cassava production as a means of poverty reduction among rural farm households in North Central Nigeria using Kwara State as a case study. The study pays particular attention to how the female-headed households are faring in relation to their male-headed counterparts. The specific objectives of the study are: examination of the socio-economic characteristics of the rural farm households based on gender of the household heads; an analysis of the costs and returns to cassava production in the study area; an estimation of the cassava production function in the study area as well as the resource use-efficiency in cassava production in the area.

[1] estimated the costs and returns as well as the productivity of resources used in cassava production

*Corresponding author: Eniola Oluwatoyin Olorunsanya; E-mail: eniolaolorunsanya@gmail.com
(Accepted for publication December 15, 2014)
***ISSN**: 2218-2020, © Agricultural University of Tirana*

in Akwa Ibom State of Nigeria using 150 cassava growers. The analytical tools employed for the study were budgetary and production function analyses. The results obtained show that the cost per hectare of cassava production when family labour was accounted for was ₦24,414.80. Labour was the most important cost item accounting for 62.52% of total cost of production. Net farm income per hectare was ₦5,585.20. The productivity analysis shows that the use of labour and fertiliser was inefficient. The study recommends measures to increase labour and fertiliser efficiency such as use of recommended amount of fertiliser per hectare. [3] carried out an economic analysis of cassava production in Eket Local Government Area of Akwa Ibom State. Costs and returns as well as production function estimates were carried out. The results show that 60% of the farmers were females with no formal education. Gross margin per hectare in cassava production in the study area was ₦141,950.00 with cost benefit ratio of ₦1.90: ₦1.00. The study recommends improved level of education for the cassava farmers for increased efficiency in production.

2. Methodology

This study was carried out in North Central Nigeria using Kwara State as a case study. The 2006 national census puts the population of Kwara State at 2,365,353 people (National Population commission, 2006). Kwara State is located between latitudes $7^0 45'$N and $9^0 30'$N and longitude $2^0 30'$E and $6^0 25'$E. The climate in the state is tropical with two main seasons and an intervening harmattan period occurring mostly from December to January. The rainfall pattern in Kwara State is bimodal and it starts in April and ends in October with a short dry period of about two weeks in August. The annual rainfall ranges from 800mm to 1500mm and varies from 1000mm to 1500mm in the South-Western part. Maximum average temperature ranges from 30^0 C to 35^0C across the state while the minimum is between 21.1^0C and 25^0C.

Kwara state is stratified into sixteen Local Government Areas (LGAs) based on ecological and administrative characteristics. A three stage sampling technique was used to select the representative farming households for the study. The first stage entailed a random selection of five LGAs from the sixteen LGAs in the state. Cassava is grown in almost all the LGAs of the state. The second stage comprised of a random selection of two villages from each of the selected LGAs to give a total of ten villages for the study. The last stage was a random selection of twenty-one farm households from each of the ten selected villages to give a total of two hundred and ten farm households altogether. Data on production and socio-economic characteristics of the farm households were obtained from the survey using a set of structured questionnaire. Descriptive statistics, costs and returns and multiple regression analysis were used to analyse the data generated from the survey. The equation for the budgetary analysis used for the study is given as follows:

NFI = TR - TC

Where NFI = Net Farm Income

TR = Total Revenue

TC = Total Cost.

The total variable cost per hectare for cassava production in the study area includes cost of fertilizer, labour, transportation, cassava stems among others. The fixed cost includes depreciated value of cost of fixed items such as cutlasses and hoes and other farm implements which are negligible in arable production. Multiple regression analysis was used to estimate the production function for cassava production in the study area. The hypothesized independent variables in the model were cassava stems in tonnes, fertilizer in kilogrammes, family and hired labour in mandays and farm size in hectares. The model is specified as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, e_i)$

Y = Cassava output in tonnes

X_1 = Farm size in hectares

X_2 = Cassava stem in tonnes

X_3 = Family labour in Mandays

X_4 = Hired Labour in Mandays

X_5 = Fertiliser in kilogrammes

2.1 *Resource–Use Efficiency in Cassava Production*

The efficiency of the resources used in cassava production in the study area was calculated using efficiency ratio as stated in equation 1.

$$r = \frac{MVP}{MFC} \quad \text{.....(1)}$$

Where r= efficiency ratio

MVP = Marginal Value Product of variable Xi and is given as $MVP = MPP_{xi} \times P_q$

P_q= Unit price of output

MPP_{xi} = Marginal Physical Product of input Xi and is given as $MPP = \frac{dy}{dx} = b_i \frac{\bar{Y}}{\bar{X}}$

$\bar{Y}$ = Arithmetic mean value of the output

$\bar{I}$ = Arithmetic mean value of the respective input

MFC= Marginal Factor Cost of variable Xi which is the unit cost of variable Xi

The prevailing market price for each of the variables was used as the corresponding Marginal Factor Cost (MFC) since the farmers were assumed to be operating under a perfectly competitive input market. Family labour was also assumed to earn its opportunity cost which was the prevailing wage rate paid to hired labour in the study area. If the calculated efficiency ratio is less than one, then the resource is over utilised; if r is greater than one, the resource is underutilised; r equals one or MVP = MFC implies the resource is efficiently utilised [13].

3. Results and Discussion

3.1Socio-Economic Characteristics of Respondents

The descriptive statistics of some selected variables in cassava production and socio-economic characteristics of the cassava producing farm households in the study area are presented in Table 1 based on gender of the household heads. The table shows that 85 per cent of the representative farm households were headed by male.

Table 1: Descriptive Statistics of Some Key Variables in Cassava Production in Kwara State

Variable	Male-Headed	Female-Headed	All Households
Gender	178 (84.77)	32 (15.23)	210
Single	12 (6.7)	-	12
Married		11(34.4)	11
Monogamous	50 (28)		50
Polygamous	115 (64.6)		115
Widowed		21 (65,6)	21
Divorced	1 (0.6)		1
Age			
20-40	25 (14)	4 (12.5)	29
41-60	125 (70)	17 (53.1)	142
>60	28 (15.7)	11 (34.4)	39
Years of Schooling			
No Formal Education	80 (44.94)	16 (50)	96
Arabic Education	37 (20.79)	4 (12.5)	41
Primary	30 (16.9)	6 (18.8)	36
8-12	21 (11.8)	5 (15.6)	26
13-16	10 (5.6)	1 (3)	11
Household Size			
1-5	19 (10.7)	14 (43.8)	33
6-10	72 (40.5)	17 (53.1)	89
>10	87 (48.8)	1 (3.1)	88
Farm Size			
<1	18 (10)	7 (21.9)	25
1-2	143 (80)	25(78.1)	168
>2	17(10)	-	17
Cooperative Membership			
Yes	54 (30)	5 (15.6)	59
No	124 (70)	27 (84.4)	151
Access to Input			
Yes	77 (43.3)	16 (50)	93
No	101 (56.7)	16 (50)	117
Amount of Credit Utilisation			
Nil	118 (66.3)	21 (65.6)	139
1-25,000	30 (16.8)	4 (12.5)	34
25001-50000	23 (12.9)	7 (21.9)	30
>50,000	7 (4)	-	7
Farming as Major Occupation			
Yes	129 (72.5)	19 (59.4)	148
No	49 (27.5)	13 (40.6)	62

Source: Field Survey, 2010

The modal age class for the two categories of households was 41-60 years, 70 and 53 per cent of the male and female-headed households respectively were in this category. Farming in the study area was dominated by the middle-aged individuals and this suggests negative implication for adoption of modern method of farming. Over 60 per cent of the heads in the two categories of households had no western education. This also suggests a negative implication on adoption of modern methods of farming for the

farm families in the study area. [2] reported similar finding for Africa. The result on access to farm land and other productive resources show that the female-headed households were at a disadvantage than their male-headed counterparts. This is in agreement with [10,4] that female-headed households have less access to productive resources than their male–headed counterparts. Credit utilisation was low in the study area, 66% of the two categories of households had no access to credit from either formal or informal sources. The female-headed households were also unable to access credit above N50,000 due to risk associated with such facilities and lack of collateral facilities for such loans. [11, 4] report low access to productive resources by female-headed households.

3.2. Cost Structure for Cassava Production in North Central Nigeria

The cost structure for cassava production (Sole) is presented in this section. Variable cost constitutes the bulk of total cost of cassava production, over 93 percent for the two categories of households (Table 2). The fixed component was the depreciated value of fixed items like cutlasses, hoes, etc and the imputed rental value of land. The cost of both hired and family labour constitutes the bulk of variable cost of production, 50% for the two categories of households. This is followed by the cost of transportation which was 24 and 21 percent respectively for the female and male-headed households.

Table 2. Costs and Returns to Cassava Production per Hectare in North Central Nigeria Based on Gender of the Household Heads

Cost Item	**Female-Headed**			**Male-Headed**		
Budget Item / Ha	**Quantity**	**Price/Tonne**	**Amount**	**Quantity**	**Price**	**Amount**
Revenue						
Cassava Roots	14.3	11000	157,300	16.0	11500	184,000
Cassava Stems	6.19	4500	27855	7.74	4500	34830
Total Revenue			**185155**			**218830**
Variable Cost						
Cassava stem cuttings	4.12	4500	18,540 (14.5)	5.16	4500	23220 (15.9)
Fertilisers	3.4	2000	6800 (5.3)	5.0	2000	10,000 (6.9)
Cost of Family Labour	57.6	800	46080 (36.3)	68.70	800	54960 (37.7)
Cost of Hired Labour	21.5	800	17200 (13.5)	22.50	800	18000 (12.4)
Transport Cost			30,000 (23.6)			30,000 (20.6)
Total Variable Cost			**118,620 (93.3)**			**136,180 (93.4)**
Depreciated value of fixed item		Various	3500 (2.8)		Various	4550 (3.1)
Imputed Rent			5000 (3.9)			5000 (3.4)
Total Cost			**127,120**			**145,730**
Net Farm Income			**58035**			**73100**
Return on Capital			**46%**			**50%**
Capital Turn Over			**1.46**			**1.50**

Source: Field Survey, 2010

The average net farm income per hectare for cassava production was ₦58,035 and ₦73,100 for female and male-headed households respectively. The capital turnover was 1.46 and 1.50 respectively for female and male–headed households indicating that for every one naira invested in cassava production in the study area, the female and male-headed households respectively had 46kobo and 50 kobo return. Cassava production is thus a profitable venture in the study area and could be a focus crop for poverty reduction among rural farm families. [3] reported high profitability for cassava production in Akwa Ibom state.

3.3. Multiple Regression Results

The double log function was chosen as the lead equation based on the size and sign of the coefficients as well as the magnitude of the coefficient of determination (R^2) and t-values. The adjusted R^2 value for the lead equation was 0.62 indicating that 62% of the variation in the output of cassava was explained by the fitted explanatory variables (Table 3). Farm size, family labour in mandays, cassava stem in tonnes and fertiliser in kilogrammes were significant at 1 and 5% respectively.

Table 3. Estimated Coefficients for Cassava Production in North Central Nigeria

Variable	Coefficients	t-value
Farm Size	0.273	2.37*
Family Labour	0.226	2.30*
Hired Labour	0.040	1.44
Cassava Stem in tonnes	0.423	3.40*
Fertiliser in Kilogram	0.015	2.56**
Constant	3.217	4.55
R^2 0.69		
Adjusted R^2 0.62		
F Statistics 24.2		

Data Analysis 2014, *,** denote significant at 1% and 5% respectively

The estimated production function is given as:

$$Ln\,Y = Ln\,3.217 + Ln\,0.273X_1 + Ln\,0.266X_2 + Ln\,0.040\,X_3 + Ln\,0.423\,X_4 + Ln\,0.015$$

3.4. Resource-Use Efficiency in Cassava Production

The resource-use efficiency of the variables was calculated using efficiency ratio formula given in the methodology. The prevailing market prices for all the inputs were used as their marginal factor cost. The marginal value product for each variable was calculated using the marginal physical product of respective variable and the unit price of output as stipulated in the methodology. Table 4 shows the estimated efficiency ratio for each of the variables. The prevailing wage rate per manday at the time of the survey was ₦800. The imputed rental value for one hectare of land was ₦5000 at the time of the survey.

Table 4. Estimated Resource-Use Efficiency in Cassava Production in North Central Nigeria

Farm Input	Production Elasticity	MPP	P_q	MVP	MFC	MVP/MFC	Remark
Farm Size	0.273	3.13	11250	352125	5000	0.70	Over utilised
Family Labour	0.226	0.07	11250	787.5	800	0.984	Over utilised
Cassava Stem	0.423	1.73	11250	19462.5	4500	4.325	Under utilised
Fertiliser	0.015	0.003	11250	33.75	80	0.422	Over utilised
Return to scale = 0.937							

Computed from regression result

Table 4 shows that cassava stem was under-utilised with efficiency ratio value that is greater than unity while other remaining variables were over utilised, their efficiency ratios being less than unity. Reduction in the over-utilised variables and increase in the under-utilised one will ensure optimal utilisation of resources in the study area.

4. Conclusion

Investigation of cassava production as a means of poverty reduction was carried out in North Central Nigeria using two hundred and ten farm households. Cassava production was profitable in the area although with a lower return per capital employed for the female-headed households than their male-headed counterparts. Production of cassava by resource poor farm households can serve as a strategy for poverty reduction in the area. Improvement should however be made on accessibility to productive resources by the female-headed households who were somewhat at a disadvantage. The study also suggests that the farm households should reduce the usage of over-utilised resources and increase the usage of under-utilised ones for optimal efficiency in production. The farm

families in the study area could also make use of adult education facilities provided by the government for improved level of education.

5. References

[1] Adinya, O. B., Ajayi, S, Idiege, D. A: **Economic analysis of cassava production in Akwa Ibom State, Nigeria.** *Journal of Agriculture, Forestry and the Social Sciences* 2007, (2):14-22.

[2] Djurfeldt A. A., Djurfeldt, G, Lodin J. B. **geography of gender gaps: regional patterns of income and farm-nonfarm interaction among male-headed households in eight African countries**. *World Development* 2013, ***48****: 32-47.*

[3] Ebukiba. E. **Economic analysis of cassava production in Akwa Ibom State.** *Agriculture and Biology Journal of North America* 2010.1 (4): 612-614.

[4] Food and Agricultural Organisation of United Nations (FAO): **Women in agriculture: losing the gender gap for development**, 2011 Rome.

[5] International Fund for Agriculture and Rural Development (IFAD): Rural Poverty Report, 2011, Rome.

[6] National Bureau of Statistics (NBS). **Statistical Information on Nigeria** 2014. Available online at: www.nigerianstat.gov.ng.

[7] National Bureau of Statistics: **Gender Dimensions to Livelihoods in Nigeria. LSMS-IS A Integrated Surveys on Agriculture** 2013**.** Available online at: www.nigerianstat.gov.ng.

[8] National Population Commission: **Census data for Nigeria** 2006. available online at http://.nigeriamasterweb.com/Nigeria06censusFigs.html retrieved on January, 2013-01-18.

[9] Odoemenem, I. U, Otanwa, L. B: **Economic Analysis of Cassava Production in Benue State, Nigeria**. *Current Research Journal of Social Sciences* 2011, 3 (5): 406-411.

[10] Olorunsanya, E.O, Omotesho, O. A: **A gender analysis of determinants of poverty among rural farming households in Nigeria**. *Albanian Journal of Agricultural Science* 2014, *13 (2): 96-109.*

[11] Olorunsanya, E. O., Babatunde, R. O., Fakayode, S. B., Toluhi, M: **A gender analysis of rural households' credit utilisation in Kabba/ Bunu Local Government Area of Kogi State, Nigeria**. *Nigerian Journal of Farm Management*, 2013a, 14 (1): 71-75.

[12] Olorunsanya, E. O., D. S. Akindejuoye; B. A. Sule, J.A. Olayinka: **Economic Analysis of Cassava Processing into Gari by Women in Ondo-West Local Government Area of Ondo State, Nigeria**. *Development Journal of Science and Technology Research (DJOSTER)* (2013b, 2 (1): 136-141.

[13] Olorunsanya, E. O. Fakayode, S. B., Babatunde, R. O., Orebiyi, J. S. and T.T. Adejumolu: **Efficiency of Resources Used in Yam-Based Cropping Systems in Ekiti State**. *Global Approaches to Extension Practices* 2009, 5(2): 45-53 A Journal of Agriculture Extension.