Original Research Article

A Gender based Economic Analysis of Yam Production among Resource Poor Farm Households in Kwara State, Nigeria

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Abstract

The study carries out a gender based economic analysis of yam production among resource poor farm households in Kwara State with implication for poverty reduction in the state. One hundred and eighty randomly selected representative farm households were used for the study. Descriptive statistics, budgetary analysis and multiple regression model were the analytical tools. The results of the descriptive statistics show that 85% of the heads of the farm households were male with 66% of the male heads having no western education against 59% for the female-headed households. Labour cost was the major cost of production accounting for 64% and 66% of the total cost of production for the male and female-headed households, respectively. Yam production enterprise was profitable in the study area with net farm income of ₦136,950 and ₦128,800 for male and female-headed households, respectively. The return on capital employed was 48% and 45% for male and female-headed households, respectively. This shows that for every naira invested in yam production enterprise in the study area, average returns of 48kobo and 45kobo were obtained for the male and female-headed households, respectively. Farm size, family labour and yam seeds were the significant variables explaining the variation in yam output in the study area. Farm size and labour were under-utilised while yam seeds were over-utilised. The study recommends increased farm size and labour use per hectare and reduction in yam seeds per hectare for efficient resource use and increased net farm income for better living standard for the farm households.

Keywords: Yam production, *Dioscorea* spp., female and male-headed households, budgetary analysis, regression model.

INTRODUCTION

Yam (*Dioscorea* spp.) is a staple food crop in West Africa providing food for a large percentage of the population. Nigeria presently is the largest producer of yam in the world contributing two-thirds of global yam production each year (NBS, 2013). Yam also ranked second to cassava in root and tuber crop production in Nigeria and it is grown in 27 of the 36 states of the country with the North central zone being the main producer (NBS, 2013). The common species of yams grown in the country are *Dioscorea rotundata* (white yam) and *Dioscorea alata* (water yam). Yam consumption also cuts across all the states of the federation emphasising the importance of the crop in Nigerians' diet. NBS (2013) reports that in year 2013, 46 percent of Nigerian households consume yams during post planting season and 53 percent during post harvest season. In the year under review, 23 percent of the households in poorest quintile in Nigeria consumed yams compared to 63 percent of households in the richest quintile. Yam is thus increasingly becoming food for the rich. Yam can be eaten boiled, roasted, fried, pounded or made into pottage. There is also some religious, social and cultural importance attached to planting, harvesting and eating of yam in Nigeria (Izekor and Olumese, 2010).

Although land planted to yam has been on the increase over

the years in Kwara state, the yield per hectare is, however, on the decline with increasing cost of production all adding up to reduce the net farm income of the resource poor farm households thus accentuating their level of poverty. The need to meet immediate financial obligations also make these farm households to dispose off their harvest when price is at the lowest thus losing out to middlemen who have the ability to store and sell when price is at the peak. Coupled with these are the problems of inefficiency in production, low productivity, post harvest losses, environmental factors and high cost of production among others (Ibitoye and Attah, 2012). High cost of production continually erodes the net farm income of these resource poor farm households with over thirty per cent of their yearly harvest stored up as seed yam for future production thus reducing quantity available for sale. All these add up to reduce their net farm income and increase their vulnerability to poverty. There is therefore the need to examine the level of profitability of yam production for increased net farm income and better standard of living for this category of households.

Okeoghene et al. (2013) examined the profitability of yam production in Delta state, Nigeria. Yam production was found to be profitable in the state with a gross margin of ₦647,710 per annum. Omojola (2014) also examined the costs and returns to upland yam production in Ekiti State,

Western Nigeria. The study found out that yam production enterprise was profitable in the state with a mean net farm income of ₦940,650.13 per annum. Ibitoye and Onimisi (2013) also carried out an economic assessment of yam production in Kabba-Bunu Local Government Area of Kogi State, Nigeria. The study found yam to be profitable with a gross margin of ₦121,000 per hectare. The present study examines the profitability as well as resource use efficiency in yam production in Kwara State to verify if the success story recorded in these states is applicable to Kwara State. This is due to the fact that profitable yam enterprise and efficient resource utilisation will result in increased net farm income and better living standards for these resource poor farm households.

MATERIALS AND METHODS

This study was carried out in North Central Nigeria using Kwara State as a case study. The population of Kwara State was put at 2,365,353 people in the year 2006 (National Population Commission, 2006). The state lies between latitudes 7°45'N and 9°30'N and longitude 2°30'E and 6°25'E. The climate in the state is tropical with two main seasons and an intervening harmattan period occurring mostly from December to January. Kwara State has bimodal rainfall pattern which starts in April and ends in October with a short dry period of a fortnight in August. The annual rainfall ranges from 800 mm to 1,500 mm and varies from 1,000 mm to 1,500 mm in the South-Western part. Maximum average temperature is from 30 °C to 35 °C across the state with a minimum of 21.1 °C to 25 °C. There are sixteen Local Government Areas (LGAs) in Kwara State based on ecological and administrative considerations. A three stage sampling technique was used to select the representative farming households for the study. A random selection of three LGAs was made in nine major yam producing LGAs in the state, this was the first stage. The second stage entailed a random selection of three villages from each of the selected LGAs to give a total of nine villages for the study. The last stage was a random selection of twenty farming households from each of the selected nine villages to give a total of one hundred and eighty representative farm households for the study. Data obtained were on socio-economic and production characteristics of the farm households through the use of a set of structured questionnaire. Descriptive statistics, budgetary analysis and multiple regression model were used to analyse the data generated from the survey. The budgetary analysis was carried out using the following formula:

$$NFI = TR - TC$$

Where NFI = Net Farm Income

TR = Total Revenue

TC = Total Cost.

The implicit function of the multiple regression model used for analysing the data generated from the survey is stated in equation 1:

$$Y = f(X_1, X_2, X_3, X_4, X_5, e_i) \quad (1)$$

Where Y = Output of yam in kilograms

X_1 = Farm Size in hectares

X_2 = family labour in mandays

X_3 = Hired labour in mandays

X_4 = Yam seeds in kilograms

X_5 = Fertilizer in bags

e_i = Stochastic error term

Resource Use efficiency in yam production in Kwara State

The efficiency of the resources used in yam production in the state was calculated using efficiency ratio as stated in equation 2.

$$r = \frac{MVP}{MFC} \quad (2)$$

Where r = efficiency ratio

MVP = Marginal Value Product of variable X_i and is given as

$$MVP = MPP_{xi} \times P_q$$

P_q = Unit price of output

MPP_{xi} = Marginal Physical Product of input X_i and is given as

$$MPP = \frac{dy}{dx} = b_i \frac{\bar{Y}}{\bar{X}}$$

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

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

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

The prevailing market price for each of the variables was used as the corresponding Marginal Factor Cost (MFC) since the farmers were assumed to operate 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 at the time of the survey. If the calculated efficiency ratio (r) is less than one, then the resource is adjudged to be over utilised; r greater than one implies the resource is underutilised and r equals one or MVP = MFC indicates the resource is efficiently utilised (Olorunsanya et al., 2009). The double log form of the implicit function specified in equation 1 with its explicit form specified in equation 3 (in its linearised form) allows for the estimation of the resource use efficiency.

$$\log Y = a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 \quad (3)$$

The dependent variable Y and explanatory variables X_i are as explained above.

RESULTS AND DISCUSSION

Socio-economic characteristics of yam producers in Kwara State, North Central Nigeria

The results of the socio-economic characteristics of the

yam producers are presented in this section based on gender of the household heads. Table 1 shows that yam production is a male dominated enterprise in the study area, over 85% of the heads of the yam farming households are male. This is to be expected judging from the fact that yam production

Table 1. Socio-economic characteristics of yam producers in North Central Nigeria

Variable	Male-Headed n=161	Female-Headed n=19	All Households n=180
Gender	161 (89.4)	19 (10.6)	180 (100)
Single	11 (7)		11 (6.1)
Married		7 (37)	7 (3.9)
Monogamous	41 (25.5)		41 (22.8)
Polygamous	107 (66.5)		107 (59.4)
Widowed	1 (1)	12 (63)	13 (7.2)
Divorced	1 (1)		1 (0.6)
Age			
20-40	23 (14.3)	2 (10.5)	25 (13.9)
41-60	115 (71.4)	9 (47.4)	124 (68.9)
>60	23 (14.3)	8 (42.1)	31 (17.2)
Highest Educational Qualification			
No Formal Education	69 (42.8)	8 (42.1)	77 (42.8)
Arabic Education	38 (23.6)	3 (15.8)	41 (22.8)
Primary	26 (16.1)	5 (26.3)	26 (14.4)
Secondary	22 (13.7)	3 (15.8)	25 (13.9)
Tertiary	6 (4)	-	6 (3.3)
Household Size			
1-5	18 (11.2)	7 (36.8)	25 (13.9)
6-10	63 (39.1)	12 (63.2)	75 (41.7)
>10	80 (49.7)	-	80 (44.4)
Farm Size			
<1	4 (2.5)	3 (15.8)	7 (3.9)
1-2	136 (84.4)	16 (84.2)	152 (84.4)
>2	21 (13.1)	-	21 (11.7)
Cooperative Membership			
Yes	43 (26.7)	16 (84.2)	59 (32.8)
No	118 (73.3)	3 (15.8)	121 (67.2)
Access to Input			
Yes	67 (41.6)	8 (42.1)	75 (41.7)
No	94 (58.4)	11 (57.9)	105 (58.3)
Amount of Credit Utilisation			
Nil	105 (65.2)	14 (73.7)	119 (66.1)
1-25,000	29 (18.0)	2 (10.5)	31 (17.2)
25001-50000	21 (13.1)	3 (15.8)	24 (13.4)
>50,000	6 (3.7)	-	6 (3.3)
Farming as a Major Occupation			
Yes	120 (74.5)	11 (57.9)	131 (72.8)
No	41 (25.5)	8 (42.1)	49 (27.2)
Extension Access			
Yes	47 (29.2)	9 (47.4)	56 (31.1)
No	114 (70.8)	10 (52.6)	124 (68.9)
Farm Income			
Less than ₦100,000	55 (34.2)	13 (68.4)	68 (37.8)
₦100,000- ₦250,000	71 (44.1)	4 (21.1)	75 (41.7)
Above ₦200,000	35 (21.7)	2 (10.5)	37 (20.5)

Data Analysis 2014

is a labour intensive enterprise. Olorunsanya et al. (2013) reported male dominance in farming enterprise in Kwara state. Sixty-seven per cent of the married male heads practice polygamy due to cultural and religious beliefs of the people in the area. The results of the descriptive statistics further show that less than 60 percent of the heads of the female headed households had no western education as against over sixty-six per cent for the male-headed households. Low level of western education has been reported among members of farming households in Nigeria (NBS, 2014). NBS (2014) also corroborated the finding of lower level of western education among heads of female-headed households than male-headed ones. Over 85 and 89 per cent of the farmers in the male-headed and female-headed household categories are above forty years of age confirming the earlier assertion by past studies that farming enterprises are mostly dominated by the aged in Nigeria due to its rudimentary way of operation which makes it unattractive to the youth (Olorunsanya and Omotesho, 2014 and NBS, 2010). Table 1 shows further that the female-headed households had smaller household size (about 37% had less than five members per households) as against 11% for the male-headed ones. Polygamy accounted for this among the male-headed households, 67 percent of the heads in male-headed households practice polygamy. Large household size is likely to provide ample family labour for farming activities where members of such households are not engaged in non-farm activities (Olorunsanya et al., 2013). Farm holding is still relatively small for the female-headed households, about 16% had less than one hectare as against about 3% for the male-headed households. Usually female-headed households in Nigeria as in all parts of Africa have low access to productive resources than their male counterparts (IFAD, 2011 and World Bank, 2013). This is evident in the low level of net farm income recorded by this category of households, over 68 percent of the female-headed household category recorded a net farm income of less than ₦100,000 as against 34% for the male headed households. This suggests

a higher level of well being for the male-headed households than their female headed counterparts.

Labour structure for yam production in Kwara State

The labour structure for yam production in the study area is presented in Table 2. The table shows that land clearing records the highest amount of mandays for the two categories of households while the least mandays is recorded for staking. Yam production is still a labour intensive operation in Nigeria. The required mandays per hectare for the male and female-headed household categories were 272 and 254 mandays, respectively. An average manday is eight hours with cost per manday ranging between ₦600-₦800 at the time of the survey.

Cost structure of yam production in North Central Nigeria

The cost structure as well as returns to yam production for the two categories of households is presented in Table 3. Total cost of production for yam enterprise comprises of variable and fixed components. The variable cost consists of cost of labour, yam seeds, transportation, among others. While the fixed cost, though negligible in small holder arable production consists of the depreciated values of fixed items such as cutlasses, hoes, baskets and so on. Labour cost constitutes the highest cost of production in the study area accounting for 64 and 66 percent of the total cost of production for male-and female-headed households respectively. This is followed by the cost of yam sett 27.5 and 24.5 per cent, respectively, for the male and female-headed household categories.

An average yield per hectare of 5.4 and 5.1 tonnes for male and female headed household, respectively, on about 5,000-10,000 mounds (heaps) of yam per hectare were recorded in the study area. Average price per tonne at the peak of sales was ₦82,000 and ₦81,500, respectively, for the male and female-headed households. The average net

Table 2. Labour Structure for Yam Production in North Central Nigeria

Labour Structure	Male-Headed			Female-Headed		All Households	
	Unit Cost	Quantity	Total Value	Quantity	Total Value	Quantity	Total Value
Labour in Mandays							
Land Clearing	800	66 (24.3)	52800	70 (27.6)	56000	68 (25.8)	54400
Land cultivation	800	56 (20.6)	44800	47 (18.5)	37600	52 (20)	41600
Planting	600	38 (14.0)	22800	40 (15.7)	24000	39 (14.8)	23400
Fertiliser Application	600	15 (5.5)	9000	15 (6.0)	9000	15 (5.7)	9000
Weeding	600	42 (15.4)	25200	37 (14.6)	22200	40 (15)	24000
Staking	600	12 (4.4)	7200	10 (4.0)	6000	11 (4.0)	6600
Harvesting	600	43 (15.8)	25800	35 (13.8)	21000	39 (14.7)	23400
Total		272	187600	254	175800	264	182000

Source: Data Analysis 2014

Table 3. Costs and returns to yam production per hectare in North Central Nigeria

Cost Item Budget Item / Ha	Male-Headed			Female-Headed		
	Quantity	Price/Tonne (₦)	Amount (₦)	Quantity	Price/tonne (₦)	Amount (₦)
Revenue						
Yam Tubers kg	5,400	82,000	442,800	5,100	81,500	415,650
Total Revenue						
Variable Cost	Quantity	Unit Cost				
Yam Seed	2,000	40/kg	80,000 (26.2)	2,000	35/kg	70,000 (24.4)
Fertilisers	6	2,000	12,000 (4)		2000	12,000 (4.2)
Labour Cost			187,600 (61.3)			182,000 (63.4)
Transport Cost			10,000 (3.3)			8,500 (3)
Miscellaneous Cost		Various	5,000 (1.6)			3,400 (1.2)
Total Variable Cost			294,600 (96.3)			275,900 (96.2)
Depreciated value of fixed item			1,250 (0.4)			950 (0.3)
Imputed Rent			10,000 (3.2)			10,000 (3.5)
Total Cost			305,850			286,850
Net Farm Income			136,950			128,800
Return on Capital			0.48			0.45

Source: Data Analysis, 2014. The average heaps (mounds) per hectare in the study area are between 5,000 to 100,00 heaps.

farm income per hectare for the male and female-headed households was ₦136,950 and ₦128,800, respectively. The return per capita employed shows that for every naira invested in the yam production enterprise an average return of 0.48 and 0.45 kobo were obtained for the male and female headed households, respectively. Yam production is a profitable enterprise in the study area with higher return per every invested naira for the male-headed household than their female counterparts. Omojola (2014); Ibitoye and Onimisi (2013) and Okeoghene et al. (2013) found yam production enterprise to be profitable in Ekiti, Kogi and Delta states of Nigeria, respectively.

Regression results for yam production in Kwara State

Table 4 shows the results of the multiple regression model specified in equation 1 in the methodology. The double log function was chosen as the lead equation due to the magnitude of the coefficient of determination R^2 , standard

Table 4. Regression Results for Yam production Enterprise in Kwara State

Variables	Coefficients	t-values
Farm Size	0.177	2.23*
Family Labour	0.506	2.89*
Hired Labour	0.068	0.20
Yam Seeds	0.165	2.02*
Fertilizer	0.005	0.52
Constant	7.114	22.65
Adjusted R^2	0.73	

Source: Data Analysis, 2014

*denotes significance at 1%

error, the t-values as well as the size and the sign of the estimated coefficients. The results of the regression model shows that family labour in hectares, and yam seeds in tonnes were the significant variables explaining the variation in yam output in the study area. Hired labour and fertilizer usage in kilogrammes though have the required signs were not significant in explaining the variation in yam output in the study area. The estimated coefficient of determination (R^2) with a value of 0.73 indicates that 73% of the variation in the output of yam is explained by the fitted explanatory variables.

Resource-use efficiency in yam production in Kwara State

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 5 shows the estimated efficiency ratio for each of the variables. The prevailing wage rate per manday at the time of the survey ranges between ₦600 to ₦800 with the modal value of ₦800. The imputed rental value for one hectare of land was ₦10,000 at the time of the survey. Table 5 shows that farm size and family labour were under-utilised with efficiency ratio values that are greater than unity while yam seeds were over utilised with efficiency ratio that is less than unity. Reduction in the use of yam seeds and increase in farm size and family labour will ensure optimal utilisation of resources in the study area.

Table 5. Estimated resource-use efficiency in yam production in Kwara State

Farm Input	Production Elasticity	MPP	P _q	MVP	MFC	MVP/MFC	Remark
Farm Size	0.177	1.334	82,000	109388	10,000	10.939	Under utilised
Family Labour	0.506	0.012	82,000	984	800	1.23	Under utilised
Yam Seeds	0.165	0.001	82,000	82	40,000	0.002	over utilised
Return to scale	0.848						

Computed from regression results

CONCLUSION

This study carries out an economic analysis of yam production in Kwara State with implication for poverty reduction in Nigeria since yam is one of the staple food crops in the country. Yam production enterprise was found to be profitable in the state with return per capital employed higher for male-headed households than their female-headed counterparts. Although yam production is a male dominated enterprise in the state, it can still be used as a means of poverty reduction among resource poor farmers in Nigeria due to its profitability. Farm size, yam seeds and family labour are the significant variables influencing yam production in the study area. There is however room for improvement in the efficiency in the utilisation of these resources. For instance, yam seeds were over utilised while family labour and farm size were underutilised. Efficiency in resource utilisation will ensure higher level of income and improved livelihood for the farming households.

REFERENCES

- Ibitoye S. J., Attah S. (2012): An assessment of Yam Mini-Sett Utilisation and Profit Level in Kogi State, Nigeria. *International Journal of Applied Research and Technology* 1(5): 8-14.
- Ibitoye S. J., Onimisi, J.A. (2013): Economic Assessment of Yam Production in Kabba- Bunu Local Government Area of Kogi State, Nigeria. *Journal of Development and Agricultural Economics* 5(11): 470-475.
- International Fund for Agriculture and Rural Development (IFAD) (2011): *Rural Poverty Report*, 2011, Rome.
- Izekor O. B., Olumese M. I. (2010): Determinants of Yam Production and Profitability in Edo State, Nigeria. *African Journal of General Agriculture* 6(4): 30-35.
- National Bureau of Statistics (2010): *Poverty Profile Report for Nigeria*. Federal Government of Nigeria, Abuja.
- National Bureau of Statistics (2013): *Yam Consumption and Production in Nigeria LSMS- ISA Integrated Surveys on Agriculture*. Available online at: www.nigeriastat.gov.ng
- National Bureau of Statistics (NBS) (2014): *Statistical Information on Nigeria*: Available online at: www.nigerianstat.gov.ng.
- Okeoghene E.S., John E., Ose O.O. (2013): Profitability Analysis of Yam Production in Ika South Local Government Area of Delta State, Nigeria. *Journal of Biology, Agriculture and Health* 3(2): 118-130.
- Olorunsanya E. O., Fakayode S. B., Babatunde R. O., Orebiyi J. S., Adejumo T.T. (2009): Efficiency of Resources Used in Yam-Based Cropping Systems in Ekiti State. *Global Approaches to Extension Practice* 5(2):45-53. Available online at www.ajol.info/index.php/gaep
- Olorunsanya E. O., Akindejuoye D. S., Sule B. A., Olayinka J.A. (2013): 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*, 2(1): 136-141.
- Olorunsanya E. O., Omotesho A. O. (2014): A Gender Analysis of Determinant of Poverty among Rural Farming Households in Nigeria. *Albanian Journal of Agricultural Science* 13 (2): 96-109.
- Omojola J. T. (2014): A Comparative Analysis of Upland and Wetland Yam Production in Southwest, Nigeria. *Journal of Agriculture and Crop research* 2(7): 126-133.
- World Bank (2013): *World development Indicators*, the World Bank, Washington D. C. Available on: www.worldbank.org.

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