Determinants of Gender Productivity among Small- Holder Cocoyam Farmers' in Nsukka Agricultural Zone of Enugu State, Nigeria

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DETERMINANTS OF GENDER PRODUCTIVITY AMONG SMALL- HOLDER COCOYAM FARMERS' IN NSUKKA AGRICULTURAL ZONE OF ENUGU STATE, NIGERIA.

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Abstract

The study used the log-linear model derived from the Cobb-Douglas functional form for explaining determinants of productivity among male and female cocoyam farmers in Nsukka Agricultural Zone of Enugu State. The study involved a multi-stage random sampling technique of 120 farmers, consisting of 60 males and 60 females. For the male farmers, the coefficients for capital, cocoyam setts, labour and education were directly related to productivity and significant at 5% level. The coefficients for age and farm size were negative and significant at 5%level. The coefficients for fertilizer, manure, and extension contact were positive but not significant. The coefficients for household size and farming experience were negative but not significant. For the female farmers, all the coefficients were highly significant at 1% level except manure. The coefficients for capital, cocoyam setts, fertilizer, labour, household size, education, farming experience and number of extension contacts were directly related to productivity. The coefficients for farm size and age were negatively related to productivity. The results calls for policies aimed at increasing capital inputs and planting materials for cocoyam production. Encouraging the youths to cultivate cocoyam and accessibility to productive resources targeted at the small scale cocoyam enterprise. Given the inverse productivity-farm size relationship in agriculture, what is needed for increased productivity in cocoyam production is land redistribution supported by technical and financial assistance for farmers. There is need, also, for policies aimed at encouraging the experienced cocoyam farmers to remain in production, increase their extension contacts and increased use of fertilizer.

Key words: Gender, Productivity, Small-land Holdings and Log-Linear Model.

Introduction

Cocoyam (*Xanthosoma* sp., *Colocasia* sp.) is a starchy tuber crop that has been widely cultivated and consumed in the Southeastern agricultural Zone of Nigeria for decades (Ndon *et al*., 2003). Nigeria is the world's largest producer of cocoyam, and ranks third among the nation's root and tuber crops after yam and cassava (FAO, 2007). From 0.73 million metric tones in 1990, cocoyam production in Nigeria rose by 432.8% to 3.89 million metric tones in 2000 (Ojiako, *et al*., 2007) and further by 30.3% to 5.068 million metric tones in 2007 (FAO, 2007).

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

It has been identified that the differences in gender performance and participation is derived more from differences in productivity (Iheke, 2006). These observed differences in productivity are based on physical factors, skill, distributional and input imbalances (Adegeye, 1988; Akanji, 1991, 1997 and Iheke, 2006). It has been shown that women in farming households can be as productive as their male counterparts when given access to appropriate resources (World Bank, 1997 and Quisumbing, 1994).

Therefore, policies to improve the productivity of male and female cocoyam farmers as well as information on relative access to and control over resources is important in the development of food security strategies. The objective of this paper is to provide a basis for equitability, effective and better allocation of resources between male and female cocoyam farmers.

Methodology

A multi-stage random sampling technique was used for the study. The farmer participatory research involved 120 farmers, 60 males and 60 females from three sub-circles drawn from 5 circles randomly selected from 2 blocks in the zone. Primary data were collected with the aid of a well structured questionnaire and included such variables as output, land, capital, Labour, fertilizer, cocoyam planting materials, manure, age, household size, education, farming experience and number of extension contacts, etc.

Analytical Procedures

The log-linear model derived from the Cobb Douglas functional form was the econometric model specified for explaining productivity following Ukoha (2000) in cocoyam production. This functional from is the most popular in applied research because it is easiest to handle mathematically (Koutsiyiannis, 1979). It is only when satisfactory results are not obtained from this model that other forms will be tried out (Ukoha, 2000). The model is described thus:

$$\ln Y = a_0 + a_1 \ln Z_1 + a_1 \ln Z_2 + a_3 \ln Z_3 + a_4 \ln Z_4 + a_5 \ln Z_5 + a_6 \ln Z_6 + a_{7\,\ln} Z_7 + a_{8\,\ln} Z_8 + a_9 \ln Z_9 + a_{10} \ln Z_{10} + a_{11} \ln Z_{11} + e$$

Where

Y	=	Productivity of cocoyam in kg/ha
Z_1	=	farm size in hectares
Z_2	=	capital input in naira made up of depreciation,

		Charges on farm tools and equipment, interest on borrowed capital and rent on land
Z_3	=	cocoyam planting materials in kg
Z_4	=	fertilizer input in kg
Z_5	=	manure input in kg
Z_6	=	labour for all activities in mandays
Z_7	=	age in years
Z_8	=	household size
Z_9	=	farmers level of education in years
Z_{10}	=	farming experience in years
Z_{11}	=	number of extension contacts
$b_0 - b_{11}$	=	coefficients estimated
e	=	error term
In	=	represents the natural logarithm

Results and Discussion

a) Average statistics of male and female cocoyam farmers

The data in Table 1 show the average statistics of the male and female farmers in the zone.

Table 1: Average Statistics of male and female cocoyam farmers in Nsukka Agricultural Zone of Enugu State, Nigeria.

Variable	Mean Value		Maximum Value		Minimum Value	
	Males	Females	Males	Females	Males	Females
Farm size(ha)	1.45	1.47	3.00	4.00	0.20	0.40
Labour (mandays)	136.18	115.23	748.20	603.00	2.02	9.50
Fertilizer input(kg)	223.83	285.17	2600	2600	0.00	0.00
Cocoyam setts(kg)	443.17	626.33	2100	2100	100	50.00
Capital Input(₦)	2113.3	1690.73	4990	2880	575	480
Age(yrs)	49.18	50.90	72.00	71.00	27.00	30.00
Education(yrs)	8.26	11.10	18.00	20.00	0.00	0.00
Farming experience(yrs)	10.83	10.20	35.00	20.00	1.00	2.00
Household size	6.65	6.73	20.00	11.00	0.00	0.00
Output(kg)	1396.6	1215.67	15000	5000	200	120
Extension contacts(No)	7.00	9.60	20.00	24.00	0.00	0.00
Manure (kg)	181.00	178.33	500.00	400	0.00	0.00

Source: Field Survey, 2008

On average, a typical male farmer in the zone was 49 years of age with 8 years of education, about 11 years of farming experience, household size of about 7 persons, cultivated 1.45ha of land, made an average of 7 extension contacts in the year, used about 44kg of cocoyam setts, spent about N2113.32 on capital inputs, employed 136 mandays of labour and produced 1,396kg of cocoyam annually. For the typical female farmers, she

is 51 years old, with 11yrs of education, 10 years of farming experience, household size of about 7 persons, 1.47ha of cultivated farm land, 10 extension contacts in a year, used about 626kg of cocoyam setts, spent about N1, 690 on capital inputs, employed 115 mandays of labour and produced 1,215kg of cocoyam

b) Determinants of Gender Productivity

The data in table 2 show the results of the econometric analysis for determinants of gender productivity among small-holder cocoyam farmers in Nsukka agricultural zone of Enugu State, Nigeria. The coefficients for farm size and age were negative and significant at 5% level of probability for the male farmers and 1% level of probability for the female farmers. The relationship between farm size and yield became a focal point of agrarian debates after the 1960s when Farm Management Surveys in India first established the empirical basis (Gul Unal, 2008). Since then, the evidence has been so widely observed by many others in different countries that inverse relationship is considered a "stylized fact" of agriculture in developing countries (Heltberg, 1998; Cornia, 1985; Benjamin, 1995; Masterson, 2005 and Okoye *et al.,* 2007). It is argued that small land holdings benefits farmers because it reduces the risks of drought, frost, floods, pests, and other uncertainties as a result of separated plots. Small land holdings also benefits small farmers in terms of decreasing risk, since "having all one's land in a single soil type, in a single location, and single exposure is considered risky." (Kaldjian, 2001). Old age might pose disadvantages in agriculture because most of the work is physically demanding and also because older household heads might be too conservative to try new, more efficient techniques (Gul Unal, 2008).

The coefficients for capital inputs, planting materials, labour and education were positive as expected and significant at 5% level of probability for the male farmers and 1% level of probability for the female farmers in the zone. We expect the education level of the household head to be positively related to productivity since better educated farmers may have improved access to knowledge and tools that enhance productivity (Gul Unal, 2008). Given the fact that agriculture is a labor intensive production in countries such as Nigeria, more labor input would increase productivity. Hence, we expect a positive relationship between labor and productivity (Okoye et al, 2008).

The coefficients for fertilizer, household size, farming experience and number of extension contacts were positive and significant at 1% level of probability for the female farmers. Large household size might create might create a positive effect on output per hectare if household labor is devoted mostly to agricultural production. It is also important to note that women are very active participants to agricultural production in Nigeria which would impact labor input and, hence, productivity, positively. The more experienced a farmer is the more efficient his decision making processes and the more he will be willing to take risks associated with the adoption of innovations. This result agrees with those of Onyenweaku and Effiong, (2005), Onyenweaku and Nwaru (2005) and Okoye *et al* (2008). Fertilizer, an improved technology, shifts the production frontier upwards leading to higher productivity. This result is consistent with that of Hussain (1989) and Onyenweaku and Okoye (2007). Increased extension contacts would lead to

more knowledge on improved cocoyam technologies which have a strong influence in increased productivity.

Table 2. Determinants of Gender Productivity among Small-holder Cocoyam Farmers in Nsukka Agricultural Zone of Enugu State, Nigeria. 2008

Production Factors	Parameters	Coefficients	
		Males	**Females**
Constant term	a_o	6.1326	74.2306
		(0.80)	(9.1315)***
Farm Size in hectares	a_1	-1.0998	-3.7396
		(-2.0583)**	(-11.2226)***
Capital inputs in naira	a_2	0.6492	5.3815
		(2.5679)**	(8.1838)***
Cocoyam Planting materials in kg	a_3	0.7134	2.5394
		(2.3686)**	(7.6502)***
Fertilizer input in kg	a_4	0.2828	1.0817
		(0.63.3)	(7.9404)***
Manure input in kg	a_5	0.1124	-2.8266
		(0.3028)	(-1.5370)
Labour for all activities in mandays	a_6	0.0236	1.93662
		(2.5109)**	(8.8378)***
Age in years	a_7	-2.2095	-8.5993
		(-3247)**	(-8.1414)***
Household size	a_8	-0.0555	4.1541
		(-0.1181)	(9.2092)***
Farmers level of education in years	a_9	0.3668	7.4207
		(2.3596)**	(9.1366)***
Farming experience in years	a_{10}	-0.3806	2.6112
		(-1.3099)	(.9104)***
Number of extension contacts	a_{11}	0.0739	0.3487
		(0.1598)	(4.2561)***
	R^2	0.7717	0.9619
	F	3.0728	36.7660

Note: ** and *, means significant at 5% and 1% respectively**
Values in parentheses represent t-values

The importance of the variables in explaining productivity can be determined by multiplying their regression coefficients (ignoring signs) with the quantity S_i/S_y which serves as a correction scale (Senedecor and Cochran, 1967; Ukoha, 2000). S_i is the standard deviation of the independent variable whose regression coefficient is being standardized while Sy is the standard deviation of the dependent variable. The regression coefficients in table 3 were standardized to make them unit free and comparable.

Table 3. Relative Importance of the explanatory variables according to Gender in Nsukka Agricultural Zone of Enugu State, Nigeria.

Explanatory Variables	Standardized Estimate	Rank (Males)	Explanatory Variables	Standardized Estimate	Rank (Females)
CAP	.3047	1	CAP	2.6051	1
SETT	0.2092	2	SETT	1.6024	2
AGE	-0.0116	3	FERT	0.5653	3
LAB	0.0018	4	LAB	0.2400	4
EDU	0.0012	5	AGE	-0.0792	5
FARS	-0.0003	6	EDU	0.0353	6
			EXP	0.0150	7
			HHS	0.0101	8
			EXT	0.0030	9
			FARS	0.0028	10

The standardized coefficients show that the most important determinants for productivity in cocoyam production based on magnitude for male farmers were capital, planting materials, age, labour, education and farm size in descending order. For the female farmers, they were capital, planting materials, fertilizer, labour, age, and education, farming experience, household size, extension contact and farm size also in descending order.

CONCLUSION

All factors related to gender productivity call for policies prioritized towards increasing capital inputs and planting materials for cocoyam farmers. Encouraging the youths, who are agile and stronger to remain in farming, increased labour, free education especially for the girl child as well as access to productive resources targeted at the small scale cocoyam enterprise. The most prominent implication is that it may provide economic justification for redistributive land reforms. If land productivity is higher in small farms then policies to promote economic growth call for redistributive land reforms supported by technical and financial assistance for farmers. Land reforms have played a very important role in economic transformation, creating agricultural surplus, growing consumer demand, and creating political stability to maintain rapid industrialization for developing countries. There is need also for policies targeted at encouraging the experienced female farmers to remain in production, increase their extension contacts and increased use of fertilizer.

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