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Research article

Socio-Economic Determinants of Cocoyam Production among Women Farmers: Implications for Agricultural Transformation and Food Security in Southeast, Nigeria.

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Abstract

The study investigated socio-economic determinants of cocoyam production among women farmers and highlighted implications for Agricultural transformation and food security in southeast, Nigeria. The study described the socio-economic characteristics of the women farmers and ascertained their cocoyam production activities. The study also identified specific women farmers' perceived socio-economic determinants of cocoyam production and highlighted implications for Agricultural transformation and food security in southeast, Nigeria. Two hundred and forty women farmers selected through a multi-stage random technique constituted the sample size for the study, while data were collected through structured interview schedule and focus group discussions. Analytical tools such as frequency counts, percentages, mean scores and multiple regression were adopted. The results show that majority (60.1%) of the women farmers were within the ages of 41 and 60 years, while most (53.8%) of them were married. Majority (66.7%) of the women had either WASC/SSCE/GCE O/L or OND/NCE qualification and Large (55.0%) estimated their annual income as ₦101, 000.00 to ₦150, 000.00. The women employed manual labour (M=4.0) as part of their cocoyam production activities and planted cocoyam within the periods of April to June. Major cocoyam production activities reported by women farmers include; use of manual labour in land clearing (M=4.0), use of small mounds (M=3.5), planting distance of 30cm x30cm (M = 3.8) and use of organic manure (M=3.5). The results of the regression analysis show that the major socio-economic determinants of cocoyam production as shown by their positive coefficients and significant at 1% (P=0.01) were educational status (X_3), farm size (X_4), and annual income(X_6). The study recommends Government's provision of infrastructure, improved institutional support and women sensitive participatory extension approach towards cocoyam production. In conclusion, sustainable Agricultural transformation and food security in southeast, Nigeria depends on the extent issues of socio-economic determinants raised and recommendations made can be addressed and sustained.

Key words: Determinants, Cocoyam Production, Agricultural transformation, Food security

Introduction

Cocoyam (***Colocasia spp***) is an important staple crop cultivated for food security in Nigeria. Lyinga and Nzietchueng [1] have established the relevance of cocoyam in the dietary needs of households and noted that about 280 million people eat cocoyam mainly colocasia esculenta and xanthosoma species worldwide. Specifically cocoyam is composed of 70-80% water, 20-25% starch and 1.5-3% protein with high minerals and vitamin nutrients [2]. Basically the cocoyam corms, cornels and leaves could be utilized in various ways when boiled, fried, baked, roasted and processed as dry chips, flour, starch, soup paste and infant industrial food preparation [3]. According to FAO [4], cocoyam is described as mother of life and the traditional staples in many developing countries.

In Nigeria, cocoyam production is carried out by rural farmers under traditional practices in small scale holdings. Both NRCRI [5] and FAO [4] reported that cocoyam is negatively perceived as poor people's food and crop produced by women in Nigeria. Evidently, Onyenweaku and Ezeh [6], have blamed the low level of cocoyam production and overall food insecurity in Nigeria on inadequate priority policy attention and erroneous conceding of the crop without support to women population. Although cocoyam is produced by males in some Nigerian's farming communities, the traditional roles of women in the production and utilization processes in southeast, Nigeria seem to attribute cocoyam production to women as major apostles in nutritional needs of households. Evidently, multiplicity of end users coupled with tolerance to draught and varieties of climatic and soil conditions as well as propensity of all year round availability make cocoyam highly preferred for food security compared with other root crops such as yam and ginger in Nigeria. According to NRCRI [5], cocoyam roots are storable in the ground for months after they are mature and cocoyam production system serve as valuable human food, animal feed and industrial raw materials.

Despite the enormous needs of cocoyam in the diets of households, cocoyam production has been left in the hands of small holder farmers especially women farmers who make up about 80% of the cocoyam farming population in southeast, Nigeria. Little seems to be done towards investigating socio-economic determinants of cocoyam production among the women farmers necessary in improving the production pattern and scale of operation in southeast, Nigeria. Earlier research reports by Onyenweaku and Ezeh [6] have blamed low cocoyam production on inadequate priority attention on the part of Government administrations possibly because of its unacceptability by high income earners. One basic step towards cocoyam transformation is to investigate the socio-economic determinants as critical issues in the production process [7]. There seems to be paucity of information on land, labour and other socio-economic variables as well as inputs as determinants of production among the women cocoyam farmers in the southeast Agricultural zone of Nigeria.

The forgoing scenario posses the following pertinent questions addressed by this study. What are the socio-economic characteristics of women cocoyam farmers in the southeast, Nigeria? What indicates appropriate cocoyam production activities among the women farmers? What socio-economic related variables serve as determinants to cocoyam production among women farmers? What specific issues from this study could serve as implications for Agricultural transformation and food security in the southeast, Nigeria?

The Purpose and Objectives of the Study

The purpose of this study was to investigate socio-economic determinants of cocoyam production among women farmers in the southeast, Nigeria. Specifically, the objectives were to; describe the socio-economic characteristics of the cocoyam women farmers and determine cocoyam production activities in the food chain of women farmers in the zone. The study also analysed socio-economic variables as determinants of cocoyam production among women farmers and highlighted implications for agricultural transformation and food security in the Southeast, Nigeria.

Methodology

Study area and Population

This study was carried out in the southeast, Nigeria. The zone is one of the Agricultural zones in Nigeria. It has five states namely: Abia, Anambra, Ebonyi, Enugu and Imo states. The zone is agrarian and well suited for the production of arable crops namely; maize, cocoyam, yam and cassava because of favourable climatic and soil conditions. The annual rainfall is between 203cm and 266.5cm with daily temperature of about 30^{o}c (81F). The

people live in organized settlements, towns and cities as well as complement agricultural occupations with non-farm activities such as trading, artisan and civil service. Among the farmers about 75% of them are women who cultivate cocoyam with other crops. Thus all the women farmers who cultivate both cocoyam and other crops and utilize cocoyam in one way or the other constituted the population for the study.

Sampling Techniques and Sample Size

Both purposive, multistage and random sampling techniques were adopted to select the respondents .Three states namely: Anambra, Enugu, and Imo were purposively selected basically because of proximity to one another and intensity of cocoyam production in the states. One zone from each of the states involved namely; Awka from Anambra, Enugu from Enugu and Okigwe from Imo states were purposively selected because of the intensity of cocoyam production activities in the zones. Under the multistage and random sampling techniques, one Local Government Area (LGA) each from the zones involved were randomly selected in the first stage, while in the second stage, 2 communities each from the selected LGAs were randomly involved. In the third stage, four villages from each of the communities involved and 10 cocoyam women farmers from each of the villages involved were randomly selected. Thus a total of 240 women cocoyam farmers randomly selected constituted the sample size for the study.

Data Collection

Primary data were sourced through structured interview guide organized in sections according to specific objectives. Thus the structured interview schedule reflected issues on: socio-economic characteristics of women cocoyam farmers, cocoyam production activities in the food chain of women farmers and issues related to their socio-economic characteristics as determinants of cocoyam production in the southeast, Nigeria.

Data Analysis

Data collected were analyzed using both descriptive and inferential statistics such as: frequency counts, percentages, mean distribution and multiple regression analysis respectively. Objective one was analyzed using frequency counts and percentages, while objective two was analyzed using mean distribution and objective three was analyzed using multiple regression.

Results and Discussion

Socio-economic characteristics of the women farmers in southeast, Nigeria

Data in Table 1 show that majority(60.0%) of the women cocoyam farmers in southeast, Nigeria were within the ages of 41 to 60 years, while most(53.8%) of them were married. The results indicated that women who farmed on cocoyam in the southeast, Nigeria were adults and this scenario also indicated limited level of youth involvement and a threat to sustainable cocoyam production and food security in the southeast, Nigeria. Earlier research reports by Eremie [8] and Eze [9] have indicated that the youth posses regenerative energies, knowledge and potential intelligence which could endear them for sustainable development initiatives including Agricultural transformation. Majority (66.7%) of the women farmers had either WASC/SSCE/GCE O/L 0r OND/NCE qualifications, while 65.4 percent of them indicated that their farm sizes ranged between 0.6 and 2.0 hectares. This study indicated that the women farmers in southeast, Nigeria have basic education needed to facilitate comprehension of best practices in cocoyam production and Agricultural transformation. The study therefore, corroborates with Blum [10] and Madukwe [11] who viewed education as a facilitating factor in any Agricultural food production programme. The results also indicated that the women farmers produced cocoyam in small holdings and this scenario could aggravate food insecurity in southeast, Nigeria. Table 1 also indicated that majority (60.9%) of the cocoyam woman farmers had 11-20 years of farming experience, while 67.6 percent of them employed either family or communal labour in their cocoyam production activities. Above all large (55.0 %) numbers of the women farmers estimated their annual income to be ₦ 101,000.00 to ₦ 150.000.00.

Table 1: Percentage distribution of cocoyam women farmers according to their socio- economic characteristics

Variables		Frequencies (N = 240)	Percentage (%)
Age (years)	≤ 30	20	8.3
	31-40	35	14.6
	41-50	62	25.8
	51-60	62	34.3
	61 years and above	41	17.1
Marital status:	Single	33	8.3
	Married	129	53.8
	Widowed	52	21.7
	Divorced	26	10.8
Levels of Formal Education: FSLC		37	15.4
	WAEC/SSCE/GCE OL	105	43.8
	OND/NCE	55	22.9
	HND/BSc./BA/B.Ed.	22	9.2
	MSc/MBA/MA/M.Ed	21	8.8
Farm size (HAs):	≤ 0.5	47	19.6
	06-1.0	104	43.3
	1.5-2.0	53	43.3
	2.5-3.0	24	10.0
	3.5 has and above	12	5.0
Farming experience (years): ≤ 5		10	4.2
	6-10	41	17.1
	11-15	106	44.2
	16-20	40	16.7
	21 and above	43	17.9
Sources of labour:	Hired	32	13.3
	Family	82	34.2
	Communal	79	34.2
	Migratory/exchange	47	19.6
Estimated annual income: ≤ ₦50,000.00		33	13.8
	₦ 51, 000.00-100,000.00	39	16.3
	₦ 101,000.00-150,000.00	132	55.0
	₦ 161,000.00-200,000.00	28	11.7
	₦ 201,000.00and above	18	7.5

Source: Field Survey 2013

Production activities of cocoyam women farmers in southeast, Nigeria

Data in Table 2 show that the women farmers in southeast Nigeria employed manual labour (M=4.0) and bush burning (M=3.7) as methods of land preparation, while planting structure adopted by the women include, mounds (M=3.5) and ridges (M=3.5). Earlier research reports by Ikwelle, Ezulike and Eke-Okoro [12], have blamed low level of cocoyam production on the use of low inputs of labour. The use of manual labour coupled with traditional planting structure of mounds could constitute serious challenges in cocoyam production to economic level and threaten food security in southeast, Nigeria. This study therefore corroborates with Okoye and Onyenweaku [13], who blamed failure of cocoyam to meet demands of food security on use of manual labour of the production levels in Nigeria. The women farmers adopted time of cocoyam planting either April to June (M=4.1) or July to September (M = 3.6) with the planting materials of corm/cormels (M=3.3) and use of sets (M=3.2) at the planting distance of either 30cmx30cm (M=3.8) or 60cm x60cm (M=3.1).

Table 2 indicated that the women farmers in the southeast, Nigeria employed manual weeding control (M=4.1) and use of organic manure (M=3.5) complemented with inorganic manure (M=3.3) in their cocoyam production activities. The results indicated labour as a serious challenge to meaningful cocoyam production and food security in the southeast, Nigeria. However, the women combination of use of organic with inorganic manure indicated their efforts towards appropriate resource use aimed at minimising financial stress on scarce resources common in farming in the southeast, Nigeria.

Table 2: Mean distribution of cocoyam production activities among women farmers in southeast, Nigeria.

Production activates		M (max = 5)
Land preparation:	Manual	4.0
	Use of herbicides	2.4
	By burning	3.7
	My mechanization	2.0
Planting structure:	Small mounds	3.5
	Ridges	3.5
	Zero tilling	2.7
	Heaps	2.7
Time of planting:	Jan-March	2.3
	April –June	4.1
	July –September	3.6
	October –December	1.6
Planting Materials:	Use of corms/cormels	3.3
	Use of setts	3.2
Planting distance/ spacing:	30cm x 30cm	3.8
	90cm x 90cm	2.3
	75cm x 25cm	2.8
	60cm x 60cm	3.1
Method of weed control:	Use of manual weeding	4.1
	Use of herbicide	2.8
	By mechanization	1.5
Use of fertilizer or organic manure:	Use of organic manure	3.5
	Use of fertilizer	3.3
Pest and Disease control:	Use of pesticides and insecticides	2.2
	Use of wood ash	3.5
	Use of neem extracts	3.5
Preferred Harvesting method:	By manual	4.2
	Use of harvester machine	1.4
Estimated output:	≤ 100kg/ha	2.7
	101-200kg/ha	3.0
	201-200kg/ha	3.3
	301-400kg/ha	3.8
	401-500kg/ha	2.8
	501 and above	2.0
Source: Field survey 2013		
Decision rule accept for mean		≤3.0

Furthermore, Data in Table 2 show that the women farmers employed use of wood ash (M = 3.5) and neem extracts (M = 3.5) in pests and diseases control. The women also indicated use of manual labour in cocoyam harvesting and estimated their average yield in cocoyam production as between 101 kg/ha and 400kg/ha.

Socio-Economic Determinants of Cocoyam Production among Woman Farmers.

Ordinary least square (OLS) method of multiple regression analysis was used to determine the socio-economic determinants of cocoyam production among women farmers on total output of cocoyam as presented in table 3.
Table 3: Results of Multiple Regression Analysis on Socio-Economic Determinants of Cocoyam among Women Farmers on their output obtained.

Variables	Variables Name	Regression Co-efficient	Standard error	T-value	Significant
Bo = constant		6.475	1.127	5.743	S*
X_1 = Age		-719	473	-1.522	NS
X_2 = Marital Status		-131	.309	-.424	NS
X_3 = Academic Qualification		-1.324	.248	-5.331	S*
X_4 = Farm Size		.694	.207	3.351	S*
X_5 =Farming Annual Income		.625	.274	-2.263	S**
X_6 = Estimated Annual Income		.625	.220	2.833	S*
X_7 = Membership of Women organization		-098	204	-4.82	NS

Source: Data analysis 2013
S* = statistically significant at 1 % level
S** = statistically significant at 5% level;
NS = Not statistically significant
F^2 = Multiple determination = .537 (53.7%)
Adjusted R^2. 508 (50.8 &); F – ratio = 18.576
Standard error of the estimates = 2.34827
Durbin waston constant =2.075

Results of multiple regression analysis as presented in Table 2 show that the multiple determination (R^2) of the regression mode was 0.537 (53.7%) indicating that about 53.7% variation in the dependent variable (total cocoyam output) used in the regression model was caused by combined changes in the explanatory variables (Socio-economic characteristics) adopted. The R^2 values were high enough to justify the goodness of fit of regression model, since explanatory variables exert effects on the explained variables. The results further revealed that F-ratio value was 18.567 and statistically significant at 1% level. This clearly expressed the overall effects of the independent variables on the dependent variables. Also, the values of Durbin waston constant (2.075) was low, confirming that the forecasting power of the regression model was very high, since important variables were not omitted and this is statistically reliable because the value of the standard error of estimates (2.34827) was low.

The coefficient of marital status (X2) was negative, indicating that marital status was inversely related to total output of cocoyam and was not statistically significant. This inverse relationship further implies that farmers in the area can produce cocoyam irrespective of their marital status. However, the apriori expectation was not met. This is because married farmers with their households are usually better off to adopt labour intensive farming technologies. Levels of formal education(X3) had negative coefficient and are statistically significant at 1% level. This negative co-efficient implies that academic qualification of the farmers and total output of the cocoyam had inverse relationship, which means that the higher educational qualifications of farmers will bring about higher production of cocoyam. Thus cocoyam production has bearing or bear on educational qualification which significantly connotes that enhanced educational qualification will entail increase in cocoyam production. This result is justified because the more educational attainment of the farmers the greater their propensity to comprehend relevant information on production. Again, the cocoyam farm size (X4) was positive and statistically significant at 1% level, revealing that farm size was positively related to output of cocoyam in the area, so apriopri expectation was met. This can be attributed to the fact that the larger, the farmers' size of farm holdings, the higher the output obtained from cocoyam in the study area. Farming experience (X5) had negative coefficient and it was statistically significant at 5% level. This implied that negative relationship existed between farming experience of farmers and their total output in the study area. However the apriori expectation was not met, because adequate farming experience is expected to enhance the farmers' adequate knowledge and correct application of technologies that will improve cocoyam production.

Furthermore, estimated annual income (X6) had positive relationship with the total output of cocoyam. This positive relationship is based on the fact that enhanced annual income of the famers will bring about enhanced production. This is because the farmer's higher income will assist him in obtaining improved production inputs and technology which will invariably increase production. The apriori was totally met. The result of the regression analysis showed that the co-efficient of multiple determinations R2 was 0.537 and significant at 1% level. Specifically academic status (X3), farm size (X4), and annual income (X6) were identified to be positive coefficient and significant at 1% (P = 0.01).

Implications for Agricultural transformation and Food security in Southeast, Nigeria.

Cocoyam possesses viable potentials which could motivate interests among operators in government administrations, producers and primary consumers in its production as an important staple root crop. Available research information show that cocoyam production as a food security measure in the south east Nigeria has been conceded to women as apostles in the household diets. This study shows remarkable difference in the socio-economic characteristics of the women farmers. These differences constitute baseline information to the government and development institutions as critical determinants in the cocoyam production processes and overall agricultural transformation. Thus, the differences in household and farm sizes, farming experiences, educational qualifications, sources of labour and estimated annual income have implications to research and extension agencies for purposes of structural arrangement and overhaul in research and extension training network for viable agricultural transformation.

The envisaged overhaul is geared towards improvement in cocoyam production and sustainable agricultural transformation as well as food security. This approach can be complemented by the ADPs in categorising the women into groups for training and participatory agricultural transformation. Moreover, the improvement has implications to research institutions and universities in the southeast, Nigeria such as the National Root Crops Research Institutes (NRCRI) Umudike and the Universities in the zones on issues relating to basing cocoyam technologies on the socio-economic background of the farmers and mobilizing the women into groups for participatory training and agricultural transformation.

This situation has implications for governments provision of facilities towards meaningful cocoyam based research and regular extension staff training as well as contacts with women farmers. The envisaged government support should involve meaningful logistics in order to attain effectiveness of cocoyam technologies and mobilization of women in groups for extension training and contacts. These issues on governments support have implications for improved budgetary allocation and financial as well as other resources supports to ADP extension on the part of the benefiting Local Government Areas (LGAs). The situation could involve increasing number of extension staff of the ADPs, re-orientation and re-training of relevant community development staff of the LGAs to complement in the cocoyam production and Agricultural transformation efforts of the ADPs. This will assist the ADPs as rural-oriented extension organisation to meaningfully mobilise the women farmers for participatory agricultural transformation and food security in southeast, Nigeria.

Furthermore, for the ADPs to contend with emerging improvements and challenges in mobilizing cocoyam women farmers and overall agricultural transformation as well as food security has implications to southeast, state Government administration in conjunction with LGAs to employ a democratic philosophy as a strategy under the ADPs. This measure will assist the ADPs in modifying the attitudes among the women farmers towards co-existence in groups to work with local leadership and collaborating institutions as well as relevant inputs agencies under the ADPs. The forgoing measures would result in necessary harmonization in cocoyam production, and overhaul activities of the women farmers under the ADPs. The envisaged harmonization and overhaul would be appropriate to the extent that it would involve re-orientation and improve women groups cohesion to enable the ADPs focus extension contacts on potential groups of women farmers for participatory Agricultural transformation and food security in Southeast, Nigeria.

Conclusion

This study investigated socio-economic determinants of cocoyam production among women farmers and highlighted implications for Agricultural transformation and food security in southeast, Nigeria. This study was based on the prevalent situations of inadequate involvement of the socio-economic potentials of women farmers in Agricultural transformation and neglect of potentials of cocoyam in food security under cocoyam favourable ecology of southeast Nigeria. Results of the study indicated that low performance in agricultural transformation and food insecurity in the Southeast, Nigeria are blamable on the diverse socio-economic characteristics, traditional patterns, and low scale of cocoyam production among the women farmers. The study recommends Government's provision of infrastructure, improved institutional support and women sensitive participatory extension approach towards cocoyam production. In conclusion, sustainable attainment of the Agricultural transformation agenda and cocoyam supported food security in southeast, Nigeria, depends on the extent the socio-economic issues of women and their associated cocoyam production activities can be addressed and sustained.

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