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EMPIRICAL ANALYSES OF PRODUCTION BEHAVIOUR AMONG SMALL-SCALE SWEETPOTATO FARMERS IN EBONYI STATE NIGERIA

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Abstract
The study investigated some determinants of sweet potato production among small-scale farmers in Ebonyi state. Primary data were collected from 400 small-scale sweet potato farmers in Ebonyi State using a multi-stage sampling technique. The instruments used for data collection were interview schedule and focus group discussion (FGD). Data collected through these methods were analysed using descriptive statistics, while ordinary least square regression was used to determine factors associated with sweet potato production. FGD was analysed by transcribing responses of the discussants. Findings revealed that, 46.07% of the respondents were males while 53.93% were female farmers. The average age of the respondents was 43 years while 75% had formal education. The average farm size was about 2.8ha. Many (64%) of the respondents had more than 10 more in the market because they were more receptive to new ideas and are less risk averse than their aged counterparts. However, there should be a threshold in terms of age beyond which the agility to participate in the market may decline**.** Similarly, the coefficient of marital status (5%) also had an indirect relationship with market participation. This implies that processors who are married tend to not participate in the market than their counterparts who are not. This implies that more of the cassava products produced will be used in feeding the family, thus reducing the quantity taken to the market. The result agrees with that of Egbetokun *et al*., (2017) who obtained similar result in his study in Osun State, Nigeria. Result of the regression analysis showed that respondent's age, gender, household size, educational level, Farming experience, and membership to farmers association were positive and significantly influenced sweet potato production. The results therefore call for policies aimed at provision of affordable education and encouraging experienced farmers to form groups/associations to enhance access to innovations that will enhance production.

Key words: Sweetpotato, Production, and Ebonyi State

Introduction

Sweet potato (*Ipomoea batatas* (L) Lam) is a creeper of the convolvulaceae family. It originated from Central America and is widely grown as important staple food in most parts of the world (FAO, 2006). It is important commodity in the diet in many parts of Africa (Adekoya *et al.*, 2010). Sweet potatoes have multiple uses as it is a regular food and cash crop, used as raw materials and for livestock feed. It is also an important source of income especially in the rural areas. It is an important root crop that provides food to a large segment of the world population, especially in the tropics and subtropics where bulk of this crop is cultivated and consumed. Sweet potato is an important food crop in Nigeria that is valuable in the diet of rural poor in the tropics (Odebode, 2004). It is a low input crop and used as a vegetable, desert, source of starch and eaten as a substitute for yam as a result of lower cost of production. The importance of sweet potato is increasing in Nigeria's farming and food systems because its production has recorded good profit margin and is suitable for income generation. It has the potential for food security and serves as a cash crop (Adekoya *et al.*, 2010). It has edible roots which can be eaten boiled, fried, or baked. The tubers can be consumed by man, the leaves and stems provide important fodder sources for domesticated animals.

Nigeria is one of the largest producer of sweet potato in sub-Saharan Africa with annual production estimated at 4.03 million tons per year with farm size of about 1.7mha and yield of 2.3t/ha (FAO, 2018). Sweet potato is an important food security and early maturity crop that can be intercropped with some crops like yam and maize. It can also be a mono-crop based on the intentions of the farmer. It can be grown three times a year, has a high yield potential, high nutritional value, resistance to production stress, environmentally friendly with diverse food forms among others (Ikwelle *et al.*, 2001 and Kays, 2004). The crop has moved up from the minor status to an enviable position of being the fourth most important tuber crop in Nigeria after cassava, yam and cocoyam.

In Nigeria, more than 85% of the sweet potato

production is done by farmers who maintain small farms operations manually with traditional farm tools such as hoes and machetes (Okonkwo *et al*., 2009). More than 80% of sweet potato produced in Nigeria is used for human consumption, but in present day Nigeria, sweet potato is not only used for consumption but also as raw materials for industries. It is consumed in boiled form, or dried and milled into flour or to prepare a fermented drink called *Kunu* in the North and Central Nigeria. It can also be used as ingredient of West African dishes such as *fufu* and *amala*, the leaf is an ingredient in soups (Tewe *et al*., 2003).

Sweet potato is one of the most misunderstood major food crops (Ezeano, 2006). It is often viewed as an 'unloved' crop or 'poor man's food or 'strictly subsistence', 'food security' or 'famine relief crop' and is grown mainly by women on small plots (Ezeano, 2015). Despite sweet potato's potential to address universal goals including poverty eradication, wealth creation, diversification of small-scale farmers and food security, little empirical study has been done on the crop worldwide (Andea, 2012). In spite of the role of sweet potato as one of the world's most important food and vegetable crop, playing an important role in combating vitamins and other nutritional deficiencies, it is still regarded as a minor crop and food for the poor. Hence, it is rated low in the food priority list. There is the need therefore to ascertain some socio-economic factors associated with level of sweetpotato production in Ebonyi state. This study was therefore designed to: describe the socio-economic characteristics of the sweet potato farmers in Ebonyi state, examine the cropping pattern of sweet potato among small-scale farmers, and ascertain some socio-economic factors affecting sweet potato production in the study area.

Methodology

The study was Ebonyi State with all the three Agricultural Zones; Ebonyi South, Ebonyi North and Ebonyi Central which followed a multi-stage sampling procedure. In the first stage, two local government areas (LGA) in zones were purposively selected based on cropping intensity. Afikpo-South and Onicha LGAs were selected in Ebonyi South, Ohaukwu and Abakaliki LGAs for Ebonyi North and Ikwo and Ishielu LGAs for Ebonyi Central. In the second stage, two Council Wards were also purposively selected from each LGA, giving twelve Council Wards. Simple random sampling technique was used to select respondents who are sweet potato farmers in the study area. Consequently, in the third stage, 28 respondents each was systematically selected in four council wards giving a total of one hundred and twelve respondents in Ebonyi Central Zone, because of its higher population. Twenty seven (27) respondents were selected in eight council wards in Ebonyi-North and Ebonyi-South zones each, giving a total of two hundred and sixteen respondents in the zones. Thus, bringing total respondents administered with interview schedule to three hundred and twenty eight (328). Structured interview schedule and Focus group discussion (FGD) were used as instruments for data collection. One FGD was conducted in each of the twelve selected council wards giving a total of 12 FGDs. Each group is made up of six discussants giving a total number of participants to seventy two (72). In analyzing data generated for the study, descriptive statistics were used to describe the socio-economic characteristics of the farmers, and the production pattern of sweet potato in the study area. In explaining the influence of some socio-economic factors associated with level of production of sweet potato, ordinary least square regression analysis was used as a statistical tool.

The regression model was specified implicitly as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9) + e \quad \text{.....(1)}$$

Where:

Y= level of sweet potato production in the study area (t/ha)
X_1 = Age (years)
X_2 = Gender (dummy variable; 1= male, 0 =female)
X_3= Household size (No)
X_4= Educational level (years)
X_5= Farm size (hectare)
X_6= Farming Experience (years)
X_7= Farming status (dummy variable;
1=full time, 0= part-time)
X_8 = Membership farmers Association (dummy variable; 1=member, 0= non member)
X_9 = Access to credit (dummy variable; 1= access, 0=no access)
e = error term

The model used was the linear form because of the presence of many dummy variables in the model. It is only when satisfactory results are not obtained from this model that other forms will be tried out, following Ukoha, (2000).

Results and Discussion

The result in Table 1 shows the socio-economic characteristics of the respondents in the study area. From the data obtained, about 46.07% were males while 53.93% were females. This implies that sweet potato production in Ebonyi State is female dominated. This is in agreement with the findings of Okwusi *et al*., (2005) which showed that females dominate in the production, processing and utilization of sweet potato in Southeast zone of Nigeria. The study also revealed that about 5.24% of the respondents were within the age range of 18-30 years, while 30.89%, 47.12%, 15.18% and 1.57% were within the age ranges of 31-40, 41-50, 51-60 and more than 60 respectively. This implies that young people of active age dominated the activities in sweet potato production in the study area. This finding agrees with Olagunju *et al*., (2013) who noted that majority of sweet potato farmers in Osun State were in the active productive years. Results showed that 8.35% of the respondents were single, 78.1% married, 2.09% divorced and 11.52% widowed. This implies that majority of the sweetpotato farmers in the state were married. The table further shows that households that had between 1-5 persons made up 35.60% of the respondents, six to ten members 50.79%, 11-15 persons was 12.04% and 16-20 persons made up 1.57% of the respondents. This means that the farmers had relatively large-sized households since they believe that getting

married with more children is an alternative source of labour *in-lieu* of hired labour. Educational status of respondents indicated that 24.61% of the respondents had no form of formal education, 22.51% attained primary level of education, while 32.98% and 19.90% attained secondary and tertiary levels respectively. This implies that majority of the farmers were literate. The high proportion of literate people among the farming population implies that majority of them are in a better position access and process innovations on sweet potato production. About 20.42% of the respondents cultivated less than 1ha of land, while many (47.12%) cultivated between 1-3ha. Others (26.70%, 5.76%) cultivated between 4-6ha and more than 7ha respectively. this implies that majority of the sweet potato farmers are small scale farmers. This finding is in agreement with the findings of Aniedu (2006) and Mbanaso (2010) who found small-scale farmers dominating the activities of sweet potato production in the Southeast zone of Nigeria. The result also corroborate with the findings of Omoare (2014) who stated that sweet potato farmers in Osun and Kwara States operated mostly on a small scale. Farmers' estimated annual income indicated that 10.47% (40) of the respondents had an estimated annual income of less than ₦100,000, 15.18% (58) earn up to ₦100,000-₦200,000 per annum while 53.40% (204) had ₦201,000-₦300,000 and 20.94% (80) ₦301000-₦400000, per annum.

The result in Table 2 revealed that majority (75.92%) of the sweet potato farmers adopted both mixed and sole cropping pattern, while 17.02% adopted mixed cropping pattern and 7.07% sole cropping pattern alone. The result from focus group discussion showed that sweet potato is mainly intercropped with yam, cassava, maize and okra. It is also planted sole in some areas especially in Ikwo LGA, where the farmers noted that sole sweet potato farming gives higher yield than when intercropped with other crops. This is done in Fadama areas from March to April while intercropping is from May to July. Mixed cropping pattern is practiced more in order to ensure food security and guide against crop failure. Sweet potato is usually intercropped with cassava, maize, yam and okra in the study area as indicated. The findings from this study corroborated with Oyediran, (2013) that mixed cropping system is commonly practised by farmers in order to ensure adequate food security in all seasons.

The results in Table 3 show the regression estimates of some factors influencing the level of sweet potato production in the study area. The coefficient of age was positive and significant at 5% probability level. This implies that as the age of the farmer increases, the level of cultivation increases. This could probably be that with increasing age, the farmers might have access to more land to cultivate which will translate to higher production of sweet potato. This result is in line with the findings of Agwu *et al*., (2014) who found out that age of farmer was positive and significant at 1% level but against a priori expectation probably because the older farmer seems to be more active in the production of sweet potato than their younger counterparts. The coefficient of sex was positive and significant at 1% level of probability level which implies that male farmers produce more sweet potato than their female counterparts in the study area. This might be because the male farmers are more energetic and stronger. The coefficient of household size was positive and significant at 5% probability level. This implies that an increase in household size will lead to a corresponding increase in the level of sweet potato production. This implies availability of family labour for sweet potato production. Coefficient of educational level was positive and significant at 1% probability level. This implies that any increase in educational attainment will lead to a corresponding increase in sweet potato production. Education as it were has the tendency of exposing people and placing them in higher position over others with little or no education. With more education, farmers are able to access and process information on new techniques of production. This result is in consonant with the findings of Odoemelam (2016) who noted that education enhance individual skills and capital for farming or agro-enterprise activities. Coefficient of farming experience was positive and significant at 1% probability level, which implies that any increase in farming experience will lead to increase in sweet potato production in the study area. The level of farming experience is an important factor as it is a major determinant of managerial acumen (Eze *et al*., 2013). Coefficient of membership to farmers association was positive and significant at 10% probability level. This implies that membership of groups had a positive relationship with sweet potato production among the farmers. Belonging to associations could be a forum to exchange ideas, render assistance to each other and access to useful information and innovation on sweet potato production. The R^2 value of 0.8032 indicates that 80.32% variability in sweet potato produced was explained by the independent variables. The F value was highly significant at 1% indicating goodness of fit of regression line.

Conclusion

The study shows that sweet potato is a commonly grown among all farmers in the study area which serve as food and income generation. The study also showed that sweet potato farmers were economically active, married, experienced and operated on a small-scale. Important variables influencing level of production include; age, sex, household size, education, farming experience and membership of farmer association. The results therefore call for policies aimed at provision of free and affordable education to enable farmer's access and process information on innovations that will enhance production. There is also need to encourage experienced farmers to form associations/cooperatives to enhance information flow and economics of scale.

Table 1: Socio-economic characteristics of the respondents

Variable	Frequency N= 382	Percentages (100)	Mean
Sex			
Male	176	46.07	
Female	206	53.93	
Age			
18-30	20	5.24	43.1
31-40	118	30.89	
41-50	180	47.12	
51-60	58	15.18	
60&above	6	1.57	
Marital Status			
single	32	8.38	
Married	298	78.1	
Divorced	8	2.09	
widowed	44	11.52	
Household size			
1-5	136	35.60	
6-10	194	50.79	5
11-15	46	12.04	
16-20	6	1.57	
Level of Education			
No formal education	94	24.61	
Primary education	86	22.51	
Secondary education	126	32.98	
Tertiary education	76	19.90	
Farm size			
Less than 1ha	78	20.42	2.8 ha
1-3ha	180	47.12	
4-6ha	102	26.70	
7ha &above	22	5.76	
Annual Income			
Less than ₦100,000	40	10.47	
₦100,000-₦200,000	58	15.18	
₦201,000-₦300,000	204	53.40	
₦301,000-₦400,000	80	20.94	
Total	**382**	**100**	

Source: Field Survey, 2019

Table 2: Distribution of respondents according to cropping pattern

Cropping Pattern	Frequency	Percentages
Sole cropping	27	7.07
Mixed cropping	65	17.02
Both	290	75.92

Source: Field Survey, 2019

Table 3: Regression Estimates of the Determinants Sweet potato Production in the study area

Variables	Coefficient	Std Error	T-value
Age	39442.76	16883.83	2.34**
Gender	48916.07	14509.45	3.37***
Household size	56349.08	19345.13	2.91**
Educational level	4324.063	1092.68	3.96***
Farm size	-8600.805	17617.53	-0.49
Farming experience	4933.589	1093.7	4.51***
Farming status	21415.71	30233.9	0.71
Membership of association	80434.13	44225.39	1.82*
Access to credit	10921.78	24526.97	0.45
constant	90858.72	69361.93	1.31
R2	0.8032		
R	0.5790		
F	3.59***		

Source: Computed from STATA 13
, **, is significant at 10%,5% and 1% level**

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