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Commercialization of Pro Vitamin A Cassava Roots among Small-holder Farmers in Anambra State, Nigeria

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ABSTRACT
This study was conducted to assess the level of commercialization of pro-vitamin A cassava among small-holder farmers, and estimate the determinants of commercialization and identify constraints to commercialization. A multistage sampling technique was used in selecting samples. Data were collected using structured questionnaire administered to 120 pro-vitamin A cassava producing households. Data were analyzed with descriptive statistics, Household commercialization Index (HCL) and Ordinary Least Square Regression model. The results of the socioeconomic characteristics revealed that average age, household size, number of years spent in school and marketing experience of the respondents were 37years, 12 years, 3 persons and 9 years respectively. Linear regression estimate showed that sex, household size, membership of an association, marketing costs and level of education were significant at varied levels of probabilities. Major constraints identified were inadequate market stalls, perishability, low demand and inadequate funds among others. There is the need to intensify promotion and popularization activities of the nutritional value of pro-vitamin A cassava in the study area, this will stimulate demand, encourage production and commercialization. It is advocated that farmers are trained on how to add values to pro-vitamin A cassava through diversification and processing into various products. This will reduce wastage and distressed sales, thereby increasing income of pro-vitamin A cassava producing households.

Keywords: Pro-vitamin A, Cassava roots, Small-holder, Farmers and Anambra State

INTRODUCTION

Cassava is one of the most important staples of rural and urban households in southern Nigeria (Nweke, Haggblade and Zulu, 2014). Reports showed that the daily consumption per capita nationally was 226.93g. In the rural areas the daily consumption of cassava was estimated to be 239.74g while at the urban level, it was 213.70g per person per day (Nwachukwu and Eze, 2018). There is therefore the need to commercialize cassava roots due to its demand and large consumption rate. Commercialization can be defined as that part of agricultural production that is marketed (Goverah *et.al.*, 1999). Cassava plays a vital role in bridging the gaps in food security, poverty alleviation and environmental protection (Clair and Etukudo, 2000). Cassava roots are rich source of good energy, containing mainly starch and soluble carbohydrates, though its nutritive value is imperatively low (Abdoulaye *et. al.,* 2015).

In order to bridge the widening gap in nutrition and its attendant food insecurity in Nigeria, the Government has tried many agricultural initiatives and projects such as the development of the cassava industry in 2003 and 2006 respectively (Nwachukwu and Ezeh, 2007). None of these plans has been able to address the issue of nutritive value of cassava.

The *Harvest Plus* programme was initiated to improve the vitamin A status of resource poor farmers especially women and children in developing countries such as Nigeria. In 2011 and 2013, the project assisted in the breeding and delivery of suitable vitamin A cassava variety through bio-fortification (Oparinde *et.al.,* 2014). The International Institute for Tropical Agriculture (IITA) Ibadan in partnership with the National Root Crops Research Institute,(NRCRI), Umudike, Nigeria, developed and released the first pro-vitamin A cassava variety in 2011 which included UMUCASS 36(TMS 01/1368), UMUCASS 37and UMUCASS 38 (TMS 01/1371) Subsequently, in 2013 three more varieties were released UMUCASS 44, UMUCASS 45 and UMUCASS 46 (NRCRI, 2014).

The pro vitamin A cassava varieties have high yields and resistant to some pests and diseases; draught and can provide 25% of daily recommended vitamin A intake (De Moura *et.al.,* 2015, Chavez *et. al*, 2007). These varieties have been disseminated and adopted by farmers in some of the states in southern Nigeria which include Imo, Anambra, Delta and Akwa Ibom States (Amadi, *et.al*., 2019). One of the reasons for high adoption rate of pro-vitamin A cassava varieties was due to its nutritive value (Uwandu, *et.al.,* 2019). Amadi, *et.al.,* (2019) also reported that high consumption rate of pro-vitamin A cassava in Anambra State was attributed to its health benefits.

Despite the high adoption and consumption rate of pro-vitamin A cassava in Anambra S tate, there is still dearth of information on its level of commercialization in the state. Hence, the study was designed to:
i) Describe the socioeconomic characteristics of the respondents,
ii) Assess the level of commercialization of pro-vitamin A cassava
iii) Estimate the determinants of commercialization, and
iv) Identify constraints to commercialization of pro-vitamin A cassava

METHODOLOGY
The study was conducted in Anambra State, Nigeria. A multi stage sampling technique was used in the selection of pro-vitamin A cassava farmers. Firstly, two out of the four agricultural zones in Anambra state were purposively selected because of the intensity of pro vitamin A production and marketing in the areas. The zones were Aguata and Anambra. In the second stage, four communities each was selected from the two agricultural zones, making it a total of eight communities namely, Omogho, Ajali, Ogboji and Ezirafor Aguata zone, Omor, Umumbo, Igbariam and Nando for Anambra zone respectively. In the third stage, fifteen cassava farmers were selected from each community in the two zones which was 60 farmers in each of the two zones bringing it to a total of 120 pro-vitamin A cassava farmers (respondents). Data were collected using structured questionnaire. List of pro-vitamin A cassava producers was accessed from NRCRI, Umudike Extension Research officers who participated in the dissemination of pro-vitamin A cassava in the study area. This served as the sample frame. Data were analyzed using descriptive statistics for objectives i and iv (Socioeconomic characteristics of the farmers and Constraints to commercialization). Commercialization index was employed to ascertain the level of commercialization of pro-vitamin A cassava in the study area.(Objective ii) This was specified as:

$$\text{Commercialization Index} = \frac{\text{Value of crop sold}}{\text{Total value of crop produced}} \times \frac{100}{1} \qquad (1)$$

The index measures the ratio of the gross value of crop sold by household i in the year j to the gross value of all the crops produced by the same household(i) in the same year (j) expressed as percentage. The index is a measure of the extent to which the household crop production is oriented toward the market. A value of zero signifies total subsistence-oriented households and the closer the index is to 100, the higher the degree of commercialization. This index has been used previously

by Govereh *et. al.* (1999) and Strasberg *et.al.* (1999). The third objective (Determinants of commercialization of pro-vitamin A cassava) was analyzed using ordinary least square regression model. The model is implicitly expressed as follows:

$$Y = f(X_1+X_2+X_3 \ldots X_8) + e \quad (2)$$

Y = Commercialization (Mean score)
X1= Sex (Male =1, female = 0)
X2 = Age (years)
X3 = Household size (number)
X4= Distance to the market (km)
X5= Membership of marketing association (yes = 1, no=0)
X6= Marketing experience (years)
X7= Market cost (₦)
X8= Level of education (years)
e = Error term

RESULTS AND DISCUSSION

Socio-economic Characteristics of Farmers

The results of the socio-economic characteristics of the respondents as shown in table 1 depicted that most of the respondents (83.3%) were females, indicating that more females were involved in commercialization of pro-vitamin A cassava in the study area. This result agrees with the findings Adenegan (2015) and Adenegan (2013)[b] who reported that more women are involved in cassava commercialization in Nigerian farming system. About half (41%) of the respondents were between 30-39 years and the mean age was 37 years. This implied that respondents were young and energetic farmers. The result also showed that 53.3% of the respondents acquired secondary school education while 39.2% had tertiary education and the mean level of education was 12 years. The result also revealed that 60% of the respondents were married, while 40% were unmarried. Majority of the households (69.2%) had household size of 1-4 while 24.2% had a household size of 5-8 and the mean of household size was 3 persons. Most of the respondents (76.7%) had a marketing experience of 1-10 years while 21.7% had marketing experience of 5-8years and the mean marketing experience was 9 years. This also could help in commercialization. Having good experience will make the respondents master some of the strategies that are vital in the business. A majority (58.33%) of the respondents belonged to an association which could also help in commercialization through exchange of ideas and information

Table 1: Socio-economic Characteristics of Pro Vitamin A Cassava Farmers

Variables	Frequency	Percentages	Mean
Sex			
Male	20	16.7	
Female	100	83.3	
Total	**120**	**100**	
Age			
20-29	24	20.0	
30-39	49	40.8	**37 years**
40-49	31	25.8	
50-59	16	13.3	
Total			
Educational level			
No formal education	7	5.8	**12 years**
Primary education	2	1.7	
Secondary education	64	53.3	
Tertiary education	47	39.3	
Total			
Marital status			
Single D	48	40.0	
Married	72	60.0	
Household size			
1-4	83	69.2	**3 persons**
5-8	29	24.2	
9-12	08	6.7	
Marketing experience			
1-10	92	76.7	**9.4 years**
11-20	26	21.7	
21-30	02	1.7	
Membership of association			
Yes	70	58.33	
No	50	41.67	
Total	**120**	**100**	

Source: Field Survey Data, 2019

Commercialization of Pro Vitamin A Cassava Roots

Household Commercialization Index(HCI) was used to measure the level of commercialization among small- holder pro- vitamin A cassava farmers in Anambra State. The results in Table 2 show the various levels of commercialization. Majority (42.5 %) of the respondents had commercialization index between (51% - 100%), implying that majority of the households had above 50% commercialization index. The medium class household (30%) fell between 26-50% while the low class households with the least 27.5% commercialization index fell between 1-25%.Furthermore, the result signified that pro-vitamin A cassava producing household sold an average of 50 % of its output with sales ranging from 4.9% to 98.0%. According to Govereh *et.al.* (1999) and Stratesberg *et.al.* (1999), the closer the index is to 100, the higher the degree of commercialization.

The commercialization level of the pro-vitamin A cassava producing household is apparently high. This could be as a result of high adoption and consumption of this variety of cassava in the study area, which can subsequently induce high production and commercialization.

Table 2. Analysis of level of commercialization of Pro-vitamin A Cassava Root Among Small-holder Farmers in Anambra State, Nigeria

Level of commercialization	Frequency	Percentage
Low (1-25%)	33	27.5
Medium (26-50%)	36	30.0
High (51-100%)	51	42.5
Total	**100**	**100.0**
Mean commercialization index	53.43	-
Minimum commercialization index	4.90	-
Maximum commercialization index	98.00	-

Source: Field Survey Data, 2019

Determinants of Pro Vitamin A Commercialization

The result of the linear regression output of the determinants of commercialization of pro vitamin A cassava roots are presented in Table 3. Determinants of commercialization of pro- vitamin A was analyzed using the linear regression output The R^2 was 0.827 indicating that the variable explained 82.7% variation in the dependent variables. The F- value was 50.035 and significant at 1% showing the goodness of fit of the model.

Table 3: Linear Regression Estimates of the Determinants of Pro-vitamin A cassava Commercialization in Anambra State

Variable	Coefficient	Standard error	T statistics
Constant	4.548	0.185	**24.583*****
Sex	-0.023	0.066	**-3.833*****
Household size	-0.091	0.049	**-1.857****
Membership of association	0.016	0.009	**1.778****
Age	0.018	0.124	0.145
Marketing cost	-0.017	0.004	**-4.25*****
Level of education	0.112	0.029	**3.862*****
Distance to market	0.016	0.045	0.355
Marketing experience	0.014	0.058	0.706
F statistics			50.035
R^2			0.827

Source: Field Survey Data, 2019, *** Significant at 1%, ** at 5%

The results showed that five out of eight variables tested were significant at varied levels of probability. These include sex, household size, and membership of an association, marketing cost and level of education. The coefficient of sex was negatively related to commercialization at 1%, implying that more women are involved in the commercialization of pro vitamin A cassava root. The result is consistent with Agwu *et.al.* (2015) and Opondo *et. al.* (2017) who stated that a man's social life is not as interactive as that of a woman and this reduces the activity in the commercialization and also men are more prominent in off farm activities to argument household income and needs. The result contradicts that of Forsythe *et. al.* (2016) who opined that men and women are equally involved in commercialization of cassava at different levels, but men dominate the marketing while women are more in processing activities.

The coefficient of household size was inversely related to commercialization at 5% level. This implies that larger household size tends to decrease the rate of commercialization by increasing consumption. This is expected due to the fact that more of the production crops will be consumed by the family thereby reducing expected quantity meant for sales (marketed surplus). This finding is at consonance with that of Nwachukwu and Eze (2018).The coefficient of membership of association was significant and directly related to commercialization at 5 %, signifying that an increase in membership of an association will lead to a corresponding increase in commercialization of pro vitamin A cassava root. This could be attributed to group information and cross fertilization of ideas. The coefficient of marketing cost was significant at 1% and negatively related to commercialization, implying that an increase in marketing cost will lead to a decrease in

the level of commercialization. The findings contradicted Opodo*et.al* (2017) who reported a positive relationship between marketing cost and level of cassava commercialization.

The coefficient of level of education was significant at 1% and was positively related to commercialization, this implies that increase in the level of education increases commercialization by increasing knowledge and information access which are critical in decision making. This finding is consistent with Ogbonnaya (2012) and Onyegbulam *et. al.* (2019). But at variance with the view of Opondo *et.al* (2017) and Adenegan *et.al*.(2013)[a] who reported a negative relationship between years of schooling and commercialization of cassava.

Constraints to Commercialization of Pro Vitamin A Cassava

There were a lot of challenges against commercialization of pro vitamin A cassava. Top on the list was inadequate market stalls where these cassava stems and roots can be kept for sale. This scenario normally leads to the exposure of cassava under rain and sun which quickens deterioration. Perishability ranked second in order of severity of constraints. This is serious because cassava cannot store for a long time if unprocessed. This can give way to distressed sale whereby the pro vitamin A producer will be forced to sell at a giveaway price and below cost price to prevent deterioration. Other constraints identified were low demand, inadequate funds, bulkiness, susceptibility to diseases and poor access to road.

Table 4: Constraints Faced by Respondents in the Commercialization of Pro-VitaminA Cassava in Anambra state

Constraints	*Frequency	Percentage	Rank
Inadequate marketing stall	117	97.5	1st
Perishability	116	96.7	2nd
Low demand	69	57.5	3rd
Inadequate funds	66	55.0	4th
Bulkiness	54	45.0	5th
Susceptibility to disease	54	45.0	6th
Poor access road	51	42.5	7th

Source: field survey data, 2019. *Multiple responses recorded

CONCLUSION

The household commercialization index of the respondents was above 50% and showed that they were market oriented. The results of the study also revealed that sex, age, household size, membership of an association and marketing cost were significant factors influencing commercialization of pro vitamin A cassava. There were lots of constraints militating against commercialization; these include inadequate marketing stalls, perishability, low demand, low financial base, bulkiness, susceptibility to diseases and poor access road in order of importance.. There is need also to intensify promotion and popularization activities of the nutritional value of pro-vitamin A cassava, this will stimulate demand, encourage production and commercialization. It was advocated that farmers are trained on how to add values to pro-vitamin A cassava through diversification and processing into various products. This will reduce wastage and distressed sales, thereby increasing income of pro-vitamin A cassava producing households.

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