



ANALYSES OF COMMERCIALIZATION AMONG PRO-VITAMIN A CASSAVA FARMERS IN ABIA STATE, NIGERIA

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Abstract

This study was conducted among farmers in Abia State to assess the commercialization of Pro-vitamin A cassava. Multi-stage sampling technique was used in the study to select one hundred and twenty (120) farmers for the study. The farmers were interviewed by means of structured questionnaires to elicit information on pro-vitamin A cassava commercialization. Data collected were analyzed using descriptive statistics (such as frequency distribution, percentages, mean), and ordinary least square regression analysis. A five point likert rating scale was used to describe the perception of farmers about pro-vitamin A cassava. The result shows that *fufu* quality of yellow root cassava has the highest perception with the mean score of 4.22, followed by high market demand (4.20), highly profitable (4.10), and high nutrient (4.00). The significant determinants of pro-Vitamin A cassava commercialization include; education, age, distance to market, income, *fufu* quality, market value, price of products and processing value. The study therefore call for policies aimed at promotion of value addition of pro-vitamin A cassava, and bringing markets closer to the farmers to reduce the transactions cost of commercialization. Provision of free and affordable education to enable ease of access and ability to process information on marketing innovations, including modern cassava processing clusters for farmer groups for increased commercialization.

Keywords: Farmers, Commercialization and Pro-vitamin A Cassava

Introduction

Many years of research and development has greatly impacted on the cassava variety diversity on Nigerian farms. About 100 genotypes are grown on farmer's fields in South East States of Nigeria (Akoroda, 2011). Among root and tuber crops, cassava remains the key to food security and poverty reduction in Nigeria as most households are dependent on its production, processing and marketing (Amadi, 2018). Previous agricultural programmes in Nigeria have already emphasized high productivity and some efforts in preservation of produce, but little or no attention has been paid to improving the nutritional status of cassava as an energy giving food. Demand-driven research conducted by scientists at National Root Crops Research Institute (NRCRI) Umudike, in collaboration with International Institute for Tropical Agriculture (IITA), Nigeria has led to the development of many improved technologies on cassava with the hope to give the farmers a stable new market along with new production technologies. Among the developed technologies are improved cassava varieties that have high levels of pro-vitamin A, improved agronomic practices and cassava value

addition technology (Nwakor *et al.*, 2016).

Combating vitamin A deficiency (VAD), especially among infants and pregnant women has led to increased efforts in breeding and delivery activities of bio-fortified cassava. Biofortified cassava, provides a low-cost sustainable strategy for reducing VAD leading to improved nutrition and economic livelihoods opportunities for all ages (Olaosebikan *et al.*, 2019). The first variety of pro-vitamin A cassava was approved for release in Nigeria in late 2011, eight years after crop development activities were initiated in 2003 at the International Center for Tropical Agriculture (CIAT) and the International Institute of Tropical Agriculture (IITA) under funding from the HarvestPlus program. More than 10 years after release, it is estimated that more than one million Nigerian farm households are growing "yellow" cassava varieties, which contain significant amounts of pro-vitamin A even after processing. Yellow cassava now represents an additional source of vitamin A in Nigerian diets (Ilona *et al.*, 2017).

A potential market for root and tuber crops lies within the different product value chains. However, some of these product profiles in Nigeria are not competitive at the moment, basically because of absence of desirable traits envisioned by farmers, processors and consumers. Only about 38.37% of total cassava produced in Africa is supplied, implying post-harvest losses (FAO, 2013). The extent of commercialization of pro-vitamin A cassava varieties by farmers, processors and other stakeholders is yet to be studied. Since the final phase of a new product development focuses on the commercializing the product, the study seeks to assess the commercialization of pro vitamin A cassava among farmers in Abia State. One variable that can be used to access the trend in Cassava commercialization at the rural farm level is the proportion of cassava output that farmers sell after harvest from their fields. Cassava roots can either be sold (in roots or processed form) or consumed at home in the South-South and South-Eastern Nigeria (Ezedinmma *et al.*, 2007). The proportion sold suggests a higher degree of commercialization of the commodity. The Collaborative study on Cassava in Africa (COSCA) had used these variables along with others as indicators of cassava commercialization to show that on the average, Nigerian farmers were willing to sell about 45% of their cassava output 15 years ago (Nweke, 1994).

Understanding various factors that influence commercialization is one of the ways of unlocking constraints impeding cassava commercialization. Many studies have identified influencers of commercialization (Gabre-Madhin., 2010; Gonzalez, 2001; Omiti *et al.*, 2009). These factors are broadly categorized into household characteristics, market and institutional, as well as technical factors.

Methodology

The study was conducted among farmers in Abia State, Nigeria. The State is made up of 17 Local Government Areas (LGAs). Multistage sampling technique was used for the study. In the first stage, 6 LGAs (Arochukwu, Bende, Umuahia South, Isialangwa, Umunneochi and Umuahia North) were randomly selected, followed by random selection of 2 communities in each LGA. Ten cassava farmers were purposively selected in these communities based on intensity of commercialization giving a total number of 120 farmers for detailed study. A well-structured questionnaire with interview schedule was use to elicit information from the farmers. Data collected were analyzed by means of descriptive

statistics and ordinary least square multiple regression. A five point likert rating scale was used to measure the level of agreement of perception for yellow root among the respondents using strongly agree (5), agree (4), undecided (3), disagree (2) and strongly disagree (1). Respondents with mean score of 3.00 and above imply they are in agreement with the response questions, while respondents with mean score of less than 3.00 were not in agreement. To determine the mean likert level = $X_s = \Sigma X$. X_s of each item was computed by multiplying the frequency of each response pattern with its appropriate nominal value and dividing the sum with the number of respondent to the items. This can be summarized with equation below.

$$X_s = \Sigma fn/N$$

Where X_s = mean score

Σ = summation

f = frequency

n = likert nominal value

N = number of the respondents

$$X_s = 1+2+3+4+5/5 = 15/5 = 3.00$$

Multiple regression analysis was used to analyze the determinants of pro-Vitamin A cassava commercialization among the respondents in the study area, specified thus;

$$Y = F(X_1, X_2, X_3, \dots, X_{13}) + e$$

Where;

Y = Value of pro-vitamin A cassava roots supplied (N)

X_1 = Age (years)

X_2 = Marital status (dummy variable; 1 = married, 0 = otherwise)

X_3 = Gender

X_4 = Educational level (years)

X_5 = Distance to the Market (km)

X_6 = Income (N)

X_7 = Input access (dummy variable; 1 = yes, 0 = no)

X_8 = Food quality is good (ranked 1-5)

X_9 = Gari quality is good (ranked 1-5)

X_{10} = Fufu quality is good (ranked 1-5)

X_{11} = High market value (ranked 1-5)

X_{12} = Price of product (N)

X_{13} = High Processing value (ranked 1-5)

e = error term

Results and Discussion

Socioeconomic Characteristics of the Respondents

The socio-economic characteristics of the respondents are presented in Table 1

Table 1: Distribution of Respondents according to Socioeconomic Characteristics

Variable	Frequency	Percentage
Gender		
Female	86	71.7
Male	34	28.3
Total	120	100
Marital status		
Married	90	75.0
Single	22	18.3
Divorced	8	6.7
Total	120	100
Age		
21 – 30	32	26.7
31 – 40	28	23.3
41 and above	60	50.0
Total	120	100
Qualification		
No formal education	2	1.7
Primary	31	25.8
Secondary	60	50.0
Tertiary	18	15.0
Others	9	7.5
Total	120	100
Household size		
1-5	84	70.0
6-10	34	28.3
10 and above	2	1.7
Total	120	100
Distance to market (km)		
0-4	87	72.5
5-9	8	6.7
10-14	9	7.5
15 and above	16	13.3
Total	120	100
Distance to farm (km)		
0-4	96	80.0
5-9	0	0.0
10-14	12	10.0
15 and above	12	10.0
Total	120	100
Farming experience (years)		
1-9	16	13.3
10-19	46	38.3
20-29	26	21.7
30 and above	32	26.7
Total	120	100
Source of information		
Extension Agents	10	8.3
NRCRI Umudike	47	39.2
Fellow farmers	54	45.0
Marketers	9	7.5
Total	120	100
Cooperative membership		
Yes	90	75.0
No	30	25.0
Total	120	100

Source: Field survey, 2019

The result shows that majority (71.7%) of the respondents were females, (75.0%) of who were married, with 50% below 40 years of age. The implication is that many young people are involved in cassava farming in Abia State and this will lead to increase in production, utilization and commercialization of pro-vitamin A cassava varieties in the study area. This is because younger farmers are known to with stand more effectively the rigors, strain and stress involved in agricultural production than their aged counterparts (Onyenucheya and Ukoha, 2007). Many (50%) of the farmers attained secondary education, while 25.8% and 15% attained primary and tertiary levels respectively. This implies that the farmers were educated and this may lead to increase utilization and commercialization of pro-vitamin A cassava, because education has the capacity to influence adoption of new technology and attitudinal change to the desired technology (Okoye *et al.*, 2004). Majority (70%) of the respondents had small household size of 1-5 persons, while 28.3% had large household size of 6-10. Moderate to large household size in the study area suggests the availability of family labour which may enhance the commercialization of pro-vitamin A cassava. Majority (72.5% and 80%) of the respondents live close to the market and their farms respectively. This implies they have ease of access to their farms and markets which may enhance commercialization pro-vitamin A cassava. Most (86.7%) of these farmers have been farming for up

to 10 yrs and above implying that they are well experienced in cassava production and utilization which form the basis for commercialization. Ogbonnaya and Nwachukwu (2014) reported that increase in farming experience was positively related to commercialization. The most important source of information about cassava was fellow farmers (45.0%), followed by NRCRI Umudike (39.2%). Murphy (1993) observed that farmers communicate most frequently and effectively with those who are most known to them, more likely to obtain information from and be influenced in their farming practices and adoption decision by other farmers. About 57% of the respondents belong to co-operative societies. Membership of associations and groups possess the potentials of increased access to information important for production and marketing decision (Agwu *et al.*, 2013).

Pro-Vitamin A Cassava Varieties Cultivated by Farmers

Result in Table 2 shows the varieties of pro-vitamin A cassava grown by farmers in Abia State. The result shows that the most grown pro-vitamin A cassava variety was UMUCASS 36 (37.5%), while, UMUCASS 45 (1.7%) was the least. This showed that the farmers are growing these varieties but still in smaller proportions. Many (47.7%) have been growing these varieties since 2014/2015.

Table 2: Distribution of Respondents according to the varieties of pro-Vitamin A cassava Cultivated

Variety	Frequency	Percentage
UMUCASS 36	45	37.5
UMUCASS 37	14	11.7
UMUCASS 38	34	28.3
UMUCASS 44	15	12.5
UMUCASS 45	2	1.7
Others	10	8.3
Total	120	100
Year		
2014	50	47.7
2016	30	25.0
2018	40	33.3
Total	120	100

Source: Field Survey, 2019

Farmers Perception about Pro-vitamin A Cassava

The results in Table 3 show evidence of high perception for pro-Vitamin A cassava among the respondents with all the Likert values greater than 3. The result shows that fufu quality had the highest perception with the mean score of 4.22, followed by high market demand (4.20), highly profitable (4.10), and very nutritious (4.00). The farmers high perception of all the characteristics

assessed may have been influenced by personal beliefs and experience as there were several good qualities attributed to the pro-vitamin A cassava varieties such as, early maturity, high fresh root yield and tolerance to diseases; notably cassava mosaic disease (HarvestPlus, 2014). High perception of the characteristics assessed is indicative of the commercial value of pro-vitamin A cassava varieties.

Table 3: Distribution of Respondents according to perception about pro-Vitamin A cassava in the study area

Perception	SA	A	UN	SD	D	Total	Mean
Highly profitable	52 (260)	42(168)	10(30)	14 (28)	2 (2)	488	4.10
Very nutritious	56 (280)	40 (160)	6 (18)	8 (16)	10 (10)	484	4.00
Early maturity	18(90)	20 (80)	66(198)	8 (16)	8 (8)	392	3.30
Good garri quality	26 (130)	68(272)	18(54)	2 (8)	4 (4)	468	3.90
Good for fufu	36 (180)	74(296)	10(30)	0 (0)	0 (0)	506	4.22
Good for abacha	16 (80)	78(312)	20(60)	0 (0)	6 (6)	458	3.82
Low starch	22(110)	64(256)	28(84)	4 (8)	2(2)	460	3.83
High demand	34 (170)	72(288)	12(36)	2 (4)	0 (0)	498	4.20
Contain vit, A	36(180)	62(248)	14(42)	0(0)	8(8)	478	3.98
Very watery	26(130)	48(192)	32(96)	2(4)	12(12)	434	3.62
High storage value	18(90)	58(232)	32(96)	2(4)	10(10)	432	3.60
Attractive colour	28(140)	48(192)	16(48)	0(0)	12(12)	392	3.30
Low mortality rate	24(120)	74(296)	16(48)	0(0)	6(6)	470	3.92
Good canopy	18(90)	62(248)	24(72)	2(4)	14(14)	428	3.60
High root yield	12(60)	88(352)	16(48)	0(0)	4(4)	464	3.90
Rapid growth	8(40)	90(360)	16(48)	0(0)	0(6)	454	3.78
Easy to ferment	14(70)	74(296)	26(78)	0(0)	6(6)	450	3.75
Generally accepted	5(110)	70(280)	22(66)	0(0)	6(6)	462	3.85
Grand mean							3.82

Field survey, 2019, SA= strongly agree, A=Agree, UN= Undecided, SD=strongly disagree, D= Disagree, Decision rule: ≥ 3.0 =High, < 3.0 = Low

Sales Location and selling price

Location of sales for pro-vitamin A cassava presented in Table 4. The result shows that many respondents (50.8%) sold their products in the market, while 21.7% and 20.8% sold theirs at the farm gate and at home respectively. Many farmers sold their cassava in the market probably because of close proximity or more likely to get a better bargain. The fact that they can sell their pro-Vitamin A cassava even at home indicate that it is a commodity that is in high demand. Marketing can be a problem for poor farmers especially those living in

villages with poor feeder roads who may not have resources to transport their commodities to the market. Typically, farmers transport cassava as Head loads, on Bicycles, or in Lorries. With poor market access, marketing cassava can be particularly problematic because of its bulky nature, especially unprocessed roots. Poor access also makes the movement of goods and people difficult; particularly during the rainy season. This has significant implications for marketing (IITA, 2004).

Table 4: Distribution of respondents according to Sales Location

Place of sale	Frequency	Percentage
Farm gate	26	21.7
Market	61	50.8
Village square	8	6.7
Home	25	20.8
Total	120	100.00

Source: Field survey, 2019

Result in Table 5 showed that majority of the farmers sold pro vitamin A cassava roots, gari and fufu at varying prices per 50kg. Many (34.2%) sold their cassava roots

at the rate of N1000-N2000 per 50kg, while 29.2% sold theirs at <N1000.

Table 5: Distribution of respondents according to selling price of Pro-vitamin A cassava products in the study area

Price per 50kg	Frequency	Percentage	Quantity sold/annum (kg)
Cassava root (50kg)			
< 1000	35	29.2	500
1000-1999	41	34.2	1,800
2000-2999	22	18.3	250
3000 and above	22	18.3	250
Pro-vitamin A Cassava Gari			
< 2000	0	0.0	0
2000-4000	0.0	0.0	0
4100-6000	48	40	500
Above 6000	68	56.7	250
Pro-vitamin A Cassava fufu			
< 2000	0	0.0	0
2000-4000	2	1.6	200
4100-6000	50	41.7	950
Above 6000	68	56.7	350

Source; Field survey, 2019

About 18.3% sold their cassava roots at rate of N2000/50kg and above. The results also show that many (56.7%) of the respondents sold their yellow root gari at N6000 and above per 50kg, while 40% sold their between N4,100 – N6000 per 50kg. Many (56.7%) respondents sold yellow root fufu at N6000 and above per 50kg, while 41.7% sold theirs at between N4100 and N6000. The implication is that pro-vitamin A cassava varieties have been disseminated, adopted and marketed among farmers in Abia State but the quantities in the markets were still marginal. Most of the farmers sold quantities below 2000kg annually.

Determinants of commercialization among pro-vitamin A cassava farmers

The Ordinary Least Square regression estimates of the determinants of commercialization of pro-vitamin A cassava is shown in Table 6. The linear functional form was chosen as the lead equation (+). This was based on the number of significant variables and the high R^2 value and conformity to *a priori* expectations. The coefficient of multiple determination (R^2) of 0.865 implies that 86.5% of the total variation in the dependent variable was explained by changes in the independent variables. The F value was highly significant at 1% level indicating that the model was good.

The coefficient of age was significant at 1% level and negatively related to the commercialization of pro-vitamin A cassava in the study area. This implies that any increase in age of the respondents will lead to a corresponding decrease in the commercialization of cassava.

Ageing reduces the likelihood of engaging in commercialization especially after going past maturity age (50 years and above). Generally, productivity

declines as farmers get older, hence impacting on commercialization activities. This finding is consistent with that of Agbola (2010) who found that as household heads advance in age, they only engage in basic farming activities for short hours and spend less time on commercialization activities such as value addition and market participation.

The coefficient of education was significant at 10% and positively related to commercialization of yellow root cassava in the study area. This implies that any increase in education leads to a corresponding increase in the commercialization of pro-vitamin A cassava, thus reflecting the importance of education on nutrition sensitive agriculture. Education matters in terms of reducing the costs of searching for information. Moreover, the time taken to process and act on information decreases with education (Pingali *et al.*, 2005). Higher educational experience generates additions to the intellectual capital stock which may, in turn, lead to increased potential for skills acquisition during participation (Lapar *et al.*, 2003).

The coefficient of distance to market was significant at 5% level and negatively related to the commercialization of pro-vitamin A cassava in the study area, indicating that nearness to the market enhanced commercialization of pro-vitamin A cassava. This is in conformity with *a priori* expectation. Farmers who are farther away from market centers are less likely to commercialize. This could be that most rural transportation networks are not properly linked to the villages where majority of the farm households populate. In addition, most of the rural roads are impassible during wet season. This increases the cost of transportation hence deterring farmers from

competitive participation in markets (Pingali *et al.*, 2005).

The coefficient of income was significant at 5% level and positively related to the commercialization of yellow root in the study area. This implies that increase in income leads to a corresponding increase in the commercialization of pro-vitamin A cassava. This is in agreement with the report of Onyegbulam, *et al.*, (2020).

The coefficient of fufu quality was significant at 5% level and positively related to commercialization of pro-vitamin A cassava in the study area. This implies that

increase in fufu quality leads to a corresponding increase in the commercialization of pro-vitamin A cassava. This was in agreement with the finding of Harvest plus (2019) that fufu was the major commercial product of pro-vitamin A cassava among farmers in Oyo State.

The coefficients of market value and processing were positive and significant at 1% each and price of product at 10% level, implying that any increase in these variables will lead to a corresponding increase in the commercialization of yellow root cassava.

Table 5: Regression estimates of determinants of commercialization among pro-Vitamin A cassava farmers in the study area

Variables	+Linear	Exponential	Semi log	Double log
Constant	3.619 (7.543) ^{***}	0.172 (0.879)	15.209 (1.534)-	2.463 (1.594)
Age (X ₁)	-0.133 (-5.546) ^{***}	-0.011 (-1.277)	6.935 (-1.243)	-1.026 (-1.180)
Marital Status (X ₂)	0.636 (1.249)	0.073 (1.446)	5.814 (1.441)	3.459 (1.111)
Gender (X ₃)	-0.741 (-1.306)	-0.083 (-1.494)	4.871 (1.418)	0.238 (0.679)
Education (X ₄)	0.078 (1.818) [*]	0.025 (2.093) [*]	7.723 (2.288) [*]	1.459 (2.772) ^{**}
Distance to Market (X ₅)	0.326 (-2.161) [*]	0.096 (2.320) [*]	4.479 (2.178) ^{**}	0.581 (1.805) [*]
Income (X ₆)	2.982 (2.616) ^{**}	0.010 (0.293)	0.039 (0.028)	0.107 (0.449)
Input Access (X ₇)	0.895 (1.552)	-5.091 (-1.678) [*]	-3.073 (-2.248) [*]	-0.505 (-2.371) [*]
Food Quality (X ₈)	0.195 (1.462)	0.057 (0.695)	-0.225 (-0.173)	-0.119 (-0.588)
Gari Quality (X ₉)	0.774 (1.519)	1.244 (1.132)	2.333 (2.568) ^{**}	0.446 (3.152) ^{***}
Fufu Quality (X ₁₀)	0.550 (2.592) ^{**}	-9.344 (-3.500) ^{***}	0.254 (0.163)	-0.172 (-0.707)
Market Value (X ₁₁)	0.000 (8.013) ^{***}	-6.854 (-2.207) ^{**}	-2.205 (-1.947) [*]	-0.342 (-1.936) [*]
Price of product (X ₁₂)	0.000 (1.852) [*]	-9.344 (-4.580) ^{***}	0.154 (0.063)	-0.152 (-0.907)
Processing Value (X ₁₃)	4.309 (3.576) ^{***}	-9.554 (-3.550) ^{***}	0.226 (0.100)	0.300 (-0.207)
R ²	0.865	0.564	0.474	0.555
R ⁻²	0.849	0.520	0.431	0.519
F- ratio	52.383 ^{***}	12.706 ^{***}	11.005 ^{***}	15.239 ^{***}

Source: Field Survey, 2019

*= 10%, ** = 5%, *** = 1%; + =Lead equation; Values in parenthesis are the t-ratios

Conclusion

The study showed that pro-vitamin A cassava have been commercialized in Abia State as farmers have started making living from its roots and processed products. The important determinants of its commercialization were education, age, market distance, income, fufu quality, market value, price of the products and

processing value. The results call for policies aimed at provision of free and affordable education to enable the farmers access and process information that will enable enhanced commercialization of pro-vitamin a cassava products in the study area. There is also need for promotion of value added pro-vitamin A cassava products should be promoted. Farmers should be

encouraged through establishment of product clusters closer to markets to reduce the transactions cost of commercialization. Also, well equipped cassava processing clusters should be established for increased commercialization

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