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Selected Socio-Economic Factors Influencing Consumption of Pro-Vitamin A Cassava Products in South-East and South-South Nigeria

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ABSTRACT
This study examined the selected socio-economic factors influencing consumption of pro vitamin A cassava by respondents in south-east and south-south Nigeria. A multi-stage sampling procedure was used to select a sample of 480 respondents. Structured questionnaire and Focus Group Discussions were used to elicit information on the socio-economic characteristics of the respondents, level of consumption of pro-vitamin A cassava products and factors influencing the consumption of the pro-vitamin A products. Data collected were analyzed using descriptive statistics and ordinary least square (OLS) regression analysis. The results of the study revealed that 77.7% of the respondents had participated in extension activities. The result further showed moderate consumption (x^{-}=2.05) of pro vitamin A cassava products. Major constraints to consumption of pro vitamin A cassava products by respondents included high cost of the products, the products not easily accessible and unavailability of the products. The coefficient of years spent in education, household size, farming experience, farm size, farm income, access to farm credit, group membership, participation in extension activities and level of palatability were found to influence consumption of pro-vitamin A cassava products at 1%, 5% and 10% significant levels respectively in the study area. The study concluded that most of the respondents in the study area consumed the pro vitamin A cassava products, though at a moderate rate. This study therefore, recommends that government and technology developers through the extension personnel should make the technology available, accessible and affordable for consumers in order to increase the uptake of the technology in the study area.
Keywords: Pro- vitamin A cassava products, Farmers, Consumption, Influence

INTRODUCTION

Cassava is an important root crop widely grown by both male and female farmers in Nigeria (Amadi *et al*., 2019). It is a robust crop able to withstand disease, drought and pests and not just important as food crops but as a major source of cash income for producing households, compare with other stables (Odoemelam and Anyim, 2019). Millions of Nigerians, irrespective of age, sex or geographic location consume less vitamin A than the body needs while women and children remain the most vulnerable (Egesi *et al*, 2014). Vitamin-A is an essential nutrient lacking in the diets of poor malnourished population (Effiong et al., 2015) Vitamin A deficiencies retards growth increase risk of disease and can cause reproductive disorders. Improving cassava production with pro vitamin A could significantly improve nutrition and overall health significantly especially among poor communities. A sustainable way of mitigating vitamin A deficiency is by breeding food staples such as cassava to produce vitamin A by itself, a process known as biofortification. The consumption of pro-vitamin A cassava could help Nigeria reduce economic losses in gross domestic product estimated at about $1.5 billion (Ilona, 2012). Most importantly, it improves nutrition, especially of women and children who are the most vulnerable. In developing countries, vitamin A deficiency remains a major bottleneck to improved nutrition with approximately 250,000 to 500,000 malnourished children going blind each year, half of whom die within a year of becoming blind (Abdoulaye *et al*, 2014). The prevalence of night blindness due to vitamin A deficiency is also high among pregnant women in many developing countries (Abdoulaye *et al*, 2014).

Expectedly, Nigerians should take a lead in consumption of pro vitamin A cassava products such as *fufu, gari, tapioca,* flakes and the value-added products as these efforts will ultimately satisfy the increasing need for more healthy and nutritious food produced in environmentally sustainable ways. However, the rate of consumption of pro vitamin A cassava in Nigeria is subject to its profitability in terms of nutritional value, health benefits, marketability, high yield, quality of the products and socio-economic characteristics of farmers (Amadi *et al.*, 2019). In view of the above, the need to examine factors influencing consumption of pro vitamin A cassava products in Nigeria becomes imperative. The broad objective of the study was on factors influencing consumption of pro vitamin A cassava products in south-east and south-south Nigeria.

The specific objectives of the study are:

(i) describe the selected socio-economic characteristics of respondents;
(ii) determine the level of consumption of pro-vitamin A cassava products among the respondents; and
(iii) identify the constraints to consumption of pro vitamin A cassava products

Hypothesis

The consumption of pro vitamin A cassava is not influenced by selected socio-economic characteristics of the respondents in Imo, Anambra, Delta and Akwa Ibom States.

METHODOLOGY

The study was conducted in south-east and south-south Nigeria. In south-east, farming is the predominant occupation of the people, majority of who are small-holder farmers while in south-south, resident population (65%) are engaged in agricultural activities while (35%) of them are into oil activities (Wikipedia, 2017). The population of the study consisted of cassava farmers in the study area purposively selected from Imo and Anambra States representing south east and Akwa Ibom and Delta states representing south-south Nigeria. This was because pro vitamin A cassava had been massively disseminated in those areas. Multistage sampling technique was used in selecting the sample size of 480 respondents cumulatively chosen from the four states. The first and second stages involve purposive selection of eight agricultural zones and twenty-four blocks from the four states. In the third stage, forty-eight circles were randomly selected from the blocks. Finally, ten pro vitamin A cassava farmers were randomly selected from the circles, giving one hundred and twenty respondents from each state and a total of 480 respondents across the states. The study made use of well- structured questionnaire and focus group discussion to obtain data for the study.

The level of consumption and usage of pro vitamin A cassava products was determined using mean count presented on a 3- point rating scale. The points were always consume = 3, rarely consumed = 2 and never consumed = 1. In using the three point rating type, a mid-point was obtained by adding 3, 2 and 1 which gave 6 and when divided by 3 gave a mean score of 2.0 which was the bench mark).

Decision rule: >2.0 indicate high and moderate consumption; < 2.0 indicates low consumption

The factors influencing consumption of pro vitamin A cassava products were determined using Ordinary Least Square regression model (OLS) thus:

$$Y=b_o + b_1X_1ei$$

Where,
Y= adoption of pro vitamin A cassava varieties
X= socio-economic characteristics of respondents
B_o= regression constant
B_1=vector of parameter to be estimated
Ei= error terms

The value of log likelihood function is given as, empirical model is presented below:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 \ldots X_n + ei)$$

Where,
X_1 = educational qualification (years of schooling)
X_2 = household size: (no. of persons in a household)
X_3 = farming experience (years)
X_4 = farm size (hectares)
X_5 = farm income: (naira)
X_6 = easy access to farm credit (mean)
X_7 = member of cooperative (years)
X_8 = participation in extension activities (mean)
X_9 = level of palatability (mean)
ei = error term.

RESULTS AND DISCUSSION

The selected socio-economic characteristics of the respondents

Table 1 reveals that majority (56.9%) of the respondents in the two zones had 4-6 years of experience in farming pro vitamin A cassava. The findings show that farmers were made up of people who were both fairly experienced and also relatively new in pro vitamin A cassava farming. Majority (73.2%) of the respondents had farm size of between 0.1-0.99 hectares with a mean farm size of (0.64 hectare). These predominant small sizes at least gave credence to previous studies on pro vitamin A cassava farms which have always been reported as being characteristically small-scale production. Majority (77.7%) of the respondents have extension contact. This factor proved essential in the dissemination and adoption of pro-vitamin A cassava improved farming practices.

Table 1: Distribution of respondents based on their selected socio-economic characteristics

Variables	Imo		Anambra		Delta		Akwa Ibom		Pooled
	F	%	F	%	F	%	F	%	%
Farming experience									
1-3	45	37.5	47	40.2	69	57.5	46	38.3	43.4
4-6	75	62.5	73	0.8	51	42.5	74	1.7	6.9
Mean		3.7		3.7		3.4		3.7	3.6
Farm size									
0.1-0.99	95	79.2	81	67.5	92	76.7	83	9.2	73.2
1.0-1.99	24	19.9	39	32.5	27	22.5	35	9.2	6.0
2.0 and above	1	0.8	0	0	1	.8	2	1.7	0.8
Mean		0.60		0.64		.60		.7	.64
Extension contact									
Yes	9	65.8	87	72.5	105	87.5	102	85	77.7
No	41	34.2	33	27.5	15	12.5	18	15	22.3
Total	**120**		**120**		**120**		**120**		**480**

Source: field survey, 2018

Level of consumption form and usage of pro vitamin A cassava product

The result (Table 1) showed a grand mean of $\bar{x}$ =2.05, implying a general moderate consumption and usage of pro vitamin A cassava products. Specifically, moderate and high level of consumption form and usage of pro vitamin A cassava products by respondents in Imo State were consumed in garri form ($\bar{x}$=2.68), consumed in fufu form ($\bar{x}$= 2.47), disposed as fresh root ($\bar{x}$=2.00), disposed as stem ($\bar{x}$=2.07), used as flour ($\bar{x}$=2.07), consumed in flakes (abacha) form ($\bar{x}$=2.55) and consumed in value added form (cake, bread, chin-chin, doughnut) ($\bar{x}$=2.05) with a mean score of ($\bar{x}$=1.99).While in Anambra State were consumed in garri form ($\bar{x}$=2.94), consumed in fufu form ($\bar{x}$= 2.88), disposed as stem ($\bar{x}$=2.13), used as flour ($\bar{x}$=2.03), consumed in flakes (abacha) form ($\bar{x}$=2.30) and consumed in value added form (cake, bread, chin-chin, doughnut) ($\bar{x}$=2.01) with a mean score of ($\bar{x}$=2.05).

In Delta State were consumed in garri form ($\bar{x}$=2.40), consumed in fufu form ($\bar{x}$= 2.10), disposed as fresh root ($\bar{x}$=2.00), disposed as stem ($\bar{x}$=2.00), used as flour ($\bar{x}$=2.04), consumed in flakes (abacha) form ($\bar{x}$=2.35), consumed in value added form (cake, bread, chin-chin, doughnut) ($\bar{x}$=2.04) and consumed in *tapioca* form (2.15) with a mean score of ($\bar{x}$=2.00).While in Akwa Ibom state were consumed in garri form ($\bar{x}$=2.83), consumed in fufu form ($\bar{x}$= 3.00), disposed as fresh root ($\bar{x}$=2.10), disposed as stem ($\bar{x}$=2.09), used as flour ($\bar{x}$=2.07), consumed in flakes (abacha) form ($\bar{x}$=2.53) and consumed in value added form (cake, bread, chin-chin, doughnut) ($\bar{x}$=2.05) with a mean score of ($\bar{x}$=2.07).

The result of the finding shows that there were high levels of consumption of garri, fufu and flakes (*abacha*) in each state and moderate level of consumption of value added products, flour and dispose as stem as well. The result also shows that the mean for Imo and Delta states were low while that of Anambra and Akwa Ibom states were moderate. The moderate and low consumption and usage of these products could be that the food culture change is difficult to effects, is usually a gradual process in the sense that when people are used to a particular food item or technology, no matter how rich the new one is or pressure of giving them a new item, it takes time for that to be. This study corroborates with the reports of Rogers (2003) which noted that getting a new idea adopted or in used, even when it has obvious advantages, is often very difficult.

Table 2: Mean score responses of the respondents based on their level of consumption form and usage of pro vitamin A cassava products

Pro vitamin A cassava products	Imo(n=120)		Anambra (n=120)		Delta (n=120)		Akwa Ibom (n=120)		Pooled (n=480)	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Consume in garri form	2.68	.1567	2.94	.2353	2.40	.1568	2.83	.4613	2.71	.1691
Consume in fufu form	2.47	.2006	2.88	.4213	2.10	.2007	3.00	.4710	2.61	.3709
Dispose as fresh root	2.00	.2013	1.93	.5525	2.00	.2090	2.10	.2048	2.11	.3120
Dispose as stem	2.07	.2219	2.13	.5757	2.00	.2013	2.09	.2048	2.18	.2987
Use as flour	2.07	.2006	2.03	.2146	2.04	.3902	2.07	.2673	2.05	.6020
Consume in flakes (*abacha*)	2.55	.6169	2.30	.8158	2.25	.6169	2.53	.7214	2.40	.2752
Use as cassava chips	1.02	.1286	1.28	.5824	1.02	.1286	1.01	.0913	1.08	.3236
Consume in value added: bread, cake, etc	2.05	.2032	2.01	.2611	2.04	.2032	2.05	.3044	2.03	.2669
Tapioca	1.00	.0920	.100	.5087	2.15	.4719	1.00	.6500	1.28	1.022
Grand mean	**1.99**		**2.05**		**2.00**		**2.07**		**2.05**	

Source: field survey, 2018. Decision rule: >2.0 indicate high and moderate consumption; <2.0 indicates low consumption

Constraints to consumption of pro vitamin A cassava products

Table 3 shows that the level of consumption of pro vitamin A cassava products among respondents were constrained by some factors in the study area. Majority of the respondents were seriously constrained by high cost of the products (51.3%), the products not easily accessible (40%) and unavailability of pro vitamin A cassava products (37.7%). This implies that some factors are more or less retrogressive to the total consumption of the vitamin A cassava products. This finding is in line with the report of HarvestPlus Brief, (2016), that pro-vitamin A cassava have low dry matter content and poundability (a property well sort after by the Nigerian community) compared to the local cassava varieties, and this presents a major disadvantage to its acceptance by the rural persons.

Table 3: Constraints to consumption of pro vitamin A cassava products among respondents

Constraints to consumption	Imo (n=120)		Anambra (n=120)		Delta (n=120)		Akwa Ibom (n=120)		Pooled (n=480)	
	F	%	F	%	F	%	F	%	%	Rank
Unavailability of pro vitamin A cassava products	64	53.3	38	31.7	38	31.7	51	42.5	37.7	3rd
The products not easily accessible	60	50	40	33.3	42	35	50	41.7	40	2nd

High cost of the products	58	48.3	69	57.5	56	46.7	63	52.5	51.3	1st
Complexity of the technology	82	68.3	21	17.5	30	25	20	16.7	31.9	5th
The yellowish colour of the products.	20	16.7	56	46.7	50	41.7	16	13.3	29.6	6th
The product is not palatable	61	50.8	31	25.8	62	51.7	24	20	37.1	4th
Socio-cultural factors	15	12.5	10	8.3	16	13.3	12	10	11.0	7th

Source: Field survey, 2018. *Multiple Responses Recorded

Selected socio-economic factors influencing consumption of pro vitamin A cassava products among the respondents in south-east and south-south Nigeria

Table 2 showed the regression estimates of the influence of selected socioeconomic characteristics of respondents on consumption and usage of pro vitamin A cassava products in the study area. The coefficient of multiple determinations (R^2) value of 0.512 indicated that 51% of the variations in consumption and usage of pro vitamin A cassava products were explained by the variables in the model. The Chi-square value was statistically significant at 1% level of significance indicating high goodness of fit of the model used for the analysis. The significant variables were years in education, household size, farming experience, farm size, farm income, easy access to farm credit, group membership and level of palatability. The R^2 value for Imo, Anambra, Delta and Akwa Ibom were 0.986, 0.385, 0.875 and 0.930 indicating 98%, 38%, 87% and 93% with Imo state chosen as the lead equation for the four functional forms based on the value of R^2.

The result shows that coefficient of years in education was significant at 10% and positively related to consumption and usage of pro vitamin A cassava products in the study area. This implies that any increase in number of years of education led to a corresponding increase in consumption and usage of pro vitamin A cassava products. This agrees with *a priori* expectation. Education facilitates farmers' understanding about pro vitamin A cassava nutritional and health benefits and this increases consumption. This result concurs with the report of de Stein *et al* (2010) that consumption was now based on how well enlightened they are of its nutritional advantage against the high incidence of the vitamin A micronutrient deficiency in their communities. Also, Onumadu *et al*, (2008); Ume *et al.,* (2013) and Okoroafor and Nwobiala (2014) observed that the level of education supports adoption of technology through information sharing and distribution.

The result also shows that coefficient of household size was significant at 5% and positively related to consumption and usage of pro vitamin A cassava products. The positive sign of the variable implies that the larger the household size, the higher the consumption and usage of the products, especially households with little children and pregnant women. This agrees with *a priori* expectation. It is also estimated that by 2018 more than 2 million farming households will be planting vitamin A cassava and at least 17 million rural and urban consumers will be eating vitamin A *gari* and *fufu* in their regular diets (Ilona, 2012). This result agrees with the findings of Abdoulaye *et al, (*2015) that large households are better adopters of improved cassava varieties in Nigeria..

The coefficient of farming experience was positive and was significantly related to consumption and usage of pro vitamin A cassava products at 1% level of probability in the two zones. This implies that any increase in farming experience will lead to a corresponding increase in the probability of consumption and usage of pro vitamin A cassava products among farmers in the study area. The more they cultivate the varieties, the more they consume and use the products. This finding is in line with *apriori* expectation and findings of Anyanwu *et al*, (2016) who reported that increase in years of experience would enable farmers to efficiently produce effectively and maximize agricultural output for improved income.

The coefficient of farm size was positive and was significantly related to consumption and usage of pro vitamin A cassava products at 1% level of probability in the two zones. This implies that a unit

increase in farm size, increases consumption and usage of the products. Farm size has influence in consumption and usage of the products because people with large farm size may have a chance to apportion certain portion of the land for testing the newly improved varieties compared to people with small farm sizes.

The coefficient of farm income was revealed to be positive and significantly related to consumption and usage of pro vitamin A cassava products at 1% level. It can be adduced that an increase in farm income increases the probability of consumption and usage of pro vitamin A cassava products by farmers in the study area. Increase in farm income is expected to boost adoption of agricultural technologies because a poor farmer may not readily adopt an innovation that is too expensive. This is not in line with *a priori* expectation and findings of Amadi, *et al*; (2019) who says that a unit increase in income will cause increase in adoption of the technologies.

The coefficient of easy access to farm credit was found to be positive and significantly related to consumption and usage of pro vitamin A cassava products at 1% level. This implied that easy access to credit led to an increase in consumption of pro vitamin A products across the states. Following the argument that poor households experience difficulties trying to sustain immediate family, increased volume of credit helps to better the financial capacity of such households. This is in line with Olagunju (2007) who noted that farmers with better access to credit are significantly more likely to be adopters of the technology and that credit schemes tend to focus on the distribution of very few inputs but restricted to only few group of farmers.

The coefficient of years in group membership was positively related to consumption and usage of pro vitamin A cassava products and statistically significant at 1% alpha level. This indicated that the more in group membership the more the adoption and consumption of pro vitamin A cassava products in the two zones. This also is in accordance with *a priori* expectations. This result is consistent with the findings of Natson *et al*. (2018) that cooperative societies ensure collective production, marketing, enables farmers to access loans, training, ensuring pooling of resources together and reduction of information asymmetry thus reducing transaction costs and ensuring economies of scale.

The coefficient of respondents' level of palatability was negatively related to consumption and usage of pro vitamin A cassava products and statistically significant at 1% alpha level in the study area. This implies that any increase in the level of palatability of the farmers will lead to a corresponding decrease in the probability of adoption of pro vitamin A cassava products among farmers in the study area. Comparatively, the level of consumption and usage of pro vitamin A cassava were more influenced by selected socio-economic characteristics of farmers in south- south than in south-east Nigeria.

Table 3: Ordinary least square result of the influence of selected socio-economic characteristics of farmers on consumption of pro vitamin A cassava in the study area.

Variables	Imo Linear	Anambra Linear	Delta Linear	Akwa Ibom Exponential	Pooled Linear
Constant	.051 (13.421)***	.665 (-2.145)*	.065 (7.139)***	.066 .(-4.53)***	.185 (.676)***
Educational qualification	.157 (11.918)***	.024 (.321)	.231 (8.030)***	.157 (3.859)***	.062 (1.875)*
Household size	.199 (11.736)***	-.008 (-.094)	.094 (2.858)**	.202 (4.692)***	.099 (2.787)**
Farming experience	.495 (31.684)***	.028 (.326)	.191 (5.693)***	.317 (7.476)***	.132 (3.471)***
Farm size	.618 (53.075)***	.216 (2.836)**	.552 (19.998)***	.260 (6.530)***	.128 (3.498)***
Farm income	.090	.442	.443	.153	.351

	(4.729)***	(5.718)***	(15.420)***	(12.407)***	(10.355)***
Easy access to farm credit	.603	.448	.099	.522	.238
	(37.88)***	(0.032)	(3.49)***	(12.765)***	(6.636)***
Years in group	-.079	.162	-.412	-.672	-.109
membership	(-4.180)***	(2.127)*	(5.042)***	(-6.952)***	(-2.115)**
Participation in	.105	.145	.087	-.027	.181
extension activities	(2.072)**	(0.471)	(3.278)***	(-.737)	(5.311)***
Level of palatability	.151	.002	.194	.341	.418
	(-0.56)	(.028)	(7.520)***	(9.130)***	(12.392)***
F. stat	1130.13***	10.026***	184.346***	84.430***	54.723***
R^2	.986	.385	.930	.875	.512
R- adjusted	.985	.347	.925	.864	.503

Source: Field Survey data, 2018. Key: Significant at 1%***, Significant at 5% ** Significant at 10%* level of probability

CONCLUSION

The study revealed that (77.7%) of the respondents have participates in extension activities. The result further showed moderate consumption ($\bar{x}$ =2.05) of pro vitamin A cassava products. Major constraints to consumption of pro vitamin A cassava products by respondents included high cost of the products, the products not easily accessible and unavailability of the products in the study area. The study also revealed that all the selected socio-economic variables such as education, household size, farming experience, farm size, farm income, farming experience, farm size, access to farm credit, group membership, participation in extension activities and level of palatability were found to influence consumption of pro-vitamin A cassava products in the study area. Therefore, all the significant variables in the study should be taken into consideration by the technology developers and south-east and south-south ADPs in its efforts to increase the uptake of Pro-vitamin A cassava products.

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