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Determinants of Adoption of Pro Vitamin A Cassava Varieties by Farmers in Imo State, Nigeria

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ABSTRACT
The study examined the determinants of adoption of Pro vitamin A cassava by farmers in Imo State, Nigeria. Multistage sampling technique was adopted to select a total of 120 farmers for the study in 2018 using questionnaire and focus group discussion. Descriptive statistics and tobit regression model were used to assess farmers 'perception of pro-vitamin A cassava, levels of adoption, constraints and determinants of adoption of pro vitamin A cassava by farmers in the study area. The result showed low perception ($\bar{x}$=2.80) of pro vitamin A cassava, though some individual mean indicated positive perception; high level of adoption ($\bar{x}$=2.47) of pro vitamin A cassava. Tobit regression result showed that access to extension services at 1%, educational qualification, association membership at 5% and farming experience and nutritional information at 10% were the determinants of adoption of pro vitamin A cassava in the study area. Among the serious constraints in adoption of pro vitamin A cassava were: inadequate fund, high cost of labour, lack of farm credit, literacy level of farmers, marketing problem, inadequate fertilizer and poor extension visit. This paper therefore recommends that improved nutritional information about the new cassava technology should be prioritized to sensitize the farmers despite the high level of adoption among farmers and regular extension visits in order to further educate farmers.

Keywords: Pro- vitamin A Cassava, Varieties, Farmers, Adoption, Determinants

INTRODUCTION

Cassava is important, not just as food crop but as major source of cash income for producing households, in comparison with other staples. It contributes positively to poverty alleviation by generating income for the largest number of households (Anyanwu, 2016). Cassava crop is otherwise the main vehicle used for the delivery of sustainable vitamin A nutrient through bio fortification in Nigeria. Pro-vitamin A cassava is a genetically improved cassava variety containing β-carotene (a precursor of vitamin A) which has the potential for the alleviation of vitamin A deficiency in low income population (Onyeneke *et al*., 2018). In Nigeria, the world's largest producer and consumer of cassava, Vitamin A deficiency affects 30% of children under the age of 5 (WHO estimates), resulting in reduced immunity, impaired vision, and, in some cases, even blindness and death (Njoku *etal,* 2013) Furthermore, these health impairments cost Africa's largest economy an estimated US $1.5 billion in lost Gross Domestic Product (GDP) every year (Egesi *et al,* 2014).

Progressively, International Institute of Tropical Agriculture (IITA), Ibadan in partnership with National Root Crops Research Institute (NRCRI), Umudike, Nigeria, developed these pro vitamin A cassava varieties using traditional breeding methods in a Harvest-Plus-funded project. The first three pro vitamin A cassava varieties were released in 2011 by the National Variety Release Committee of Nigeria as UMUCASS 36, UMUCASS 37, and UMUCASS 38; and are recognized as IITA genotypes TMS 01/1368, TMS 01/1412, and TMS 01/1371 while the last three varieties released later were UMUCASS 44, UMUCASS 45 and UMUCASS 46 (NRCRI, 2014). The project works with national partners and the private sector to ensure that the pro-vitamin A-rich varieties reach resource-poor farmers in Nigeria (Abdoulaye *et al,* 2015). According to Ilona (2012), it is 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 consuming vitamin A *gari* and *fufu* in their regular diets. The rate of adoption of pro vitamin A cassava in Imo State depends on its profitability in terms of its availability, affordability, accessibility, nutritional value, health benefits, high yield, marketability and quality of the products. The objectives were to assess farmers' perception of Pro-vitamin A cassava, determine the levels of adoption of pro vitamin A cassava among farmers and to analyze the determinants of adoption of pro vitamin A cassava by farmers in Imo state.

MATERIALS AND METHODS

The study was conducted in Imo state, Nigeria. Imo is credited with a resident population of about 4 million (projected from NPC, 2006). The state is divided into three agricultural zones namely: Owerri, Orlu and Okigwe. A multistage sampling procedure was used in selecting the sample for this study. In the first stage two agricultural zones (Owerri and Orlu) were purposively selected. This is because pro vitamin A cassava has been massively disseminated in those areas. The second stage involved the selection of three (3) blocks from each of the two agricultural zones, making up a total of six (6) blocks. The third stage involved the random sampling of two circles from each of the blocks totaling twelve (12) circles. Ten (10) pro vitamin A cassava farmers were randomly selected from the list of pro vitamin A cassava farmers in the area, making it a total number of 120 farmers for the study. Focus Group Discussion and interview schedule with well-structured questionnaire were used to elicit information from the respondents. Data were analyzed by the use of descriptive statistics and inferential statistics: Tobit regression model specified as:

$$I_i = B^T X + e_i \quad (1)$$

$$Y_i = O \text{ if } I_i = T \quad (2)$$

$$Y_i = I \text{ if } I > T \quad (3)$$

Where,

Y represents a limited dependent variable, which simultaneously measures the adoption of pro vitamin A cassava.

I is an underlying latent variable that indexes of adoption of pro vitamin A cassava

T is an observed threshold level

X is the vector of independent variables of adoption of pro vitamin A cassava

β_i is a vector of parameters to be estimated

ei = error term. If the non variable T, becomes a continuous function of the independent variables and otherwise for the generated case

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

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

Where,

Y = Level of adoption of pro vitamin A cassava (measured by mean score of farmers)

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: (in Naira)

X_6 = Easy access to farm credit (mean: very easy, hardly easy, not at all)
X_7 = Member of cooperative (years)
X_8 = Participation in extension activities (mean: very often, hardly often, never)
X_9 = Nutritional information (yes = 1, no = 0)
ei = Error term.

RESULTS AND DISCUSSION

Farmers' Perception of Pro Vitamin A Cassava

The result (Table 1) showed grand mean of ($\bar{x}$=2.80), implying a negative perception of the farmers about pro vitamin A cassava. However, some individual mean results revealed that farmers had positive perception on nutritional value ($\bar{\mathbf{x}}$ = 4.29), followed by rapid growth variety ($\bar{\mathbf{x}}$ = 4.28), high yielding variety ($\bar{\mathbf{x}}$ = 4.26), matures early ($\bar{\mathbf{x}}$ = 3.06), resistant to disease/pest ($\bar{\mathbf{x}}$ = 3.01) and good for gari ($\bar{\mathbf{x}}$ = 3.00). On the other hand, some factors such as it does not select soil, it is a marketable products, decays easily in the soil, respond only to fertilizer, good for fufu, starch and value added products had negative perception by the farmers. This implies that farmers perceived and adopted pro vitamin A cassava based on factors that had relative high impact on their socio-economic status. This study is in consonance with the findings of Etuk and Umoh (2014) that positive perception of bio-fortified cassava through awareness was found to influence its adoption and sustainability. This corroborates the findings of Njoku *et al*, (2014) that some of the farmer-preferred traits included high yield, early maturity, tolerance to pests and diseases, sweetness, high amount of dry matter (DM) content, easy peeling, marketable roots, and roots that keep long in the ground without decaying.

Table1: Mean score responses of the farmers on the perception of pro vitamin A cassava

Pro vitamin A cassava Traits	$\bar{x}$	SD
It is a high yielding variety.	4.26	.439
It is a rapid growth variety.	4.28	.452
It has nutritional value.	4.29	.456
It is good for garri.	3.00	.330
It is good for fufu.	2.95	.437
It is good for flour.	2.15	.381
It is good for starch.	1.98	.128
It is good for value added products: bread, chin-chin,	2.30	.481
It is a marketable product.	2.23	.561
It decays easily in the soil.	2.59	.793
It matures early.	3.06	.250
It is resistant to disease/pests	3.01	.223
It does not select soil.	1.01	.182
It responds only to fertilizer.	2.09	1.20
Very expensive to maintain.	2.85	.817
Grand Mean	**2.80**	

Source: Field survey, 2018. *Decision: > 3.0 indicates positive perception; < 3.0 indicates negative perception.

Adoption of Pro Vitamin A Cassava

The result (Table 2) showed grand mean of ($\bar{x}$=2.46), implying high adoption of pro vitamin A cassava among farmers in the study area. Furthermore, the result indicated that 54 farmers adopt and still use the first pro vitamin A cassava varieties released and disseminated to farmers in 2011 while 41 farmers adopted and stopped and 25 farmers never adopted and the mean of $\bar{\mathbf{x}}$ =2.24 implies that there were moderate adoptions of the first pro vitamin A cassava varieties in the study area. The result also showed that 94 farmers adopt and still use the second varieties of pro vitamin A cassava released in 2014 while only 15 farmers adopted and stopped and 11 farmers never adopted and the mean of $\bar{\mathbf{x}}$ =2.69 implies that there was high adoption of the second pro vitamin A cassava varieties in the study area. The reason for higher adoption might be because of its high yielding, early maturity and nutritional/ health benefits. This finding is in accordance with the report of

Abdoulaye *et al,* (2015) who stated that several factors could drive the adoption process. It is also expected that high adoption would bring about improvement in the health and economic condition of the farmers and eradicate vitamin A deficiency in the study area.

Table 2: Famers level of Adoption of pro vitamin A Cassava Varieties

Pro vitamin A cassava Varieties	Never Adopted	Adopted and Stopped	Adopt and still Use	Total	Mean
1st three varieties released UMUCASS 36 TMS011368 UMUCASS 37 TMS1011412 UMUCASS 38 TMS1011371	25(25)	41(82)	54(162)	269	**2.24**
2nd three varieties released UMUCASS 44 TMS070220 UMUCASS 45 TMS1070593 UMUCASS 46 TMS1070539	11(11)	15(30)	94(282)	323	**2.69**
Grand mean					**2.47**

Source: Field survey, 2018. *Decision Rule: >2.0 indicate high and moderate adoption; < 2.0 indicates low adoption

Constraints to Adoption of Pro vitamin A cassava

The result in Table 3 showed that farmers had constraints militating against adoption of pro vitamin A cassava varieties due to inadequate fund ($\bar{x}$ = 4.66), high cost of labour ($\bar{x}$ = 4.30), lack of farm credit ($\bar{x}$ = 4.30),), literacy level of farmers ($\bar{x}$ = 4.23), marketing problem ($\bar{x}$ = 4.13), inadequate fertilizer ($\bar{x}$ = 4.08), poor extension visit ($\bar{x}$ = 4.03), government policies ($\bar{x}$ = 4.02), high cost/unavailability of pro vitamin A stem ($\bar{x}$ = 3.93), unavailability of flour processing machine ($\bar{x}$ = 3.83) and inadequate information ($\bar{x}$ = 3.64) with grand mean of score of ($\bar{x}$ = 3.4). The implication is that reduction of these constraints will help to improve production among farmers in the study area as well as other areas with similar constraints. The finding is in agreement with the study of Nwakor, (2010) who observed the same factors as the developmental challenges facing adoption of improved cassava in Nigeria. This finding is also in line with Agbarevo (2014) who reported that extension deliveries were not very effective in service delivery in some states and this affects adoption.

Table 3: Constraints to Adoption of Pro-vitamin A cassava

Constraints	$\bar{x}$	SD
Cost/unavailability of pro-vitamin A stem	3.93	.5142
Inadequate farmland	2.81	.8916
Diseases and pest infestation	2.35	.6693
Marketing problems	4.13	.4086
Poor extension contact	4.03	.2879
Literacy level of farmers	4.23	.4247
High cost of labour	4.30	.4602
Lack of farm credit	4.30	.4602
Inadequate information	3.64	.9148
Complexity of technology	2.21	.4833
Socio-cultural factors	2.02	.1286
Felt needs of the farmers	2.27	.6447
Poor quality of pro vitamin A cassava	2.07	.3605
Inadequate fund	4.66	.4763
Lack of fertilizer	4.08	.3469
Flour processing machine	3.83	.7409
Government policies	4.02	.4296
Herdsmen/cattle menace	2.37	.7454
Grand mean	**3.4**	

Source: field survey, 2018. *Decision >3.0 indicate serious constraints; <3.0 indicates not serious constraints

Determinants of Adoption of pro vitamin A cassava by farmers

Table 4 showed the regression estimates of the determinants of adoption of pro vitamin A cassava by farmers. The coefficient of multiple determinations (Pseudo R^2) value of 0.699 indicated that 69% of the variations in adoption of pro vitamin A cassava 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 educational qualification, farming experience, association membership, access to extension services and nutritional information.

The coefficient of educational qualification was statistically significant at 5% and positively related to adoption of pro vitamin A cassava. This implies that the higher the education, the probability of adoption of pro vitamin A cassava increases. This agrees with the findings of Ume *et al*, (2013) and Nwakor (2010) who found that education helped to facilitate adoption.

The coefficient of farming experience was statistically significant at 10% and negatively related to adoption of pro vitamin A cassava. This inverse relationship implies that the propensity to adopt decreases as experience in farming, measured by the number of years put into farming activities, increases. This could be due to the fact that farmers become more adapted to certain ways of doing things, and the process of adopting a new innovation is always difficult as reported by Rogers (2003) who noted that getting a new idea adopted, even when it has obvious advantages, is often very difficult.

The coefficient of association of membership was statistically significant at 5% and positively related to adoption of pro vitamin A cassava. This indicated that the more the membership of the farmers to an association, the more the adoption of pro vitamin A cassava in the state. Farmers who belong to associations are likely to be aware of improved pro vitamin A cassava varieties and most institution both extension and research interact more with farmer-based organizations with the aim of reaching out to many farmers within the shortest time frame with improved varieties and innovations. 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 access to extension contact was highly significant at 1% and positively related to adoption of pro vitamin A cassava. This factor proved essential in the dissemination and acceptance of the new technology of pro-vitamin A cassava varieties. This is in line with the *a priori* expectation that extension provides farmers with information on availability and technical skills for using innovations. This result agrees with the findings of Bouis and Saltzman, 2017 and Knowler and Bradshaw, 2007 that access to extension has positively influence adoption and continued use of agricultural technologies.

The coefficient of nutritional information experience was statistically significant at 10% and positively related to adoption of pro vitamin A cassava. This means that the more the nutritional and health information of pro vitamin A cassava the more the farmers adopt it. Also, nutritional campaigns have the potentials of improving the acceptance of people for pro-vitamin A bio-fortified crop varieties where they are introduced. This agrees with Ilona (2012) that Pro vitamin A cassava has the potential to contribute to improved nutritional status among Nigerians, particularly children and pregnant women of rural poor household. This result concurs with the findings of Onyeneke et al, 2018; de Steur *et al.*, 2010; Oparinde *et al.*, 2014 and Birol *et al.*, 2015) that acceptance/adoption of pro vitamin A cassava depended on how well informed they are of its nutritional advantage against the high incidence of the vitamin A micronutrient deficiency in the rural communities.

Table 4: Tobit regression estimates of the determinants of adoption of pro vitamin A cassava in Akwa Ibom state, Nigeria

Variables	Coef.	Std. Err	Z	P>|z|
Educational qualification	.6794105	.3334198	2.04	0.042**
Household size	.0557225	.0863265	0.65	0.519
Farming experience	-.2905107	.4228756	-1.64	0.101*
Farm size	-.0849654	.1510857	-0.56	0.574
Farm income	-.000023	.0000309	-0.74	0.457
Easy access to credit	.0475136	.3294483	0.14	0.885
Association membership	.5687265	.0604054	2.22	0.026**
Access to extension services	.1312111	.0758598	2.73	0.004***
Nutritional information	.2341252	.2903675	1.73	0.083*
Log Likelihood	-153.13177			
Pseudo – R Square	0.699			
Chi-Square	105.87***			

Source: Field Survey, 2018. *Keys: *** = p≤ 0.01, ** = = p≤ 0.01, ** = 0.05, = p≤ 0.01, * = 0.10

CONCLUSION AND RECOMMENDATIONS

The study evaluates the adoption of pro vitamin A cassava varieties among farmers in Imo State. The study showed that adoption of this technologically improved cassava varieties released in 2011 was moderate while that of 2014 was high among farmers. The study concluded that determinants of adoption include: educational qualification, farming experience, association membership, access to extension services and nutritional information. The study hereby recommends that improved nutritional information about the new cassava technology should be prioritized to sensitize the farmers despite the high level of adoption among farmers and regular extension by the extension agents should be prioritized in order to educate the farmers more.

REFERENCES

Abdoulaye T, Bamire,S. Adewale, O and Akinola, A (2015). Determinants of Adoption of Improved Cassava Varieties among Farming Households in Oyo, Benue, and Akwa Ibom States of Nigeria, *HarvestPlus working Paper. No 20*.

Agbarevo, M.N. B and Okeke-Sam, O (2014). The effect of adoption of cassava value added technologies on farmers' production in Abia state, Nigeria.

Anyanwu, C.I, Agwu, N.M and Okoroji V.N (2016). Determinants of Value Addition Financing Among Cassava Producing Households in Ikwuano Local Government Area of Abia State, Nigeria. *The Nigerian Agricultural Journal.* 47(2):49-57.

Birol, E., Meenakshi, J., Oparinde, A., Perez, S., Tomlins, K. (2015). Developing country consumers' acceptance of bio fortified foods. *Food Security,* 7(3): 555- 568.

Bouis, H. and Saltzman, A. (2017). Improving nutrition through bio fortification: A review of evidence from harvest plus, 2003 through 2016. *Global Food Security*, (12): 49 -58.

De Steur, H., Gellynck,X., Storozhenko, S., Liqun, G., Lambert, W., Van Der Straeten, D. and Viaene, J.(2010). Willingness to Accept and Purchase Genetically Modified Rice with High Folate Content in Shanxi Province, China. *Appetite* 54: 118–125.

Egesi, C.N, Olojede, A.O, Okogbenin, E, Parkes, E and Kulakow, P (2014) Naming, Registration and Official Release of three new pro-vitamin A cassava varieties in Nigeria *NRCRI 2015 Annual Report.*

Ilona, P. (2012). Delivery of Vitamin A Cassava in Nigeria. CIAT-HarvestPlus Survey. *The 2nd Global Conference on Biofortification: Getting Nutritious foods to people. Conference Brief #23a, IITA.*

Knowler, D., and Bradshaw, B. (2007). Farmers' adoption of conservation agriculture: A review and synthesis of recent research. *Food policy*, *32*(1), 25-48.

Natson, E.A., Bright O.A., Kwadwo, A., Patricia, P.A., Benedicta, N.F., Alex, N.W., Desmond A., Joyce H., Alex, A.A., Ernest, B. and Regina S. (2018). Adoption of Improved Sweetpotato Varieties in Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology 23(3): 1-13.*

NRCRI (2014) National Root Crops Research Institute, Umudike. *Annual Report, pp1- 32.*

Njoku, D.N, Egesi, C.N, Amanze, N.J, Eke- Okoro, O.N, Hussein, E and Olojede, A.O (2013). Evaluation of Forty-Eight Pre-Release of Pro Vitamin A Cassava Genotypes for Nutritional qualities in two diverse agro ecologies in Nigeria *NRCRI, Annual Report 2013. PP.8-10*

National Population Commission (NPC). (2006). Details of the breakdown of the National and State Provincial Population Totals 2006 Census. National Population Commission, Federal Republic of Nigeria Official Gazette 24(94):1 – 26.

Nwakor, N.F. (2010) Determinants of NRCRI Recommended Cassava Varieties in Abia State, Nigeria. An M.Sc Thesis. MOUAU, Umudike.

Onyeneke, R.U; Amadi, M.U and Anosike. F.C (2018) Bio-fortification in Nigeria: *A Systematic Review of Published Studies*. Department of Agriculture, Federal University Ndufu Alike Ikwo, Ebonyi State, Nigeria

Oparinde, A.A., Banerji, E.B. and IIona, P. (2014). Information and consumer willingness to pay for bio-fortified yellow cassava evidence from experimental auctions in Nigeria *HarvestPlus working Paper No 13 Washington DC, USA: International Food Policy Research Institute*

Rogers, E.M. (2003). Diffusion of Innovation-5th edition. *The Free Press, New York.*

Ume, S.I, Ede, N.O, Onuh, N.C, Ndukauba, J. and Ako, N. (2013). Determinants factors to the adoption of recommended cocoyam production technologies in Owerri West L.G.A of Imo state *Proceedings of the 47th Annual Conference of the Agricultural Society of Nigeria Pp.901*