Determinants of degree of adoption of Pro Vitamin A Cassava varieties among farmers in Delta State, Nigeria

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General Note
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ABSTRACT

The study examined the determinants of degree of adoption of pro vitamin A cassava by farmers in Delta State, Nigeria. Using a multistage sampling procedure, 120 pro vitamin A cassava farmers were selected from Delta state. Data were obtained using interview schedule with well-structured questionnaire and were analyzed by means of descriptive statistics like 3 rating scale, standard deviation and inferential statistics (Tobit regression model). Results showed that the coefficients of education, household size and farming experience had a direct relationship with the degree of adoption of pro vitamin A cassava varieties at 1% and 5% level of probability. The coefficients of farm income and access to extension visit had an indirect relationship with the degree of adoption of pro vitamin A cassava at 10% level of probability respectively. The adoption mean score implies that there were moderate degrees of adoption of pro vitamin A cassava in the study area. The respondents identified inadequate funding and high cost/unavailability of pro-vitamin cassava A stem as major factors affecting the degree of adoption. The study concluded that the

level of education, household size and farming experience positively determined farmers' degree of adoption of pro vitamin A cassava varieties while farm income and access to extension services negatively determined their degree of adoption of pro vitamin A cassava varieties. It is therefore recommended that more efforts of the extension workers in corroboration with the technology developers are highly needed to carry out nutritional information campaigns and agriculture shows with regards to pro vitamin A cassava to boost the degree of adoption in the study area.

Keywords: Determinants, Pro vitamin A cassava, Farmers, Adoption, Varieties

1. INTRODUCTION

One of the major goals of Nigerian agriculture development programmes and policies is to increase agricultural productivity for the accelerated economic growth. Productivity increases in agriculture can reduce malnutrition and poverty by increasing farmers' income, reducing food prices and thereby enhancing increments in consumption (Opeyemi et al., 2017). Cassava production plays a vital role in alleviating poverty in Nigeria, as it is virtually impossible that an average household will not consume a cassava product in a day. Therefore, cassava is an important factor in food security, poverty alleviation, rural urban drift, and reducing unemployment, improving dietary intake, among others (Okpukpara, 2006). Based on that, Nigeria released six improved pro vitamin A cassava varieties in an effort to maintain its lead as the world's largest producer of the root crops, eradicate vitamin A deficiency and improve incomes of farmers (IITA, 2017).

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). They performed well in different cassava production regions of Nigeria with a high yield, high dry matter, and a good disease resistance. The roots of these varieties are yellow and contain moderate levels of pro-vitamin A that can take good care of vitamin A deficiency among the growing population. Vitamin and mineral deficiencies affect more than two billion people worldwide, causing illness, disability and mortality. The problem is most severe in developing countries, where a third of the children under the age of five suffer from vitamin A deficiency and one fifth of maternal deaths are attributed to iron deficiency anemia during pregnancy (Micronutrient Initiative, 2009).

Vitamin A and iron deficiencies have several negative health and economic consequences, including early mortality and reduced productivity. Vitamin A deficiency (VAD) leads to night blindness, corneal scarring and blindness in children under the age of five (Stein et al., 2008). The new yellow root cassava varieties have the potential of providing up to 25% of daily vitamin A requirements of children and women. Since the presence of pro-vitamin A (β-carotene) in the new cassava could improve the nutritional status of the consumers, there is therefore a need to evaluate the adoption of these newly bred crops. Since cassava is a major staple food crop in Nigeria, consumption of this β- carotene cassava can help in combating vitamin A deficiency, which is a serious public health problem in many parts of the World. Technology adoption by farmers is an essential pre-requisite for the economic prosperity in Nigeria. The rate of adoption of pro vitamin A cassava in Nigeria is subject to its profitability in terms of its nutritional value, health benefits, high yielding, marketability and quality of the products. These varieties are expected to be adopted by farmers to improve their uptake of vitamin A. Pro vitamin A cassava has the potential to contribute to improved nutritional status among Nigerian rural poor households, and to boost improved pest- and disease-resistance traits (Egesi et al., 2014). Adoption of pro vitamin A cassava is an important route to improve health and nutritional status of poor cassava farmers by enhancing pro vitamin A cassava productivity. The rate of adoption of pro vitamin A cassava in south-east and south-south Nigeria is subject to its profitability, degree of risk associated with it, capital requirements, agricultural policies and socio-economic attributes. The objectives were to determine the levels of adoption of pro vitamin A cassava among farmers, to assess the factors affecting adoption of pro vitamin A cassava and analyze the degree of adoption of pro vitamin A cassava in Delta state.

2. MATERIALS AND METHODS

The study was conducted in Delta State, Nigeria. Delta State has a population of 4,112,445 (males: 2,069,309; females: 2,043,136) (NPC, 2006). It has an estimated area of 762 square kilometers (294 sq mi) and a total land area of 16,842 square kilometers (6,503 sq mi) (Wikipedia, 2017). The state is divided into three agricultural zones namely: Delta North, Delta Central and Delta South. A multistage sampling procedure was used in selecting the sample for this study. In the first stage two agricultural zones (Delta North and Delta Central) 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 (2) 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 like five (5) point rating scale and three (3) point rating types, mean and inferential statistics (Tobit Regression model). The model as used is specified thus:

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

Where:

Y = Level of adoption of pro vitamin A cassava (measured by number of adoption score of the respondents) to get the mean score.

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)

ei = Error term

3. RESULTS AND DISCUSSIONS

Adoption of Pro Vitamin A Cassava

The result of Table 1 on degree of adoption of pro vitamin A cassava varieties shows that the mean of $\bar{x}$ =2.28 implies that there were moderate adoptions of the first pro vitamin A cassava varieties while the mean of $\bar{x}$ =2.21 implies that there were also moderate adoptions of the second pro vitamin A cassava varieties disseminated in the study area. The reason for moderate adoption of the first and second varieties could be as a result of inadequate cassava stem and the quality of the varieties. Generally, the grand mean result of $\bar{x}$ =4.49 also indicates moderate degree of adoption. The moderate adoption recorded might be because of its quality and the level of nutritional information of the cassava created among the farmers by the disseminators. The finding is in agreement with the findings of Ironkwe (2012) that farmers adopt technologies that had relative high impact on their socio-economic status.

Table 1 Mean score responses on their 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)	36(72)	59(177)	274	2.28*
2nd three varieties released UMUCASS 44 TMS070220 UMUCASS 45 TMS1070593 UMUCASS 46 TMS1070539	30(30)	34(68)	56(168)	266	2.21*
Grand mean				540	4.49**

Source: Field survey, 2018. Mid Score Decision Rule: 2.0 and above is *** Very high adoption ** High adoption * Moderate adoption.

Perceived factors affecting adoption of pro vitamin A cassava varieties

The factors affecting the adoption of pro vitamin A cassava were determined on the basis of level of severity of all the results in Table 2. The result showed that inadequate funding ($\bar{x}$ =4.65) and Cost/unavailability of pro-vitamin A stem ($\bar{x}$ =4.18) were the

major factors affecting adoption of pro vitamin A cassava among farmers in Delta state. The grand mean of $\bar{x}$ =3.2 which is above the decision mean cut-point showed the factors are more or less retrogressive to the dissemination and total adoption goal of the vitamin A varieties. This finding is in line with Onyeneke *et al.*, (2018) who reported that reality of new hybrid varieties and its improved farming system, sometimes introduces certain difficulties for smallholder farmers to adopt due to inadequate fund.

Table 2 Perceived factors affecting adoption of pro vitamin A cassava among farmers

Perceived factors	$\bar{x}$	SD
Cost/unavailability of pro-vitamin A stem	4.18	.4488
Inadequate farmland	2.29	.6785
Diseases and pest infestation	2.43	.7741
Marketing problems	2.11	.4986
Poor extension contact	2.28	.6633
Literacy level of farmers	3.58	.9489
High cost of labour	4.07	.3831
Lack of farm credit	4.12	.4137
Inadequate information	3.59	.9393
Complexity of technology	2.11	.4259
Socio-cultural factors	2.04	.3278
Felt needs of the farmers	2.43	.8068
Poor quality of pro vitamin A cassava	1.98	.4193
Inadequate funding	4.65	.4787
Inadequate planting materials	4.05	.2188
Unavailability of flour processing machine	4.09	.2897
Government policies	3.90	.5710
Herdsmen/cattle menace	3.74	,9570
Grand mean	3.2	
Number of respondents	120	
Decisionmean cut-point	3.0	

Source: Field survey, 2018.

Table 3 Tobit regression estimates of the determinants of adoption of pro vitamin A cassava Delta state, Nigeria

Variables	Coef.	Std. Err	Z	P>|z|
Educational qualification	.3160592	.194666	2.62	0.004***
Household size	.2810248	.2374742	2.18	0.030**
Farming experience	2.246621	1.059881	2.12	0.034**
Farm size	2.8402	8.302079	0.34	0.732
Farm income	-1.827466	.00003	-0.73	0.035*
Easy access to credit	.0475136	.1232401	-1.34	0.181
Member of cooperative	.021803	.1232401	0.18	0.860
Access to extension services	-.0744428	.1062948	-0.70	0.484*
$Chi^2(X^2)$	20.35***			
Prob>	0.0049			
R^2	0.469			
Log Likelihood	-11.51517			

Source: field survey, 2018   *, ** and *** is significant at 10%. 5% and 1% level of probability

Determinants of degree of Adoption of pro vitamin A cassava by farmers

Table 3 shows the result of the tobit regression analysis on determinants of adoption of pro vitamin A cassava by farmers in the study area. The results revealed that the coefficient of determination (R^2) was 0.469, which implies that 46% of the variations in adoption of pro vitamin A cassava by farmers is determined by the independent variables discussed in the study and statistically

significant at 1 % level of probability (prob> Z = 0.0049). The estimate shows that educational level, household size and year of experience had positive influence on their degree of adoption of pro vitamin A cassava at 1% and 5% significant level of probability while farm income and access to extension services had negative influence on their degree of adoption of pro vitamin A cassava at 10% significant level of probability. This implies that the higher the level of education, household size and farming experience the probability of adoption of pro vitamin A cassava increases. This agrees with the findings of Ume et al., (2013) and Nwakor (2014) who found that education helped to facilitate adoption. This finding is also in line with *a prior* 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. This result also agree with the findings of Abdoulaye et al., (2015) that large households are better adopters of improved cassava varieties in Nigeria. However, the result disagrees with the findings of Anyanwu, et al., (2016) who says that a unit increase in income will cause increase in adoption of the technologies. This is also not in line with the report of Onyeneke, et al., (2018) who reported that access to extension services proved essential in the dissemination and acceptance of the new technology of pro-vitamin A bio fortified cassava varieties in Delta state.

4. CONCLUSION

The study has shown that both the first and second pro vitamin A cassava varieties have been adopted by farmers in Delta state, though at a moderate degree. The respondents identified inadequate funding and high cost/unavailability of pro-vitamin A stem as major factors affecting the degree of adoption. The study also concluded that explanatory variables such as level of education, household size and farming experience positively influenced farmers' degree of adoption of pro vitamin A cassava varieties while farm income and access to extension services negatively influenced their degree of adoption of pro vitamin A cassava varieties. This paper therefore recommends that more efforts of the extension workers in corroboration with the technology developers are highly needed to carry out nutritional information campaigns and agriculture shows with regards to pro vitamin A cassava to boost the degree of adoption in the study area.

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