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Socio-Economic Determinants of the Adoption of TME 419 and UMUCASS 38 Improved Cassava Varieties in Ajaokuta Local Government Area of Kogi State, Nigeria

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ABSTRACT

The study ascertained the determinants of adoption of recommended practices for two improved cassava varieties TME 419 and UMUCASS 38 introduced to farmers in Ajaokuta LGA of Kogi state. Data were collected from 138 farmers randomly selected from seven cassava growing communities. An interview schedule with structured questionnaire was used to elicit information. The data collected were analyzed by means of frequency tables, percentages, mean and Tobit regression model. The result revealed that most of the farmers are in their active age. Okoyawo, a local cassava variety is still the most cultivated cassava strain. TME 419 and UMUCASS 38 are merely cultivated by about 50% and 32% of the farmers, respectively. Sources of information as regards introduced improved cassava varieties were majorly through farmers sharing information with others (friends) and through extension agents, as information through radio programme came last. The results further showed that the adoption of recommended practices for improved cassava varieties were significantly determined by age, gender, educational level, levels of income, years of farming experience and extension contact, as significant relationships were found between these factors and the adoption of recommended practices for the two improved varieties studied. It is therefore suggested that policy interventions should include measures that get farmers increase their level of education, as extension efforts in the area also needs to be strengthened. Use of posters and leaflets should be encouraged as well as use of radio programme on the need to adopt improved cassava technologies need to be promoted.

Key words: Adoption, Improved Cassava Varieties, UMUCASS 38, TME 419

INTRODUCTION

Cassava (*Manihot esculenta*) is one of the most important food crops among the urban and rural poor populace of Africa. Abdoulaye *et al.* (2014), captures this fact as an important regional food source for about 200 million people of sub-Saharan Africa. In Nigeria for instance, cassava production is vital to the economy as the country is the world's largest producer of the commodity. Cassava root and leaves do not only serve as an essential source of calories but as a major source of income for rural households. Cassava provides food and income to over 30 million farmers and large numbers of processors and traders in Nigeria (Abdoulaye *et al.,* 2014). And to underscore its importance, particularly the need for technological improvement (such as improved cassava varieties), Solomon (2010); Solomon *et al.* (2011), have asserted this as the most important factor in increasing agricultural productivity and reduction of poverty in the long-term. To increase productivity, technology must be adopted in the production process and the rate of adoption of a new technology is subject to its profitability, degree of risk associated with it, capital requirements, agricultural policies and socioeconomic characteristics of farmers (Shideed and Mohammed 2005).

Several initiatives with regards to technological improvement were enacted to address the critical threat of Cassava production in Nigeria, which is the Cassava Mosaic Disease (CMD). Particularly, the International Institute of Tropical Agriculture (IITA), Nigeria's National Root Crop Research Institute (NRCRI) and some other national partners were to develop and disseminate high yielding and CMD resistant cassava varieties. Between 2002 and 2010, IITA implemented a research for development (R4D) project called Integrated Cassava Project (ICP) to support the presidential initiative (PI) for cassava launched in 2002, to boost cassava production and processing. Through this project, IITA successfully introduced and promoted cassava varieties via the National Agricultural Research Services (NARs) and Agricultural Development Programs (ADPs). Furthermore, in a research spanning 12 years, the IITA, in partnership with the

NRCRI, developed three pro-vitamin cassava varieties which were released by the Federal Government in December, 2011, using traditional breeding method in a Harvest Plus-funded project (IITA, 2011).

One of the IITA official 2005 released varieties found to have multiple resistance to CMD, and other major pests of cassava, such as, bacterial blight disease, anthracnose disease, cassava green mite, and cassava mealy bug was TME 419 (Dixon *et al.*, undated). It is particularly a high yielding and CMD resistant variety. Its other characteristics include high starch content of between 63 to75% and protein content observed to be between the range 0.8 to 2.8%. Its yield is between 10.69 to 27.26 tonnes/hectare, depending on the climatic and soil conditions. TME 419 is particularly unique in being adaptable to a wide range of ecological conditions and farming system (Dixon *et al.*, undated).

UMUCASS 38 (also known as TMS 01/1371) is one of the three pro-vitamin A released varieties of 2011. It is a vitamin A-enriched 'yellow' cassava variety that could provide more vitamin A in the diets of more than 70 million Nigerians who eat the root crop every day (IITA, 2011). The yellow color (cassava is generally white) is due to the higher vitamin A content. Vitamin A deficiency (VAD) is widely prevalent in sub-Saharan Africa, as it afflicts almost 20% of pregnant women and about 30% of children under-five in Nigeria (IITA, 2011). VAD can lower immunity and impair vision, which can lead to blindness and even death. Children and women will be the main beneficiaries of the yellow varieties, which could provide up to 25% of their daily vitamin A needs, as asserted by IITA.

In Nigeria, the major producer of cassava is the North central zone, followed by the South-South and South West zones (NAERLS, 2013). Kogi state is in the North central zone and leads the production of cassava in the country. In 2013, estimated 492.71ha of land were cultivated, yielding 4506.7Mt of cassava, which is about 9.51% of the national output (NAERLS, 2013). UMUCASS 38 (locally known as Idowe) and TME 419 (also known as Echuka Ovovu) are currently some of the improved cassava varieties introduced to the farmers in the state by extension agencies, particularly the ADP.

This study therefore intends to find out how much of these improved varieties have been adopted in one of the most cassava producing LGA of the leading cassava producing state in the country, and the extent to which the recommended practices been adopted along. The factors affecting the adoption of these varieties will also be determined. The low or partial adoption of some agricultural technologies is as result of some personal and socio-economic factors, until these factors are verified and addressed, there would be no improvement in adoption of agricultural technologies in Nigeria. Specifically the study was designed to determine the socio-economic characteristics of the respondents; identify and analyze those factors affecting the adoption of improved cassava recommended practices.

METHODOLOGY

The survey was conducted in Ajaokuta Local Government Area (LGA) of Kogi State Nigeria. It is in Kogi State located between latitude 7^0N and longitude of 11^0W zone of Nigeria. The dominant vegetation of Ajaokuta LGA by virtue of lying on the fringes of the equator, is interspaced with erect and numerous trucks of trees. The 2006 population of the local government area is put at 97,904, projected to 2018 at 2.8% is 137,000. Ajaokuta LGA has three districts namely, Ajaokuta, Eganyi and Ebiya. It has its headquarters at Ajaokuta and majority of the people in the study area are farmers. The climate condition favours agricultural activities engaged by the people for the production of crop like cassava, yam, maize, vegetable; and animals include poultry, goat, sheep, etc.

This study adopted the use of purposive and random sampling techniques. In the selecting the communities, two predominant cassava growing communities were purposefully selected each from Ebiya and Ajaokuta districts, while three communities were chosen in Eganyi district because of its higher population of cassava farmers. With these communities selected, a random selected of 10% cassava growing farmers were sampled for questionnaire administration based on the Piroska (2014) model on Practical Tools for International Development. The communities selected and a 10% sample size of the cassava farmers is as presented in the table below, Table 1. Altogether, 138 cassava farmers were sampled as respondents.

Table 1: Showing the Sample frames and Sample Sizes of Selected Communities

No selected villages	Cassava Farmers	10% Sample Size
Ajaokuta district		
Uparke	178	18
Ganaja	192	19
Ebiya District		
Apanko	182	18
Adu	197	20
Eganyi District		
Uparke	203	20
Adogo	193	19
Eganyi	241	24
Total		**138**

Data Analysis

Descriptive statistics such as mean, frequency and percentage were used to analyze the data. Also, Tobit regression model was used to determine the factor influencing the adoption of improved varieties packages (agronomical/recommended practices) for each of the varieties, TME 419 and UMUCASS 38, as recommended by extension agents. Most adoption studies have focused on just the adoption of improved varieties with no attention given to the recommended agronomical practices that come as a package with the varieties for optimum yield (Uwakah (1990); Adisa and Okunade (2005); Omonona *et al*. (2006); Mba (2007); Akinnagbe *et al.* (2008); Nsoanya and Nenna (2011); Nwakor *et al.,* (2011); and Afolami *et al*. (2015). This study therefore considers those practices along the adoption of the improved varieties and so uses Tobit regression model (Ojeleye, 2015).

Simple model specification for Tobit regression analysis is given implicitly as:

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

Where:

Y= Extent of adoption of recommended improved cassava varieties' practices (scored)
X_1= Age (years)
X_2= Sex (Dummy)
X_3= Household size (No.)
X_4= Level of education (Years)
X_5= Cassava farming experience (Years)
X_6= Farm size (ha)
X_7= Marital status (Dummy)
X_8= Level of income (₦)
X_9= Extension contact (frequency of visit)
U=Error term

RESULTS AND DISCUSSION

Socio-economic characteristics of the respondents is presented in Table 2. These attributes assume vital parts in conceptualizing the determinants of factors responsible for the adoption of recommended practices for the introduced improved cassava varieties. Table 2 reveals that about 60% of the cassava farmers were of the age 40 years and below. This shows that cassava farmers in study area were more of youths and very active. This disagrees with Pur, Ibrahim and Sabo (2007) and Nwakor, Ekwe, Amangbo, and Okoye (2008) who found that the level of youths' involvement in agriculture has reduced due to schooling and part-time farming. Also majority (71.01%) of the cassava farmers were males, while 77% were educated at various levels, which is expected to positively influence adoption of recommended practices. Majority of the farmers (76.81%)

Table 2: Socio-economic characteristics of respondents

Variable	Frequency	Percentage (%)	Mean
Age in years			
<20	2	1.45	
21-40	81	58.7	41.88
41-60	39	28.26	
>60	16	11.59	
Sex			
Male	98	71.01	
Female	40	28.99	
Marital Status			
Single	29	21.01	
Married	96	69.57	
Divorce	9	6.52	
Widow	4	2.9	
Household size (No)			
1-5	30	21.74	
6-10	101	73.19	7.27
>10	7	5.07	
Farm size (ha)			
< 2	79	57.25	
2 – 4	50	36.23	3.01
>4	9	6.52	
Cassava farming experience in years			
1-9	32	23.19	
19-20	70	50.72	19.73
20-29	24	17.39	
>30	12	8.7	
Educational level			
No formal education	20	14.49	
Arabic education	12	8.7	
Adult education	17	12.32	
Primary	59	42.75	
Secondary	19	13.77	
Tertiary	11	7.97	
Extension contact/visits			
No contact at all	44	31.88	
Weekly contact	3	2.17	
Once in two weeks contact	6	4.35	
Once in a month contact	63	45.65	
Once in quarter contact	13	9.42	
Once six months	9	6.52	
Level of income in naira			
Below 100,000	31	22.46	
100,000-200,000	55	39.89	191,681.09
200,001-300,000	43	31.16	
300,00 above	9	6.52	
Total	**138**	**100**	

had above 10 years farming experience which is expected to have positive influence on adoption, and worthy of note also is that more than half (57.25%) of the respondents cultivated less than 2 hectares of land, essentially denoting the respondents as small-scale farmers. This agrees with Mba (2007) and Nwakor *et al.,* (2011) who noted that cassava farming in the eastern part of Nigeria is usually less than 5 acres by individual farmers. Also, the level of income of the respondents averaged ₦191,681.09 with a majority (93.51%) of the farmers within the rage ₦100,000-₦300,000.

Table 3: Respondents distribution of varieties' awareness, adoption and sources of information

Varieties Awareness	Frequency (f)	Percentage (%)
TME 419 (Echuka Ovovu)	97	70.29 (of 138)
UMUCASS 38 (Idowe)	59	42.75 (of 138)
Total	**156***	
Source of information		
Friends/other farmer	62	41.89
Radio	16	10.81
Posters/Leaflets	19	12.84
Extension workers	51	34.46
Total	**148***	
Varieties Planted		
TME 419 (Echuka Ovovu)	69	50.00 (of 138)
UMUCASS 38 (Idowe)	44	31.88 (of 138)
Okoyawo (Local variety)	124	89.86 (of 138)
Total	**237***	

Awareness, Adoption and Sources of Information on Improved Cassava Varieties

Table 3 shows that only 70.29% of the respondents are aware of TME 419, while only 42.75% of the respondents are aware of UMUCASS 38. Of those aware, only 50% and 31.88% each actually planted these varieties respectively. Their sources of information included friends/other farmers, extension agents, posters/leaflets and through radio programmes at 41.89%, 34.46%, 12.84% and 10.81% respectively. Despite the awareness level of these improved varieties, a local strain, Okoyawo, is still the most cultivated cassava variety as 89.86% of the respondents cultivated the variety. This confirms the assertion of Nwakor, *et al.,* (2011), that most of the farmers in the rural areas in Nigeria still depend on local cassava varieties for their planting materials, which in turn result in a very poor yield at harvest.

The Determinants of the Adoption of TME 419 Recommended Practices

Table 4 shows the Tobit regression analysis of the socio-economic factors influencing the adoption extent of TME 419 (Echuka Ovovu) improved cassava varieties by farmers in the study area. The regression had a significant sigma at 1% and log likelihood (-22.57333), indicating a good model fit. The result reveals that age (0.067) and farming experiences (-0.126) were each significant at 5% levels. Nwakor *et al.*, (2011), in a study to find how socio-economic factors affect the adoption of improved Cassava varieties among farmers in Abia state, found sex, age and educational status to be the most significant determinants. Furthermore, the finding about years of farming experience negate the submission of Omonona *et al.* (2006); Afolami *et al.* (2015), who found that the decision to adopt improved cassava varieties by the farmers were positively and significantly influenced by some socioeconomic factors like the years of farming experience. It may perhaps be that with increasing years of farming experience, farmers get to be so comfortable with known, tested local varieties and may be reluctant to adopt new varieties with their recommended practices. The observed indication in Table 3 also support this rationale, where about 90% of the respondents still cultivate the local variety, Okoyawo.

Table 4: Determinants of the of adoption of TME 419 (Echuka Ovovu) recommended practices

Variable	Coefficients	Standard error	b/St Error	Sig.
Age	0.067	0.035	1.894	0.038**
Sex	0.309	1.133	0.273	0.785
Household size	0.159	0.14	1.136	0.256
Educational level	0.195	0.129	1.508	0.132
Farming experience	-0.126	0.056	-2.248	0.025**
Farm size	0.018	0.074	0.242	0.809
Marital status	0.913	0.599	1.525	0.127
Level of income	0.096	0.175	0.55	0.583
Extension contact	-0.189	0.149	-1.274	0.203
Sigma	0.992	0.175	5.657	0.000*

Log likelihood function = -22.57333. *, ** = Significant at 1%, and 5%.

Table 5: Determinants of the of adoption of UMUCASS 38 (Idowe) recommended practices

Variable	Coefficients	Standard error	b/St Error	Sig.
Age	-0.026	0.018	-1.398	0.162
Sex	0.459	1.113	5.803	0.000*
Household size	-0.037	0.064	-0.575	0.565
Educational level	0.214	0.065	3.313	0.009*
Farming experience	0.035	0.019	1.795	0.073***
Farm size	-0.044	0.029	-1.468	0.421
Marital status	-0.853	0.715	-1.193	0.233
Level of income	-0.406	0.239	-1.696	0.089***
Extension contact	0.165	0.096	1.725	0.0846***
Sigma	0.264	0.054	0.899	0.000*

Log likelihood function =-1.045286. *, **, *** = Significant at 1%, 5% and 10% respectively

The Determinants of the Adoption of UMUCASS 38 (Idowe) Recommended Practices

Table 5 shows the Tobit regression analysis of socio-economic factors affecting the adoption extent of UMUCASS 38 (Idowe) improved cassava varieties' practices recommended, by farmers in the area. The regression analysis has significant sigma at 1% and log likelihood (-1.045286), depicting a good model fit with strong explanatory power. The result further reveals that sex (-0.026), level of education (0.214), farming experience (0.035) , level of income (-0.406) and extension contact (0.165) were found significant at 1%, 1%, 10%, 10% and 10% level of significance respectively. These imply direct relationship thus; a change in sex, level of education, farming experience, level of income and extension contact will determine the extent of adoption of this cassava improved varieties recommended practices to farmers. The significance of sex is explained by perhaps the reason that UMUCASS 38 (Idowe) is easily cultivated, with less drudgery. Women therefore favoured its cultivation, and also because it's a pro- vitamin A cassava variety where it has been shown that women (20%) and children (30% under five) are the most deficient in Nigeria (IITA, 2011). This may also explain the negative coefficient of the level of income variable, denoting that this variety is most common among low income farmers. Extension contact was also found to be significant, denoting that with increasing contacts communicating the usefulness of the variety to the farmers, farmers will follow through with the adoption of the recommended practices. Similarly, with increasing level of education is the adoption of recommended practice as observed from the result.

CONCLUSION AND RECOMMENDATIONS

This study looked at the determinants the adoption of recommended practices for TME 419 and UMUCASS 38 improved Cassava varieties in Ajaokuta local government area of Kogi state, Nigeria. Okoyawo, a local cassava variety is still the most cultivated cassava strain as TME 419 and UMUCASS 38 are merely cultivated by about 50% and 32% of the farmers, respectively. Farmers sharing information with other farmers (friends) and extension contact led the sources of information about improved cassava varieties, as information through radio programme came last. From the findings, the adoption of improved cassava varieties were determined by age, sex (gender), educational level, levels of income, years of farming experience and extension contact, for the adoption of the two improved varieties studied. It is therefore suggested that policy interventions should include measures that get farmers increase their level of education, as extension efforts in the area also needs to be strengthened. Since the ADP extension agents are the major source of information of technology transfer, the government should improve the working condition of ADP staff and equip the body with necessary equipment for work. For instance, as mentioned in the study is the use of poster and leaflets. Use of radio programme on the need to adopt improved cassava technologies will also be a welcome approach to getting information across to the farmers.

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