EFFECT OF RISK MANAGEMENT PRACTICES ON FOOD SECURITY STATUS OF MALE AND FEMALE CASSAVA FARMERS IN ABIA STATE, NIGERIA.

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ABSTRACT
The study assessed the effect of risk management practices on food security status of male and female cassava farmers in Abia state, Nigeria. The specific objectives were to identify the types of risk faced by cassava farmers and their different management practices used; determine the level of food security status among male and female cassava farmers; estimate the influence of risk management practices (RMP) on food security status and constraints militating against effective risk management practices by cassava farmers. Primary data were collected using a structured questionnaire. Descriptive statistics, Tobit regression model, and Foster Greer and Thorbeck model were employed for data analyses. The result shows that the lack of credit, unavailability of planting materials, and increase in farm input had 100% responses by male and female cassava farmers. The result also showed that 86% and 81% of male and female cassava farmers respectively, used disease resistant cassava stem; 75% and 84% used fertilizer application, while 63% and 75% cassava farmers practiced mix cropping. The result further shows that based on the recommended daily energy level (L) of 1800 Kcal,the food insecurity line (Z) was estimated at 271.19, 222.17 and 246.68 kcals for male, female, and pooled farmers respectively. TheTobit result shows that education, age, farm size, improved seeds, credit use, extension contacts, household size, level of adoption of RMP, and farming experience significantly influenced food security status of cassavafarmers. Lack of quality seeds, fund, poor extension communication and irrigation systems were the major constraints farmers faced. Therefore, it is recommended that credit facilities should be provided to farmers. More so, investment in irrigation projects should be provided by the government to enable farmers produce maximally.
Keywords: **Risk Management, Food Security,genderCassava Farmers, Abia State.**

INTRODUCTION

Agricultural production is typically a risky business. The level of risks involved in agriculture is believed to be greater than risks involved in any other sectors. This is because according to Bhowmick, (2008) agricultural operation depends solely on the elements of weather and climates on which farmers have little or no control. Farmers in African countries face a multitude of risks of varying severity that originates from the natural, economic and socio-political environments. Farmers live with risk and make decisions every day that affect their farming operations. Many of the factors that affect the farmers' decisions cannot be predicted with a hundred per cent accuracy (David, 2013)

Men and women have performed many and different gender roles in farming enterprises either as planners, or owner, hired processors, or traders. However, within the farm household men and women are found to specialize in different tasks in cassava production. Men worked predominantly on land clearing and ploughing while, women tend to concentrate their agricultural activities around the home-stead (Ekong, 2003).

Nigeria's cassava production accounts for 19% of world the world output and 34% of Africa's output (Nwibo, (2011). Cassava is used mainly for two main purposes in Nigeria: 90% as human food and only 10% as secondary industrial material (used mostly as animal feed). About 10% of Nigeria's industrial demand consists of high quality cassava flour used in biscuits and confectioneries, dextrin pre-gelled starch for adhesives, starch and hydro lysates for pharmaceuticals produces and as seasonings. 70% of cassava processed as human food is garri, which can be used to overcome the challenges of food insecurity.Ezedinma *et al.* (2006).

Food security is when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life; food security has four important dimensions: stability, availability, accessibility and actual consumption and use of food (FAO, 2011).

Smallholder farmers in Nigeria face many risks in their farming activities. In the past and presently, the country has recordedcases of drought, crop and animal diseases and pest infestations as well as fluctuations in prices of both farm produce and inputs. As a result, there has been variability in the household level of income. Risk hinders farmers from pursuing farming as a business; risk situation is complicated by the fact that farmers operate in an environment with weak markets. Farmers do not have access to sufficient support institutions (facilities) that can help them cope with risks (Luke, 2011). Although, various risks in agricultural production and their management practices have been affirmed by previous studies and scholars(Olawuyi and Olawuyi(2015), Salimonuand Falusi,(2009), Okunmadewa (2003) However, these previous studies have not looked at how these risk in agriculture have been managed by male and female cassava farmers and their effect on food security in

Abia State. Therefore, this study aimed at providing empirical literature on how male and female cassava farmers manage, perceive, react and deal with risk in agriculture in Abia State. The objectives of this study were to identify the various types of risk in agriculture; it is the management practices used; determine the food security status and estimate the influence of risk management practices on food security as well as constraints militating against the use of risk management practices in Abia State, Nigeria.

METHODOLOGY

The study was carried out in Abia State.Abia State is located in the south east geo political zone of Nigeria. It lies between longitude 7º 23' and 8º 02' and latitude 50º 47' and 60º12 N. Multi-stage sampling procedure was used for the study. Two agricultural zones namely Umuahia and Ohafia agricultural zones were purposive selected from the three agricultural zones because of the level of agricultural activities carried out in those zones. Two; LGAs were randomly selected from each of the agricultural zones selected namely Ikwuano, Umuahia North, Ohafia and Isikwuato LGAs giving a total of four LGAs. Two communities were randomly selected from each of the four LGAs selected giving a total of eight communities. Two villages were randomly selected from each of the communities selected earlier giving a total of sixteen villages. Cassava farmers in each of the villages selected form the population of the study. Ten cassava farmers were randomly selected from each of the villages selected. Note, selection of the cassava farmers at the village level was gender sensitive. In each village, 5 male and 5 female cassava farmers were randomly selected giving a total of 160 comprising (80 males and 80 females). Primary data were used for this study. Data were collected with a questionnaire. Data analysis involved the use of descriptive and inferential statistics such frequency, percentages, Tobit regression model, and food security index.

Tobit regression Model

TheTobit regression was employed to estimate the influence of risk management practices and other variables on food security status of male and female cassava farmers in Abia State, Nigeria. The model of fit was expressed implicitly as:

$$FSI_i = \beta_0 + \beta_1 AGE + \beta_2 EDU + \beta_3 ASSET + \beta_4 FS + \beta_5 LVST + \beta_6 SEEDS + \beta_7 MI + \beta_8 HHS + \beta_9 NFD + \beta_{10} FEXP + \beta_{11} NEV + \beta_{12RMP} + \beta 13 CREDIT + e_i \quad \ldots\ldots 1$$

$\beta_{0 = \text{constant}}$

$\beta_{1 - \beta 13}$ =Coefficients of Regression

FSI_i = Food security status of i^{th} cassava farmer (Left censored at zero);

AGE = Age of cassava farmer (years);

EDU = Educational status of the respondents (years of schooling)

ASSET= Asset ownership (amount in naira)

FS =Farm size (ha);

FEXP =Farming experience (years);

LVST = Livestock ownership (number of livestock owned)

SEEDS =Improved seeds (used =1, otherwise=0)

HHS= Household size (individual living in the same household and feeding from same pot)

NFD = Non-farm diversification (diversified =1, otherwise =0)

MI =monthly income (naira)

RMP= Index of Risk management practices (no of RMP used)

CREDIT = Volume of credit used (naira)

NEV= Extension contact (no of visits)

e_i. = Stochastic Error term.

In determining the food security status of male and female cassava farmers in the study area, food security index as employed by Omonona and Agoi (2007); Arena and Anyaeji (2010) were used. This is implicitly stated as:

$$Fi = \frac{PCFE}{2/3MPCFE} \quad \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Where,

Fi = Food security index

2/3 MPCFE = Two third mean per capita food expenditure for i^{th}household

PCFE = Per capita food expenditure of all households

When $F_i \geq 1$ = Food secure i^{th} household

$F_i \leq 1$ = Food insecure i^{th} household.

Households were then classified into their food security status as "food insecure" and "food secure" household based on the food security line. A food secure household is therefore that whose per capita monthly food expenditure fall above or is equal to two-third of the mean capita food expenditure otherwise food insecure (Omonona and Agoi, 2007; Arene and Anyaeji, 2010).

RESULT AND DISCUSSION

The various types of risk encountered by cassava farmers was analysed based on gender and presented in Table 1.The result in Table 1 shows that eleven (11) distinct types of risks were identified with varying degrees of incidence according to farmers' responses. Specifically, lack of finance/credit, non-availability of quality inputs and increase in price of farm inputs had 100% responses from both farmers, implying that respondents perceived them as very significant types of risks in cassava production in the study area. This is expected because every other activity in agricultural production is influenced one way or the other by the size and application of fund in the farm. Therefore, there are always lots of problems arising from the unavailability of the required fund for the day to day running of the farm. For example, lack of adequate liquid asset at certain

critical periods of growth of crops in the field could cause substantial level of distortion in the production schedule which leads to the risk of yield loss in the long run. Lack of cash for carrying out critical activities such as weeding and fertilizer application in the farm at the right time can also result in unfavourable outcomes (Okereke, 2012).Furthermore, 75% and 81% of male and female farmers suffered weather problem. Weather-related issues here are in terms of unpredictable annual rainfall regime which manifests in a variety of problems such as flooding and droughts that expose the farmers to risks in farming business (Okereke, 2012) and female farmers suffered more from this risk than male farmers. This could be because male farmers adopt more climate change mitigating practices than female farmers. The issues of climate change, its attendant impacts on agricultural production as well as how farmers could adapt have been issues of global concern in recent times (Hassan and Nhemachena, 2008). More so, 81% and 86% of male and female farmers respectively, encountered pest and disease attack, while 86% and 81% of male and female farmers respectively, were confronted by incidence of theft. About 85% and 74% of these farmers suffered poor health condition, and 84% and 53% of these two categories of farmers had the problems of fire outbreak. The result is in Table 1.

Table 1: Types of risks encountered by farmers in cassava production

Types of risks	**Male-Farmers (MF)**		**Female-Farmers (FF)**	
	Freq.	**%**	**Freq.**	**%**
Lack of finance/credit	80	100	80	100
Non availability of quality inputs	80	100	80	100
Increase in price of farm input	80	100	80	100
Weather (drought, rainfall etc.)	60	75	65	81
Pest and diseases	65	81	70	86
Incidence of fire outbreak	67	84	42	53
Low availability of labour	50	63	70	86
Poor health condition of farmers	59	74	68	85
Market price fluctuation	49	61	52	65
Incidence of theft	69	86	65	81
Crop failure/low yield	50	63	57	71
Total	***709**		***729**	

Source: Field survey, 2017
***Multiple responses obtained**

A number of risk management practices (RMP) have been identified to be adopted by the farmers in the study area and they are presented in Table 2 based on farmers' gender. The result in Table 2 shows that 86% and81%, 75% and 84%, 81% and 63%, 81% and 53% of male and female cassava farmers in the study area used disease resistant cassava stems and fertilizer application, had off farm businesses, and practiced soil conversation. These practices are the measures smallholder farmers in the study area adopt to reduce the incidence of risk in their farming endeavour. With these and other factors kept constant, crop yield and consequently, farm income are expected to increase. Of course the use of all these practices is seen as a way of improving crop yield in order to reduce loss of farm revenue associated with low crop output. These methods could be seen as a loss reduction technique (Okereke, 2012).

Table 2: Risk management practices adopted in cassava production according to gender

Risk management Practices (RMP)	**MF**		**FF**	
	Freq.	**%**	**Freq.**	**%**
Planting of improved disease resistant cassava stem	70	86	65	81
mixed cropping	50	63	60	75
Mixed farming (crop and animal production)	62	78	59	74
Off-farm investment/employment	65	81	50	63
Sharecropping arrangement	30	38	15	19
Increase in farm size and farming in different locations against crop failure	55	69	50	63
Use of agrochemicals	60	75	67	84
Borrowing of loan/credit from banks/financial institutions	65	81	60	75
irrigation practice	20	25	10	13
Practice of soil conservation and improvement techniques	65	81	42	53
Farm protection (fencing)	60	75	60	75
Total	***784**		***618**	

The food security of the respondents (based on gender) was measured using food security index and the result is presented in Table 3. Based on the recommended daily energy level (L) of 1800 Kcal according to FAO, (2017) the food insecurity line (Z) was estimated at 271.19, 222.17 and 246.68 for the MF, FF and pooled farmers (PF) respectively. The finding shows that 53%, 69 % and 54% of the MF, FF and pooled farmers respectively, were food insecure with the estimated average food expenditure. This result suggests that majority of the MF and FF are subsisting on less than the recommended daily per capita calorie requirement of 1800 kcal implying that food insecurity exists among the two categories of farmers in the study area. The depth of food insecurity, which is also known as food expenditure deficiency is 0.18, 0.21 and 0.19 for the male, female and pooled farmers respectively,implying that they require 18, 21 and 19% increase in their food expenditure to become food secure. The severity of food insecurity for farmers in the study area is 0.11, 0.13 and 0.12 for the MF, FF and pooled farmers respectively. There is therefore a higher level of severity of food insecurity among the FF than the MF in the study area.

This observation agrees with this finding of Fawehinmi and Adeniyi (2014). According to them, there were more male-headed food-secure households than female-headed households. Although male have better access to productive resources and asset base such as credit facilities, access to improved seed varieties, land and extension services among others compared to their female counterpart, they did not have better food security status.

Table 3: Summary statistics of farmers' food insecurity indices in Abia State

Variables	MF	FF	Pooled
Incidence food insecurity (Head count ratio)	0.53	0.69	0.54
Depth food insecurity (Food insecurity gap)	0.18	0.21	0.19
Severity food insecurity (Squared food insecurity gap)	0.11	0.13	0.12
Food insecurity line (Z)	271.19	222.17	246.68
Recommended daily calorie intake (Kcal)	1800	1800	1800

Source: Field survey, 2017

The results of the Tobit regression models employed to estimate the influence of the level of risk management practices on the food security status of male and female cassava farmers in the study area is presented in Tables 4. The result in Table 4 shows that the model gave a correct prediction for evaluating the power of the explanatory variables in significantly influencing the food security status probabilities of the farmers. The model gave a Pseudo R^2 value of 0.786 and 0.707 for the Male and Female farmers. Implying that 78.6% and 70.7% changes in the food security status of the various farmers were predicted by changes in the variables included in the model. The model has a likelihood ratio chi-square of 38.172 and 36.014 all significant at 1% level, giving the model an acceptable fit. The result showed that level of education, age, asset ownership, farm size, livestock ownership, use of improved seeds, use of credit, non-farm diversification, extension contacts, household size, level of RMP, and farming experience significantly influenced food security status of male cassava farmers .while farmers' level of RMP age, education, extension contact, farm size, non-farm diversification, credit access, and household size were the significant factors influenced food security status of the female farmers. The result is presented in Table 4.

The result in Table 4.shows that age was negative for both MF and FF at 5% and 1% levels of significance respectively, suggesting that the food security status of the farmers will decline as the farmers get older. According to Fawehinmi and Adeniyi (2014), this might be because household heads that are young are more agile and active thus enhancing their productivity level, rate of adoption of new technology and level of diversification, which helps them to engage in other income generating activities thus enhancing their purchasing power and invariably their food security status. Education was positive for both farmers' at 10% and 5% levels of significance implying that food security improves with education. According to Mequanent*et al.* (2014), education is an important determinant of household food security because an educated household is more sensitive to adopt technology to maximize the output he/she generated from farm activities. Education increases the ability of households to use their resources efficiently and the locative effect of education enhances households` ability to obtain, analyse and interpret information. The result shows that the level of risk management practices adoption was negatively related to food security at 5% levels of significance for both farmers. This result means that food security challenges increase with farmers that do not adopt risk management practices. This is so because according to Salimonu and Falusi (2009) households with effective risk management practices will suffer less food shortages than those who do not have at all.

Farming experience was positively correlated to food security at 5% level of significant for Male farmers only signifying that with increased in farming experience, food insecurity will reduce. This

conforms to *a priori* expectations and agrees with previous findings that managers with more experience are more likely to take a risk management decision which has the potentials to increase households' level of income and invariably make them to be food secured households (Abotsi*et al.* 2013).The positive coefficient of asset ownership for MF at 5% significant level indicates that farmers with assets could survive food insecurity challenges better than those without assets. This variable was insignificant for FF probably because assets are scarcely owned by women given the cultural barriers they face. Fawehinmi and Adeniyi (2014) suggest that these households are able to use such asset to adopt new production technologies or to secure loans which can be invested in other productive enterprises which they can translate into cash if such households experiences shock. Farm size showed an expected positive relationship with food security for both categories of farmers at 5% and 10% levels of significance suggesting that farmers with larger farms are less likely to be food insecure compared to farmers with smaller farm sizes. This result is in agreement with the finding of (Olagunju*et al.,* 2012). that farm households which had larger farm size had better chance to produce more, to diversify the crop they produce and also have got larger volume of crop residues, thus becoming less food insecure.

Amount of credit used positively influenced food security status of the MF and FF at 1% and 5% levels of significance respectively, implying that farmers with credit facilities are more likely to be food secure than those who do not have access to credit. Production requires large investment in capital and hence credit forms important part of equity for many businesses suggesting that credit is paramount to rural food security (Frimpong and Asuming-Brempong, 2013). Use of improved seeds positively affected the food security condition of the male farmers at 1% level of significance. This implies that farmers who used improved seeds stood better chances to be food secure unlike those who used poor-quality seeds. Improved seed and other technological inputs help farmers to augment productivity and to boost production. Farmers can enhance their production by using high yielding varieties and other complementary farm (Eskezia, 2011).

The coefficient of non-farm diversification was positively related to food security at 1% significant level for both MF and FF implying that farmers with more income generating activities outsides from the farm are more likely to be food secure than those with either limited numbers of non at all. This finding supports the finding of Joshi *et al.*, (2004) who identified that diversification positively influences food security. The coefficient of extension contact positively correlated to the food security condition of the MF and FF at 1% and 5% levels of significance respectively. These farmers are more likely to experience better food security conditions. According to Olagunju*et al.,* (2012), access to extension agents enhances the chances of households having access to better crop production techniques, improved input as well as other production incentives and these go to affect their output vis-à-vis their food security status.

This result shows that household size was negatively correlated with the MF and FF food security at 1% and 10% levels of significance. This result suggests that food insecurity arises with increase in household size According to Mequanen*et al.,* (2014), large family size creates more pressure on household food security because more food and non-food expenditure is spent for them without a commensurate income addition. Livestock ownership coefficient was positively correlated with food security status of MF at 1% level of significance meaning that ownership of livestock is a viable means to escape food insecurity. Animal rearing is not usually practiced by females due to the involved stress and technical know-how which they may not possess. This finding is consistent with the result of the studies of (Abebaw, 2003) and Tesfaye, 2005).

Table 4: Influence of the level of risk management practices and other variables on the food security status of cassava farmers by gender

	Male Cassava Farmers			Female Cassava Farmers		
Variables	**Coefficient**	**SEM**	**t-value**	**Coefficient**	**SEM**	**t-value**
Constant	1.043	0.358	2.913***	0.808	0.323	2.502**
Level of adoption of RMP	0.615	0.283	-2.173**	0.695	0.283	-2.456**
Farmer's age	0.866	0.400	-2.165**	0.556	0.153	3.634***
Level of education	0.453	0.241	1.880*	0.776	0.361	2.150**
Asset ownership	0.750	0.308	2.435**	0.893	0.654	1.365
Extension contact	.634	.227	2.833***	.908	.342	2.655**
Farm size	0.944	0.422	2.237**	0.244	0.136	1.794*
Farming experience	0.213	0.089	2.393**	0.658	0.753	0.874
Improved seeds	0.665	0.245	2.714***	0.258	0.159	1.623
Monthly income	0.478	0.438	1.091	0.488	0.449	1.087

Household size	0.736	0.213	-3.455***	0.532	0.286	-1.860*
Non-farm diversification	.709	.246	2.882***	.403	.144	2.799***
Livestock ownership	.161	.037	4.351***	.606	.701	0.864
Credit	.352	.109	3.229***	.458	.202	2.267**
LR Chi- square	38.172***			36.014***		
Pseudo R^2	0.786			0.707		
Number of Obs	80			80		
Log likelihood	-46.943			-42.424		

Source: Field survey, 2017. ***, **, * = significant at 1, 5, and 10% respectively.
SEM = Standard Error of Mean

A number of factors were found to be militating against the effective management of agricultural risks among the smallholder cassava farmers in the study area. These were analysed according to gender and presented in Table 5. Result showed that all the respondents identified insufficient capital as a key factor constraining the farmers in managing risk. Low knowledge of RMP, lack of extension workshops and trainings, unwillingness to adopt and insufficient/high cost of labour were identified as major constraints in the utilization of RMP by the MF and FF cassava farmers.

Table 5: Constraints to RMP adoption in cassava production by gender

Constraints	**MF**		**FF**	
	Freq.	**%**	**Freq.**	**%**
Insufficient capital	80	100	80	100
Low knowledge of the RMP	60	75	65	81
Unwillingness to adopt the RMP	56	70	68	85
Insufficient/high cost of labour	45	56	65	81
Lack of extension workshops	45	56	43	54
Non-availability of planting materials	58	73	62	76
Total	***344**		***383**	

Source: Field survey, 2017
***Multiple responses**

CONCLUSION AND RECOMMENDATIONS

Findings show that cassava farmers in the study area were small scaled and food insecure. A number of constraints were identified to militate against farmers' capacities to manage agricultural risks efficiently towards enhanced and sustainable food production, food security and improvement of standard of living.

Based on the findings, the study recommended that credit facilities should be provided by the government to boast production. Extension worships and trainings should be organized as well as provision of better quality planting materials to enable the farmers produce optimally.

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