Journal of Environmental Issues and Agriculture in Developing Countries
Volume 11, Numbers 1-3, December 2019
ISSN: 2141-2731
Published By:
International Centre for Integrated Development Research, Nigeria
In collaboration with:
Copperstone University, Zambia.

Farmer's Responses on Integrated Farming as Risk - Averse Mechanisms to Climate Change in Etche Local Government Area of Rivers State, Nigeria

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ABSTRACT

This study examined farmers' responses on integrated farming as risk averse mechanisms to climate change consequences in Etche Local Government Area of Rivers State, Nigeria. Multi-stage sampling techniques were used in the selection of 60 respondents. The data obtained were analyzed with percentage and probit regression model. The result revealed that majority of the farmers are female, while only 40% are male, the mean age of farmers were 44 years and their mean farming experience was 18 years, while 66.7% of the farmers are married. Also majority had primary education and practised integrated crop-livestock systems. Only 18.2% of the respondents accentuated that they experienced lots of weeds infestations due to excessive rainfalls. The two common risk - averse mechanisms employed by the respondents were good adaptation measures; practicing integrated farming systems and on-farm diversification measures. Finally the probit regression result ascertained that HHS and FMEP were found to be statistically negative to respondents probability of responding to integrated farming as risk averse mechanism to climate change consequences while SCH, LNSIZE and AGE were all statistically positive to respondents' probability of using integrated farming as risk averse mechanism to climate change. It was only attested that lack of technical know-how (way of doing something more efficiently and effectively) and extension contact were their major problems. Farmers should be trained on how to combat risk on their farming operations. Also enough incentives should be given to them by the government.

Keywords: *Farmers responses, integrated farming, risk- averse mechanisms, climate change*

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INTRODUCTION

Climate Change has affected rural farmers with many negative consequences. These negative consequences are the covariant risks faced by Nigerian farmers. In the absence of any form of insurance and the almost inexistent credit markets, households have devised strategies to at least mitigate the effect of these risks on their livelihoods. For instance the risk averse mechanisms employed by poultry farmers include, drawing from personal savings, rearing of resistant breeds, restocking of birds and policing farms (Ajetomobi and Binuomote, 2006). It is important to note that most of the foods consumed in Nigeria are produced under a rain-fed system that is weather sensitive.

The peasant farmers who produce the bulk of these foods, lack the ability to adapt to weather conditions due to weak institutions, inadequate financial resources, lack of extension services, and so on. The growth in human number have therefore called for a more intensified agriculture to enable adequate food production, but unfortunately, the food producing activities which includes; livestock farming, horticulture, floriculture ,aquaculture etc. have been dominated by the small and medium scale farmers who are unable to averse risk and invest much capital for commercial agriculture. Therefore to achieve food security and food sufficiency for the ever growing global human population and especially in Africa, integrated farming system which has been defined in numerous ways, could be envisioned as encompassing a range of agricultural systems arrayed along a continuum of possible organizational structures, and spatial and temporal scales should be encouraged (Bell and Moore, 2012).

This is because it helps in risk aversion and plays a remarkable role for optimum food production, greater income generation and more variety production with managed land and financial investment (Ahmad and Parmar, 2018). It has multiple objectives of sustainability, food security, farmer security and poverty reduction. It involves use of outputs of one enterprise component as inputs for other related enterprises wherever feasible, for example, cattle dung mixed with crop residues and farm waste can be converted into nutrient-rich vermin-compost. The salient features of IFS include, innovation in farming for maximizing production through optimal use of local resources, effective recycling of farm waste for productive purposes, community-led local systems for water conservation, organic farming, and developing a judicious mix of income-generating activities such

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as dairy, poultry, fishery, goat-rearing, vermicomposting and others (ISAP, 2019). At this point, it becomes pertinent to ask the following questions: (1) what are farmer's socioeconomic characteristics? (2) what is the type of integrated farming systems practiced in the study area? (3) what are the percentage of farmers who respond to various climate change consequences in the study area? (4) what are the different risk averse mechanisms employed by the respondents in the study area? (5) how have respondents' socio-economic characteristics affected their responses on integrated farming as risk-averse mechanisms on climate change consequences in the study area**?** (6) what are the constraints respondents are facing in the study area? This study will go a long way in providing answers to these questions.

MATERIALS AND METHOD

Etche is one of the Local Government Areas (LGA) in Rivers State, Nigeria. The Etche are Igbo people and they speak Igbo language. Their primary occupation is farming with good vegetation and fertile upland. Etche communities include Akwu/Obuor, Chokocho, Chokota, Egwi, Afara, Mba, Ikwerengwo, Okehi, Ulakwo, Umuakonu, Umuebulu, Umuechem, Egbeke Igbodo the ancestral home of Etche (Igbodo is made up of the following communities; Umuohiaukwu, Umuusharam, Umuoga, Okonocho, Umuine, Umudi, Umunkwa, Umuohie, Amaku, Obibi, Ezeleaka, Umuisi]. Etche L.G.A. is located at the North-Eastern part of Rivers State, Nigeria. The study area covers some communities including Okehi, Ulakwo, Obite, Obibi, Igbo, Odagwa, Umuechem, Ndashi, Igbodo, Ozuzu, Mba and Afara. (2006 National Population Census). The data obtained were analyzed with percentage and probit regression model. The data analysis was done using E-view 6.0.

RESULTS AND DISCUSSION

Table1 shows that majority (60.0%) of the farmers are female, while only (40.0%) are male gender. These findings are in consonant with the findings of Ogunlela, Yemisi and Mukhtar, Aisha (2009), that rural women, more than their male counterparts, take the lead in agricultural activities, making up to 60-80 percent of labor force. Also recently majority of male gender in the study area have shifted their time and energy towards other economic activities like okada riding and palm oil processing. Also majority (66.7%)

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of the farmers are married and (51.7%) falls between the age range of 41-50 years with an average age of 44 years showing activeness and innovativeness in farming and other economic activities. This has shown that the bulk of the respondents are in their active age and able to take risks, unlike older farmers who are less prone to risks taking as emphasized by (Ajetomobi and Binuomote, 2006). It is believed that education is the key that unlocks the latent or inherent entrepreneurial skills of rural farmers, majority (75.0%) has primary education, and only 1.7% has tertiary education. This study has revealed that respondents can actually respond to risks. The study depicts that the majority (63.3%) of the respondents has 18 years and above as farming experience with an average of 18 years as their average farming experience. Only 46.7% of the respondents has household size of 3-10 persons, while majority (71.7%) has an income status of N200,000-400,000 per annum.

Table 2 shows that majority (66.7%) of the respondents practiced integrated crop-Livestock systems. This is due to the fact that they believed that integrated crop-Livestock systems are a good risk averse mechanism. This findings is in sync with the findings of Ezeaku *et al* (2015) that this system of farming boosts food security and income of the farmers. It was only 1.7% that practised other forms of integrated farming systems.

In table 3, multiple responses were recorded showing that more than one response was recorded from each respondent. Looking at the table, only 18.2% accentuated that they experienced lots of weeds infestations due to excessive rainfalls. Only 16.1% attested that they experienced erosion, as their major climate change consequences in the study area. It was also observed that there were, lots of pest and diseases infestations such as mosquitos' as a result of excessive rainfalls which encourages mosquitoes breeding. The area of study is upland with very minimal flooding occurrence.

From table 4, the two common risks averse mechanisms employed by the respondents in study area were good adaptation measures (14.7%) and by practicing integrated farming systems with on-farm diversification measures (14.4%). These findings support the findings of Korir (2011) that farm household's utilized on-farm diversification by operating several farm enterprises covering both livestock and crop enterprises. This is because, sustainable agriculture means an integrated approach to increasing farm yield and managing resources in order to address all three critical aspects of sustainability namely, economic, environmental and social (ISAP, 2019). As one of the mechanisms employed to averse both idiosyncratic

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and covariate risks faced by farmers in the study area, both demand push and demand pull diversification are employed as an alternative to off- farm income generating sources. Only 1.1% and 2.1% emphasized to have employed farm re-settlement and insuring their farms. These risk averse mechanisms are not commonly practiced by our farmers. This finding is in consonant with the findings of Abimbola *et al* (2013), that rural farmers do not always insure their farm and there is almost inexistent of credit markets, which caused rural households to devise other strategies to mitigate the effect of these risks on their livelihoods.

A priori is that coefficients of x(x>0) from the probit regression results, household size (-0.106126) was found to be negatively correlated to the probability of respondents to the usage of integrated farming as risk averse mechanism. The result is counter intuitive since the more farmers' households' size increases the more they would have responded positively to risk averse mechanisms to climate change consequences. The counter intuitiveness of this response could be that most of the family members might not be involved in farming.

Farming experience (-0.006499) was also found to be negatively correlated to the probability of respondents to the usage of integrated farming as risk averse mechanism to climate change consequences. The counter intuitiveness of this response might be that many years of farming experience has made the family to have acquired greater expertise on their farm operations, which assist them in risk reduction. However, years respondents spent in formal schooling (0.001820) was positively correlated to the probability of responding to the usage of integrated farming as risk averse mechanism to climate change consequences. This is a priori expectation, because as respondents' years in schooling increases, the more they understand the usefulness of integrated farming as risk averse to climate change consequences. Also land size (0.166205) was found to be positively correlated to the probability of respondents, responding to integrated farming as risk averse. This result is a priori because as land size increases, farmers will be interested in practicing and responding to integrated farming systems as risk averse. Farmer's age was also found to be positively correlated to the probability of their responding to the usage of integrated farming as risk averse mechanism to climate change consequences. This is because as farmer's age increases, the more they will respond to integrated farming, due to their techniques and expertise in farming. Age has been found to be a major determinant of how innovative

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and productive farmers would be. The innovativeness of farmers to adopt new technology and practice integrated farming as risk averse increases in their active age.

Table 6 revealed that only 12.7% attested that lack of technical know-how (way of doing something more efficiently and effectively) and extension contact were their major problem respectively. This is due to the fact that as integrated farming is a good mechanism towards food security there is still room for farmers to expand their knowledge on various types of integrated farming. It was only 1.1% that emphasized belief system as their major problem. Belief system has to do with traditional system of farming. These groups of farmers are the laggards. They find it very difficult to accept an innovation or practice integrated farming as risk averse mechanisms to climate change problems. Also 12.5% accentuated that Lack of infrastructural development was their major problem while 12.3% agreed that their major problem was lack of income.

Tab1e 1: Socio -economic characteristics of Respondents

Variables	**Frequency**	**Percentage**
Gender		
Male	44	40
Female	56	60
Age		
20-30	8	13.3
31-40	11	18.3
41-50	31	51.7
60 above	10	16.7
Marital Status		
Single	4	6.7
Married	40	66.7
Divorced	8	13.3
Widowed	3	5.0
Widower	5	8.3
Level of Education		
No formal education	9	15.0
Primary	45	75.0
Secondary	5	8.3
Tertiary	1	1.7

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Years of farming experience		
Below 3years	7	11.7
4-10	3	5.0
11-17	12	20.0
Above 18	38	63.3
Household Size		
1-5	3	5.0
3-10	28	46.7
10-15	26	43.3
Above 15	3	5.0
Income Status (N)		
Less than 100,000	12	20.0
200,000-400,000	43	71.7
500,000-700,000	3	5.0
Above1000, 000	2	3.3
Other Sources of Income		
Trading	4	6.7
Hunting/fishing	16	26.7
Okada riding	20	33.3
Artisan/fuel hawking	15	25.0
Others	5	8.3

Source: Field Survey, 2019.

Table 2: Types of integrated farming practised in the study area

Types of integrated farming practiced	**Frequency**	**Percentage**
Integrated crop-Livestock systems.	40	66.7
Intercropping systems	12	20.0
Mixed cropping systems	2	3.3
Mono -cropping systems	3	5.0
Integrated –fish farming	2	3.3
Others	1	1.7
Total	**60**	**100**

Source: Field Survey, 2019.

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Table 3: Farmers' responses on climate change consequences

Consequences of Climate change	Frequency	Percentage
Erosion	47	16.1
Excessive Flooding	7	2.4
Excessive heat	12	4.1
Seasonal variations	28	9.6
Lots of weeds infestations due to excessive rainfalls	53	18.2
Lots of pest and diseases infestations	36	12.3
Increase in Precipitation	34	11.6
Lots of run-off causing leaching	32	11.0
Lots of malaria attacks on farmers due to high rate of mosquitoes	43	14.7
Total	**292**	**100**

Source: Field Survey, 2019. Multiple responses recorded.

Table 4: Risk-averse mechanisms employed on their farming operations

Risk Averse mechanisms	**Frequency**	**Percentage**
Technical flood control	25	6.5
Re-settlement	4	1.1
Planting resistant varieties with good farm plan and cultural practices.	43	11.3
Listening to weather forecasting	11	2.8
Insuring farms	8	2.1
Practicing integrated farming and on-farm Diversification	55	14.4
Practicing good mitigation/irrigation practices	46	12.1
Practicing Organic farming	45	11.8
Joining pragmatic cooperative societies	28	7.4
Conducting good adaptation measures	56	14.7
Looking at the recent government policies e.g. *ancoure*	10	2.6
Others	49	12.9
Total	**380**	**100**

Source: Field Survey, 2019. Multiple responses recorded.

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Table 5: The probit result showing the effects of respondents' socio-economic characteristics on their responses on risk-averse mechanisms on climate change consequences in the study area

Convergence achieved after 4 iterations

Coefficient covariance computed using observed Hessian

Variable	Coefficient	Std. Error	z-Statistic	Prob.
HHS	-0.106126	0.081818	-1.297094	0.1946
FMEP	-0.006499	0.013795	-0.471133	0.6375
INCME	2.19E-07	1.87E-06	0.117401	0.9065
SCH	0.001820	0.049327	0.036891	0.9706
LNSIZE	0.166205	1.270705	0.130797	0.8959
AGE	0.024186	0.013343	1.812680	0.0699

Mean dependent var	0.716667	S.D. dependent var	0.454420
S.E. of regression	0.459317	Akaike info criterion	1.340335
Sum squared resid	11.39250	Schwarz criterion	1.549770
Log likelihood	-34.21006	Hannan-Quinn criter.	1.422257
Deviance	68.42011	Restr. deviance	71.52888
.Avg. log likelihood	-0.570168		
Obs with Dep=0	17	Total obs	60
Obs with Dep=1	43		

Source: Field Survey, 2019.

Table 6: Constraints encountered by respondents in the study area.

Constraints encountered	**Frequency**	**Percentage**
Lack of income	57	12.3
Lack of technical know how	59	12.7
Lack of extension contact	59	12.7
Lack of government/NGOs intervention	50	10.8
Lack of awareness	53	11.4
Lack of infrastructural development	58	12.5
Problem of belief system	5	1.1
Lack of markets	42	9.1
Bad government policies	43	9.2
Lack of capacity building	38	8.2
Total	**464**	**100**

Source: Field Survey, 2019. Multiple responses recorded.

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CONCLUSION

There is no doubt that rural farmers in Nigeria are facing myriad of risks as a result of climate change. Attention and technical know-how should be built in farmers in order to combat these risks. This responsibility should be anchored on extension agents who should build in capacity development to farmers through extension contact, training and visit. Farmers should be trained on how to combat risk on their farming operations. Also enough incentives should be given to them by the government so as to cushion the adverse effect of climate change.

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