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RELATIONSHIP BETWEEN SOCIO-ECONOMIC CHARACTERISTICS OF CASSAVA-BASED FARMERS AND THEIR CLIMATE ADAPTATION STRATEGIES IN EMOHUA LOCAL GOVERNMENT AREA OF RIVERS STATE.

Ugwuja, V. C. and Aladesote, B. K.
Department of Agricultural Economics and Extension, University of Port Harcourt
Corresponding author's e-mail : cugwuja@yahoo.com

Abstract
Adaptation to climate change requires farmers to realise that climate has changed and they must identify useful adaptation strategies and implement them. The study analysed the effects of socio-economic economic characteristics of farmers on the adoption of climate change adaptation strategies in Emohua Local Government Area of Rivers State. Data for the study were collected with Structured Questionnaire from sixty (60) farmers using a combination of multistage and purposive sampling technique. Data were analysed using Simple descriptive statistics and Multiple Regression Model. Results revealed that majority (38.3%) were between the age bracket of 31-40 years, while 51.7% of them were male, 48.3% were married, 60% of the respondents had one form of formal education or the other, 60% had household size of 6 -10 people. Majority (58.3%) of the farmers indicated that they have fully adopted planting of crops with early rainfall as a climate change adaptation strategy, while 56.7% use early maturing crops and 46.7% indicated change in planting dates. Results of multiple regression analysis showed that level of education, household size and extension contacts had significant influence on adoption, while gender, age of farmers and marital status had no significant influence on adoption. The study also revealed that the major constraints to adoption include; low awareness level, lack of access to improve crop varieties, low institutional capacity at local government level and limited knowledge on adaptation. The study therefore, recommends that extension programmes should be mounted in communities to increase awareness of climate change.

Keywords: Climate Change, Adaptation Strategies, Adoption

Introduction

Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period, typically decades or longer. Climate change causes higher temperature, rising sea level, change in precipitation patterns and more frequent weather related disaster (Nzeh and Eboh, 2011). Climate change has moved beyond being an environmental challenge to one that threatens livelihood and development around the world especially in the developing countries. Global warming and its aftermath has exposed many local communities to greater environmental risks such as flooding, drought, desertification, soil degradation, erratic rainfall patterns, heat stress, pest and diseases and others (Ozoh, 2010).

Parry (2012) observed that extreme weather events are likely to become more intense and frequent and the effect on ecosystem will be more severe, with up to 30% of plant and animal species at risk of extinction. Projected climate change is likely to affect millions of people, especially those with low capacity to adapt through increase in malnutrition and consequent disorder. This will have implication for child growth and development, the altered burden of water related diseases, the increased frequency of cardio respiratory infections disease carriers into new regions vectors.

The productivity of rural population has been greatly hindered by climate change which has manifested in different form such as low rainfall, drought, rising sea level and global warming. Men have higher social status as a result of more access to schooling and training and they are less affected by the impact of this change, and the households headed mostly by women are often the most chronically poor groups within rural communities. Food and Agriculture Organization (FAO, 2012).

In Nigeria, impact of climate change is already felt at different level, this include rising temperatures, late onset of rains in few places and now spreading to so many parts of the country (Archibong, 2011). The rise in daily average temperature in northern Nigeria has cause reduction in the yield of crop and livestock production, invariably affecting their livelihood. Rising temperature has caused rivers, stream and falling well water levels, meningitis and kidney stones which increases the rural farmers spending thereby reduces their income. Rising temperature on the high lands of Nigeria has been implicated in increased incidence of malaria, building Nigeria response to climate change, (BRNCC, 2011).

In the arid northern parts of Nigeria, higher temperatures will contribute to dry conditions which underlie accelerated wind erosion. These are extremely serious situations given that soil erosion is already of catastrophic proportions in Nigeria whether viewed as gullying or sheet erosion while floods annually ravage many parts of the country during the rainy season. For example, it is estimated that in Abia, Anambra and Imo States, there are no fewer than 600 gully erosion sites (Umeagbalasi, 2012).

Recurring flood along the coastal communities in Nigeria has left no fewer than 25 million in Nigeria being displaced and devastated in recent times. Those living along the coastal communities of River Niger, Delta, Benue, Sokoto, Katsina, Lagos, Ondo, Bayelsa, Akwa Ibom, Anambra and Cross River states are gravelly affected by the incessant flood menace, Nmadu (2012). The worst is that property worth billions of naira has being destroyed by the flood. The continuous ravaging flood has put many Nigeria into untold hardship which those in the coastal communities are grossly affected.

Kuckelberg (2012) conducted a survey which examines the impact of climate change on livelihoods of farmers and agricultural workers in Ghana. The result shows that there are reduction in farmer's income as a result of loss of crop; food insecurity and social insecurity. Saadat and Islam (2011) conducted a research on impact of climate change on rural livelihood in Bangladesh and the result shows that climate change caused damage on assets like education facilities, increases ill health, causes increases of interrupted power supply, scarce water for irrigation, damage of property and less production of crops.

Agriculture remains a major source of food, industrial raw material and a means of earning foreign exchange. It employs close to 70 per cent of the Nigerian population, Agricultural practice in the country is dominantly rain-fed and therefore particularly vulnerable to the impacts of climate change. Similarly, livestock production, which involves the herding of cattle, goats and sheep raised principally in the northern states, is also heavily dependent on rainfall and thereby equally vulnerable (FMENV, 2009).

Empirical study on effects of socio-economic characteristics of farmers on adoption of adaptation strategies in Oyo state showed that household size, extension visits and non-farm income significantly impact on the various strategies used on adaptation to climate change (Ajao and Ogunniyi, 2011). This study focuses on the effect of socio-economic characteristics of cassava based farmers on the adoption of climate change adaptation strategies in Emohua Local Government Area of Rivers State. The specific objectives of the study were to; describe the socio-economic characteristics of respondents in Emohua Local Government area; examine level of adoption of climate change adaptation strategies by the farmers; and examine the relationship between socio-economic characteristics of farmers and level of adoption of climate change adaptation strategies.

Methodology

The Study was conducted in Emohua Local Government Area of Rivers State. Emohua Local Government is one of the twenty-three local government areas of Rivers State. It is made up of 12 communities which are Akpabulltu, Ogbakiri, Emohua, Ibaa, Obelle, Rumundele, Elele Alimini, Omudioga, Egbeda, Ubinma, Odegu, Rumuekpe. Multi-stage sampling technique was used in selecting respondents. First stage was random selection of three (3) communities from the twelve (12) communities, these selected communities were Emohua, Elele Alimini and Rumundele, second stage was random selection of two villages from each selected community making it a total of six (6) villages, the last stage was purposive selection of ten (10) cassava based farmers from each village making a total of sixty (60) respondents for the study. Data were collected using well structured questionnaire and oral interview. Data were analysed using descriptive statistics and ordinary least square multiple regression analysis.

Model specification:

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

Where Y=Adoption index, derived based on the responses from the listed climate change adaptation strategies, which was captured by pooling a 3-point Likert type scale of adopted =3, partially adopted =2, and not adopted =1.

The independent variables are:

X_1 =Gender (dummy, male =1, female =0)
X_2 = Age (years)
X_3 = Level of education (years)
X_4 =Household size (number)
X_5 = Marital status (dummy, single =0 married =1)
X_6 = Membership of the cooperative (dummy, yes =1, No=0)
X_7 =Extension contact (dummy, yes =1, No=0)
X_8 = Farming experience (years)
e_i = error term

The relationship between the dependent and each of the independent variables was examined using the four functional forms: linear, semi-log, exponential and double- log.

Linear: $Y= B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + e$
Semi-Log: $Y= B_0 + B_1 \log X_1 + B_2 \log X_2 + B_3 \log X_3 + B_4 \log X_4 + B_5 \log X_5 + B_6 \log X_6 + B_7 \log X_7 + B_8 \log X_8 + e$
Exponential: $\log Y= B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + e$
Double Log: $\log Y = B_0 + B_1 \log X_1 + B_2 \log X_2 + B_3 \log X_3 + B_4 \log X_4 + B_5 \log X_5 + B_6 \log X_6 + B_7 \log X_7 + B_8 \log X_8 + e.$
B_o = intercept.
$B_1, B_2 \ldots B_{10}$ =estimated coefficients.

Results and Discussions

Socio Economic Characteristics of the respondents

Table 1 showed that 51.7% of the farmers were male, while 48.3% were female. Majority (38.3%) of the farmers were between the age bracket of 31-40 years old. The above finding indicates that the farmers were mainly middle aged who are in the economically active stage and has the ability to

increase yield. The result from Table 1 also showed that 40.0% of the farmers had no formal education, 16.7% had adult education, 18.3% of the farmers had primary education while 10.0% of the farmers attained secondary education and 15.0% received tertiary education. Findings also showed that majority (60%) of the farmers had 6 to 10 members in their household, 31.7% of the farmers were single, while 48.3% of the farmers were married. It was also found that 28.3% were members of cooperative societies while 71.7% were not. Since majority were not members of cooperative societies, their access to farm resources like credits and even extension contact might be lean and this would not encourage adoption.

Findings showed that 35.0% of the respondents had above 20 years farming experience, 35.0% have been visited by extension agents, while 65.0% were not visited by extension agents. This is not too good because visit or contact with extension provides opportunity for transfer of skill, knowledge and information which facilitates adoption. About 38.3% of the farmers know about adoption of climate change adaptation strategies through radio, 26.7% of the farmers know about climate change through friends/relatives/neighbours, 21.7% of the farmer got to know about the climate change through others, 6.7% got the information through television and extension visit, while 6.7% of the farmers got to know about climate through the newspaper.

Levels of Adoption of Climate Change Adaptation Strategies

The result on table 2 showed that 58.3% of the farmers indicated that they fully adopted planting of cassava with early rainfall as an adaptation strategy, use of early maturing crop varieties was fully adopted by 56.7% of the farmers, 46.7% of the farmers indicated that they fully adopt change of planting date, while the use of different crops recorded 55.0% as fully adopted by the farmers. Findings from the result also showed that 45.5% of the farmer partially adopt the use of tree planting ,40% indicated they do not adopt the use of indigenous knowledge ,55% indicated that they do not adopt diversifying from crop to livestock while 55% also showed that they do not use irrigation as a climate change adaptation strategy.

From the findings, it is obvious that farmers fully adopted only five (5) out of fourteen (14) listed adaptation strategies practices. This indicates that the level of climate change adaptation practices is still low, this could be as a result of the strenuous nature of some of the practices like planting of different varieties, tree planting or low awareness of climate change in rural communities.

Determinants of Adoption of Climate Change Strategies

Results of regression analysis for the socio economic characteristics for all the four functional forms are presented in the table 3. Double -log form was chosen as the lead equation based on the high value of R^2, more significant coefficients, highest F-value and conformity to a priori expectations of the regression coefficients. The coefficient of multiple determination (R^2) value of 0.678 indicates that about 67% of the variation in the level of socio- economic characteristics could be explained by the explanatory variables while the remaining 33% was due to other factors not specified in the model, F-ratio with 4.103 in the regression result at 1% level of significance implies that all the variables have significant or joint effect on the dependent variables.

Level of education was significant at 1% and has positive coefficient. Education is the bedrock of knowledge and as farmers' level of education increases, there will be an increased awareness of available adaptation strategies to climate change. Therefore, efforts at mitigating climate change should involve policies that strengthen educating the farmers, especially agricultural education. Household size is significant at 5% and related positively to adaptation strategies. This implies that larger household will have more labour input, subsequently can easily adopt to different climate change strategies. Also extension contact is significant at 10% and has positive coefficient. This shows that extension services disseminate innovations to the farmers. Marital status has a negative coefficient and is not significant. This shows that married farmers may not have time to adopt climate change strategies because of other family responsibilities. Age has a negative coefficient though not significant, this shows that younger people will work hard to adopt to climate change strategies

because they have more energy than older people. Cooperative membership, gender and farming experience are not significant.

Conclusion

The study analysed the socio-economic factors that influence adaptation to climate change in Emohua Local Government Area, Rivers State, Nigeria. The study revealed that majority of the farmers are not adopting many of the strategies listed in this study. The study also showed that level of education, household size, extension contacts of the farmers are statistically significant, and they affect adoption of climate change adaptation measures. It also indicates that coefficients of age, marital status, years of farming experience and marital status are not significant, implying that they are not important determinants of adoption of climate change adaptation measures. The study therefore recommends that extension programmes should be mounted in communities to increase awareness of climate change and adaptation measures which will help to reduce vulnerability.

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Table 1: Distribution of socio-economic characteristics of the farmers

Variable	Frequency	Percent
Gender		
Male	31	51.7
Female	29	48.3
Age		
21-30	20	33.3
31-40	3	5.0
41-50	14	23.3
Above 50	23	38.3
Education level		
No formal education	24	40.0
Adult education	10	16.7
Primary	11	18.3
Secondary	6	10.0
Tertiary	9	15.0
Household size		
1-5	19	37.7
6-10	36	60.0
11-15	4	6.7
Above 20	1	1.7
Farming experience		
1-5	11	18.3
6-10	11	18.3
11-15	10	16.7
15-20	7	11.7
Above 20	21	35.0
Membership of cooperative societies		
Yes	17	28.3
No	43	71.7
Extension visit		
Yes	21	35.0
No	39	65.0
Sources of information		
Friends/relatives/neighbour	16	26.7
Extension agents	4	6.7
Radio	23	38.3
Newspaper	4	6.7
Others	13	21.7
Marital status		
Single	19	31.7
Married	29	48.3
Divorced	10	16.7
Widowed	2	3.3

Table 2: Distribution of levels of adoption of climate change adaptation strategies

Adaptation strategies	Fully adopted	Partially adopted	Not adopted
Planting of crop with early rainfall	35(58.3)	21(35.0)	4(6.7)
Use of early maturing crop varieties	34(56.7)	18(30.0)	8(13.3)
Change of planting date	28(46.7)	28(46.7)	4(6.7)
Change the time of land preparation	20(35.0)	26(43.3)	13(21.7)
Change the harvesting date	13(21.7)	33(55.0)	14(23.3)
Use of different varieties	17(28.3)	25(41.7)	18(30.0)
Moving from farming to non-farming	22(36.7)	15(25.0)	23(38.3)
Different crops	33(55.0)	19(31.7)	8(13.3)
Moving to a different site	27(45.0)	24(40.0)	9(15.0)
Tree planting	17(28.3)	27(45.5)	16(26.7)
Use of indigenous knowledge	17(28.3)	19(13.7)	24(40.0)
Change from crop to livestock	9(15.0)	18(30.0)	33(55.0)
Use of credit	19(31.7)	18(30.0)	23(38.3)
Increase use of irrigation/ground water	10(16.7)	17(28.3)	33(55.0)

Table 3: Regression results on adoption of climate change adaptation strategies

Variables	**Linear**	**Semi log**	**Exponential**	**Double log**
Constant	3.013	20.708	3.060	19.512
	(16.951)	(2.817)	(11.898)	(3.846)
Gender(X_1)	0.004	-0.313	-0.010	0.120
	(0.111)	(-0.205)	(-.194)	(0.114)
Age (X_2)	0.000	-0.695	-0.028	0-.002
	(-0.105)	(-0.389)	(-.445)	(0-.039)
Level of edu(X_3)	0.047	2.854	0.104	1.274
	(3.105)*	(2.855)*	(2.979)*	(2.977)*
Hhold size(X_4)	0.018	3.617	0.124	0.528
	(2.320)**	(2.449)**	(2.400)**	(2.359)**
Marital status(X_5)	-0.038	-2.453	-0.077	-1.278
	(-0.908)	(-1.352)	(-1.220)	(-1.062)
Coop memb (X_6)	-0.022	-0.331	-0.015	-0.559
	(-0.480)	(-0.177)	(-.230)	(-0.433)
Farming exp(X_7)	0.000	0.257	0.016	0.003
	(0.305)	(0.325)	(0.561)	(0.073)
Extension contact(X_8)	0.066	2.518	0.088	1.911
	(1.193)	(1.421)	(1.413)	(1.867)***
R^2	0.568	0.593	0.625	0.678
F-value	3.731*	3.838*	3.959*	4.103*

* Significant at 1% level
** Significant at 5% level
** *Significant at 10% level
Values in parenthesis are the t- values.