



Climate change adaptation and coping strategies among arable crop farmers in Adamawa state, Nigeria

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Abstract

The study analyzed Climate Change Adaptation and coping Strategies among Arable Crop Farmers in Adamawa State and specifically: described the socio-economic characteristics of the respondents and ascertained the climate change adaptation strategies employed by the respondents in the study area. A multi-stage random sampling technique was adopted to select 232 respondents for the study. Frequency counts, percentages and means were used to analyze the data of the study. Result revealed that, 58% of the respondents were below the mean age (41 years). Majority (66.6%) were male and 69% were married, with 78% of them having acquired one form of formal education or another. The mean farm size, year of farming experience and household size were 4.1 hectares, 16 years, and 8 people respectively. Full-time farmers constituted 66.8%. Most arable crop farmers in the study area had already developed one form of adaptation initiative or another to cope with the effect of climate change but majority of them practiced mixed cropping as the most used adaptation strategy to cope with the effect of climate change. However, insurance cover was not adopted by the respondents as a means of adaptation strategy. It is recommended that, farmers should be educated on the importance of insurance cover as the means of adaptation and coping strategy.

Keywords: adaptation, coping strategies, climate change, farmers

Introduction

Adaptation is as a vital component of any policy response to climate change. Studies by Easterling *et al.* (1993) [7]; Smit and Skinner, (2002) [4] have shown that, without adaptation, climate change is generally a problem to the agriculture sector, adaptation can significantly be reduced if potential measures is taken. The intensity to which an agricultural sector is affected by climate change depends on its adaptive capacity. Indeed, adaptive capacity is the ability of a system to adjust to climate change to moderate potential damage. (IPCC, 2001) [10]. Thus, the adaptive capacity of a system or society describes its ability to modify its characteristics or behavior so as to cope better with changes in external conditions. In the opinion of Dhaka (2010) [5] adaptation to climate change requires that, farmers first notice that the climate has altered. Farmers then need to identify potentially useful adaptations and implement them. Therefore, climate change adaptation would only be possible with good knowledge of the farming and climatic conditions (Risbey *et al.*, 1999, cited by Belliveau *et al.*, 2006) [4, 17]. Thus, climate change impact studies often assume certain adaptations and little explicit examination of how, when, why, and under what conditions adaptation actually occurs in economic and social systems. To mitigate the effects of climate change, timely and useful information is necessary about the possible adaptation strategies employed by farmers. Accordingly, there is need to gain as much information as possible, and learn the positions of farmers and their needs, about what they know about climate change. This research, as part of a more recent strand of adaptation research,

seeks to investigate actual adaptations to climate change among farmers in Adamawa state and specifically;

1. Described the socio-economic characteristics of the respondents and
2. Ascertained the climate change adaptation and coping strategies employed by the respondents in the study area.

Methodology

The research was conducted in Adamawa State, North-eastern part of Nigeria. It lies between latitude 7° 28'N and 10° 55'N of the Equator and Longitude 11° 30'E and 13° 45' E of the Greenwich Meridian and land area of about 36,917 square kilometre with a population of 3,168,101 (2006 National Population Census of Federal Republic of Nigeria Official Gazette, 2007) [8]. Its temperature from 26.7 °C to 27.82 °C in the south and north eastern parts of the state respectively. The mean annual rainfall ranges from 700mm in the North West to 1600 mm in the south east. The mean annual rainfall is less than 1000 mm in the central and north western part of the state (Adebayo, 1999) [1]. Primary data were collected for the study with the use of structured questionnaire which were administered to the respondents. A multi-stage random sampling technique was used to select the respondents. In the first stage; one Local Government Area (LGA), being 20% of the local government areas were randomly selected from each of the Adamawa Agricultural Development Programme (ADADP) zone. This includes Girie, Guyuk, Mubi south and Yola South Local Government areas. In

the second stage, 25% of the wards in each LGA were selected, in the third stage; proportionate sampling was used to select a total of 24 villages/settlements in the selected wards. In the fourth stage, snow ball technique was used to select respondents from each village/settlement. In all 240 questionnaire were distributed, and a total of 232 were finally used for the study. Descriptive statistics such as frequency counts and percentages was used to analyze the data.

Results and Discussion

Table 1 shows the result of the socio-economic characteristics of the respondents. The age revealed that, 21.55% were below the ages of 30 years, 29.74% were between the ages of 30-39 years, 24.57% of the respondents were between the ages of 40-49, 11.64% were between the ages of 50-59, while only a few (12.5%) of them were above the age of 60 years. The mean age of the respondents was 41 years. Farmers that were below the mean age were younger farmers who are at their prime age while those above the mean age were older farmers. In all, 58% were below mean age of the respondents. This corroborates the findings of Akinbile and Ndaghu (2005) ^[2] that, most of the farmers are between the ages of 20-50 years. So most of the arable crop farmers are in their prime age and are still active farmers that are energetic enough to employ different adaptation strategies to cope with the effect of climate change. Sexes of the respondents revealed that, majority (66.6%) were males. This implies that men were more involved in arable crop farming than women in the study area. According to the prevailing culture, men are to provide for the households needs and may be assisted by other members of the household. This corroborates Olayemi (2012) ^[15] that, arable crop productions were mostly carried out by men. The finding is also in tandem with Olalaye (2000) who revealed that, female were usually involved in farming as helpers of labour in minor farm operations such as planting, weeding, harvesting, processing and marketing. Marital status of the respondents shows that, majority (69%) were married, 23.7% were single, 3.9% widowed while only a few (3.4%) were divorced. This implies that, majority of the respondents were married. Married individuals are more concerned with feeding for food than the singles or divorced individuals who may tend to consider their personal well being alone. They have to diversify sources of livelihood in order to meet their day-to-day household needs. This finding corroborates the work of Ofuaku (2011) ^[14] who found that, married farmers had responsibilities that must be reflected on their farming activities. Educational attainment revealed that 22.8% of the respondents had no formal education, 15.5% of them had primary education, 25.2% had senior secondary school education, and 24.0% had NCE/Diploma, while only 12.5% had B.Sc/HND. This implies that majority (77.2%) of them has one form of formal education or another. The preponderance of such educated farmers is expected to influence climate change adaptive capacity in the study area. This finding corroborates the findings of Edeghon *et al.* (2008) that, most farmers had one form of education or another which should be used to boost agricultural production. Farm size revealed that majority (37.93%) of the respondents have farm size of 2ha and below, 26.72% have farm size of 3-4ha, 13.36% have 5-6ha while 21.98% of the respondents have farm size above 6ha, the mean farm size was 4.1ha. This implies that farmers in the study area were small-scale farmers operating at

subsistence level. They need to seek other off-farm activities to argument feeding. This corroborates the work of Ofuaku (2011) ^[14] who asserted that farmers in central Agricultural zone of Delta state whose mean farm size was 3.5 hectares were small-medium holder farmers; they still depend on the use of energy sapping crude implements. Household size of the respondents revealed that 30.60% have household size of 1-5 people, 44.3% of them have 6-10 people, 16.81% have 11-15, 5.60% have 16-20 people while, only a few of them (2.16) have more than 20 people in their household. This implies that farmers in the study area have small household size. The mean household size is 8 people. Farmers that have members in their household below the mean have small household size while farmer with household size above the mean have larger household size. Household size is assumed to represent the labour input of the farm; large household size is mostly inclined to divert part of its labour force into non farming activities as a means of adaptation strategies to climate change. This corroborates the work of Gbetibouo (2009) ^[9] who found that, household size enhance the farmers' adaptive capacity to respond to climate change. Primary occupation of the respondents revealed that, majority (66.8%) were in to farming as their primary occupation, 26.3% were civil servant 5.6% were traders while 0.9% and 0.4% were artisan and students respectively. This shows that majority of the respondents were farmers, this could be as a result of the fact that over 70% of Nigerian population are rural dwellers where farming activities is the major occupation (Mark, 2011) ^[11]. Farming also is one of the simplest occupations to practice in the study area Table 2 revealed the adaptation strategies employed by the respondents to reduce the effect of climate change on their production. It shows that majority (4.52%) practice mixed cropping which ranked first, prayer (4.38%) ranked second, seeking off-farm jobs (4.36%) ranked third, while multiple cropping and use of insecticide 4.28% each ranked 4th among the adaptation strategies. Insurance cover 0% ranked the least as it was not taken by farmers. This unfortunately would have been the most effective adaptation strategy to be adopted by the respondents. This may be attributed to the fact that, most of the respondents are subsistence farm operators. Also, farmers in the study area have low awareness of the importance of agricultural insurance. However, the result points to the fact that, respondents employ one form of adaptation or another. The findings is in tandem with several scholars: Spore (2008) ^[18], Molua (2008) ^[12] and Apata *et al.* (2009) ^[3] who found that, the main strategies of reducing climate change risk is to diversify production and livelihood system. However, Mudzonga (2011) ^[13] advanced that, mitigating climate change effect among farmers goes beyond diversification alone as she stressed that, market, extension and credit service, technology and farm assets are critical for helping African farmers to adapt to climate change.

Conclusion

Based on the findings of this study, it is suffice to conclude that, arable crop farmers in the study area were small-holder farmers. They were in their prime age of production having relatively few years of farming experience. Most of them were full-time farmers. They had already developed one form of adaptation initiative or another to cope with the effect of climate change, mixed cropping ranked highest among the various adaptation strategies adopted by the respondents. However, insurance cover

was not adopted by the respondents as a means of adaptation strategy in the study area.

Recommendations

Based on the findings of this research, is recommended that, farmers should be educated on the importance of insurance cover

as the means of adaptation and coping strategy. This will be of importance to guide against risk and uncertainty which is associated with agricultural production and to ensure households food security at the time of loss of crops as a result of flooding, drought, insects' infestation and the like.

Table 1: Socio-economic characteristics of the respondents

Variables	Frequency	Percentages
Age (years)		
<30	50	21.55
30-39	69	29.74
40-49	57	24.57
50-59	27	11.64
60 and above	29	12.5
Total	232	100
Mean	41	
Sex		
Male	155	66.8
Female	77	33.2
Total	232	100
Marital status		
Single	55	23.7
Married	160	69.0
Widowed	9	3.9
Divorced	8	3.4
Total	232	100
Educational attainment		
No formal education	53	22.8
Primary education	36	15.5
SSCE	59	25.2
NCE/Diploma	55	24.0
B.Sc./HND	29	12.5
Total	232	100
Farm size (hectares)		
2 and below	88	37.93
3-4	62	26.72
5-6	31	13.36
Above 6	51	21.98
Total	232	100
Mean	4.1	
Farming experience (years)		
1-10	75	32.0
11-20	74	31.1
21-30	56	24.9
31-40	13	5.60
Above 40	14	6.40
Total	232	100
Mean	16	
Household size (people)		
1-5	71	30.60
6-10	104	44.83
11-15	39	16.81
16-20	13	5.60
Above 20	5	2.16
Total	232	100
Mean	8	
Primary occupation		
Farming	155	66.8
Trading	13	5.6
Civil servant	61	26.3
Artisan	2	0.9
Student	1	0.4

Total	232	100
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Source: Field survey, 2014

Table 2: Distribution of respondents' adaptation and coping strategies

Adaptation strategy	Frequency	Percentage	Rank
Use of short duration variety of crops	183	3.65	15 th
Change from crop production to animal production	172	3.43	19 th
Alteration in time of farm operations	214	4.26	6 th
Multiple cropping	215	4.28	4 th
Reduction in farm size	115	2.29	26 nd
Use of irrigation practices	166	3.31	21 th
Use of Organic Manure	201	4.01	10 th
Dry planting	172	3.43	19 th
Mulching	183	3.65	15 th
Crop rotation	207	4.13	9 th
Mixed cropping	227	4.52	1 th
Cultivating drought tolerant crops	144	2.87	22 th
Practicing alley cropping	111	2.21	28 th
Rain water harvesting	112	2.23	27 rd
Zero tillage to conserve soil moisture	190	3.79	12 th
seek off-farm jobs	219	4.36	3 th
Migration to safer environment	180	3.59	17 th
Weather forecasting before carrying out farm operations	140	2.79	23 th
Insurance cover	0	0.00	29 th
Terracing	135	2.69	24 st
Ploughing across the slope to reduce erosion	209	4.17	8 th
Use of insecticides	215	4.28	4 th
Changing the orientation of building house	174	3.47	18 th
Harrowing before planting/sowing of seeds	214	4.26	6 th
Planting of trees to provide shade and shelter belt	191	3.81	11 th
Use of stubbles	135	2.69	24 st
Prayers	220	4.38	2 nd
Treatment of seeds before sowing	188	3.75	13 th
Contour bounding	186	3.71	14 th
Total	5018*	100	

Source: Field survey, 2014 *multiple responses exist

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