International Journal of Agriculture and Food Science
www.agriculturaljournals.com
Online ISSN: 2664-8458, Print ISSN: 2664-844X

Received: 09-05-2021, Accepted: 09-06-2021, Published: 05-07-2021
Volume 3, Issue 2, 2021, Page No. 23-27

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

Yohanna I[1], Madu U A[1], Madugu A[1], Garba A[2]

[1] Department of Agricultural Economics and Extension, Adamawa state University Mubi, Adamawa, Nigeria

[2] Department of Agricultural Extension and Management, Bauchi State Collage of Agriculture, Bauchi State, Nigeria

DOI: https://doi.org/10.33545/2664844X.2021.v3.i2a.53

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 7º 28'N and 10º 55'N of the Equator and Longitude 11º 30'E and 13º 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 ºC to 27.82 ºC 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 forth 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 fending 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 Edeoghon *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 2hacters and below, 26.72% have farm size of 3-4hacters, 13.36 have 5-6hacters while 21.98% of the respondents have farm size above 6hacters, the mean farm size was 4.1hacters. 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% have16-20 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.

Recomendations

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

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

Source: Field survey, 2014 *multiple responses exist

References

1. Adebayo AA. Climate 11. In: Adamawa State in Maps. Adebayo, A.A. and Tukur, A.L. (eds) 1st Edition Paraclete Publishers Yola, Nigeria,1999:17-19:81:8396-99.
2. Akinbile LA, Ndaghu AA. Access to Extension and Poverty Alleviating Strategies of Farm Families in Adamawa State. Nigeria Journal of Agricultural Extension,2005:8:1-6.
3. Apata TG, Samuel KD, Adeola AO. Analysis of Climate Change perception and Adaptation among Arable Food Crop Farmers in South Western Nigeria. *Contributed* paper prepared for presentation at the international association of Agricultural Economist, Conference, Beijing, China, 2009.
4. Belliveau S, Bradshaw B, Smit B, Reid S, Ramsey D, Tarleton M *et al*. Farm-level adaptationto multiple risks: Climate change and other concerns. Occasional Canada: University of Guelph, 2006, 27.
5. Dhaka BL, Chayal K, poonia MK. Analysis of farmers' perception and adaptation strategies to Climate Change. Libyan Agriculture Research Center. Journal International,2010:1(6):388-390.
6. Edeoghon CO, Ajaye MT, Ugboya TO. Awareness and Use of Agricultural Practices by Arable Crop Farmers in Ikpoba Okha Local Government Area of Edo State. Journal of Sustainable Development in Agriculture and Environment,2008:3(2):55-63.
7. Easterling WE, Crosson PR, Rosenberg NJ, McKenney MS, Katz LA, Lemon KM. Agricultural impacts of and responses to climate change in the Missouri-Iowa-Nebraska region. *Climatic Change*,1993:24(1-2):23-62.
8. Federal Republic of Nigeria (FRN) Legal notice on publication of 2006 census results. Federal Republic of Nigeria Official Gazette,2007:4:94.
9. Gbetibouo AG. Understanding Farmers' Perceptions and Adaptations to Climate Change and Variability. The Case of the Limpopo Basin, South Africa. IFPRI Discussion February, 2009, 00849.
10. IPCC Climate Change *Impacts, Adaptation, and Vulnerability*. Report edited by McCarthy J.J. *et al*., Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, 2001
11. Mark D Farming future: Lesson from Kwara. Think Africa Press. www.thinkafricapress.com/nigeria/farming-future-lessons-kwara, 2011.
12. Molua EL Turning up the heat of African Agriculture: The impact of Climate Change on Cameroon's Agriculture, African journal of Agriculture and Resource economics,2008:2(1):45-64.
13. Mudzonga E Farmers' Adaptation to Climate Change in Chivi District of Zimbabwe. Trade and development Studies

Center 3 Downie Avenue Belgravia, Harare Zimbabwe, 2011, 1-26.
14. Ofuaku AU Rural Farmers' Perception of Climate Change in Central Agricultural Zone of Delta State of Nigeria. Indonesian Journal of Agricultural Science,2011:12(2):2011:63-69.
15. Olayemi AO. Determinants of Climate Change and Coping Strategies among Crop Farmers in Ondo State, Nigeria. Journal of Agricultural Research and Reviews,2012:1(4):127-131.
16. Olaleye R. Effectiveness of development Intervention for Economic Empowerment of Rural Women in Ondo State, Nigeria. An unpublished Ph.D Thesis submitted to Department of Agriculture and Rural Development, University of Ibadan, Nigeria, 2000, 176.
17. Risbey J, Kandlikar M, Dowlatabadi H. Scale, context and decision making in agricultural adaptation to climate variability and change. Mitigation and Adaptation Strategies for Global Change,1999:4(2):137-167.
18. SPORE, Climate Change, Spore Special Issue-August, 2008.