



CLIMATE CHANGE ADAPTATION STRATEGIES AMONG SMALL RUMINANTS FARMERS IN BORGU LOCAL GOVERNMENT AREA OF NIGER STATE, NIGERIA

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Abstract

The study examined the climate change effects and adaptation strategies among small ruminant farmers in Borgu Local Government Area of Niger State. A combination of purposive and simple random sampling techniques was adopted to select 80 small ruminant farmers in the Local Government Area. Data were collected using an interview guide. Descriptive statistics were used to analyse the data while Adaptation Strategy Use Index (ASUI) was used to rank the most frequently used adaptation strategies to climate change. The mean age and the mean family size of the small ruminant farmers were 46 years and 9 persons respectively. Majority (52.3%) of them had at least primary education with mean a mean farming experience of 8 years. Almost (97.7%) all the small ruminant farmers observed that there was climate change with flooding being the most perceived indicator of climate change. ASUI revealed that provision of housing for animals ((0.84), frequent cleaning of animals house (0.82) as well as keeping and feeding ruminants indoor during rainfall and cold (0.80) were the most frequently used adaptation strategies. The study recommends that efforts should be made to educate small ruminant farmers on the use of other adaptation strategies while assisting them by providing credit facilities and subsidies.

Keywords: Climate change, Adaptation Strategies, Ruminant farmers, perception, Constraints to use

Introduction

Climate change, which is attributed to natural climatic cycle and human activities, has adversely affected agricultural productivity in Africa and indeed Nigeria. According to Warrick and Barrow (1991), climate change is a long term shift in the climatic pattern of a specific location, region or planet measured by changes in features associated with average weather components, such as temperature wind pattern and precipitation. The climate is said to have changed when the patterns and sequence of occurrence of weather events have shifted significantly from what they used to be over a period of time (Food and Agriculture Organisation FAO, 2008). Climate change is caused by both natural and man-made factors over a period of time. The natural processes implicated in climate change include volcanic eruptions, variation in the sun intensity or very slow change in ocean circulation or land surfaces which occur on time scale of decades, centuries or longer. However, human activities are by far the major cause of climate change through the continuous release of greenhouse gases and aerosols into the atmosphere by changing land surface and by depleting the stratospheric ozone layer (Intergovernmental Panel on Climate Change IPCC, 2001).

Adaptation to climate change is the adjustment in natural or human system in response to actual or expected climatic stimuli or their effect (IPCC, 2001). With respect to small ruminant production, climate change adaptation aims at mitigating and developing appropriate coping measures to address the negative impact of climate change on small ruminant production. Adaptation to climate variability is not new but climate change is expected to present heightened risk with potentially grave consequences.

Climate change alters global disease distribution, affects small ruminant feed intake, encourage outbreak of disease which invariably affects small ruminant output (meat). Also, access to food, stability of food,



small farm size, low technology and low capitalization increase the vulnerability of small ruminant production. Fischer *et al.* (2005) asserted that developing countries including Nigeria were more vulnerable to climate change because of the scarcity of capital for adaptation measures, high level of poverty, inequitable land distribution and poor infrastructure. Thus, this study was carried out to assess climate change adaptation strategies among small ruminant farmers Borgu Local Governments Area of Niger state. The specific objectives were to describe the socio-economic characteristics of the respondents, identify the indigenous adaptation strategies to climate change and ascertain the constraints to the use of climate change adaptation strategies.

Methodology

The study was carried out in Borgu Local Government Area of Niger State. The Local Government Area has an area of land of about 16,200sqkm and shares boundaries with Benin Republic to the West, Agwara Local Government to the South, River Niger or Lake Kainji to the East and Kebbi State to the North. Borgu Local Government Area lies between Latitudes 9⁰N and 11⁰N and Longitudes 2⁰E and 4⁰E with a population of 172,835 according to the 2006 census. Major crops grown in the area are rice, millet, maize, guinea corn, sorghum, cassava and melon while sheep, goat and cattle are the most commonly reared livestock. Four (4) out of the ten wards in the study area were randomly selected while twenty (20) small ruminant farmers were randomly selected from each of the four (4) wards. This gave a total of eighty (80) respondents as the sample size of the study. Data were collected from the ruminant farmers through the administration of interview guide. The data were analysed using descriptive statistics such as frequency, percentages and means while the Adaptation Strategy Unit Index (ASUI) was used to assess the extent of use of the different climate change adaptation strategies by small ruminant farmers. In analysing the extent of use of any of the strategies by the farmers, an Adaptive Strategy Index (ASI) was then expressed using a four-point Likert scale with the scoring order 3, 2, 1 and 0 for frequently used, occasionally used, rarely used and not used respectively. The formula used to obtain the ASUI was adapted from Islam and Kasheem (1999) in Adesoji and Famuyiwa (2010) and modified by Umunna *et al.* (2013) as:

$$ASUI = \frac{[N1 \times 3 + N2 \times 2 + N3 \times 1 + N4 \times 0]}{M}$$

N1: Number of small ruminant rearers who frequently used adaptation strategies; N2: Number of small ruminant rearers who occasionally used adaptation strategies; N3: Number of small ruminant rearers who rarely used adaptation strategies; N4: Number of small ruminant rearers who did not use adaptation strategies.

M = nx3 where n = sample size

Results and Discussion

Personal characteristics of the respondents

Table 1 shows that majority (84.1%) of the respondents were male while the remaining (15.9%) constituted the female. This indicates that ruminant ownership is dominated by the male although the women play prominent role in the rearing of the animals such as feeding and marketing of the animals. The dominance of ownership among the male could also be due to the culture of the dominant tribes in the study area (Hausa/Fulani). Majority (70.6%) of the respondents were 31-50 years old while the mean age was 46 years.



This is an indication that the respondents were in their productive years and also ready to learn new ideas. Majority (70.1%) of the respondents were married, hence people with responsibilities to their families. About half (52.3%) of the respondents had at least primary education while the remaining 47.3% did not have formal education. Literacy level of farmers is expected to relate with the ability of the farmers to adapt to climate change effects. Adedoyin *et al.* (1991) pointed out that high level of education is a very good spring board for effective extension service. It was observed that majority (69.4%) of the respondents had 1-10 family size. The mean family was 9 persons. It was also observed that 88.7% of the respondents had farming experience of 1-15 years while the mean year of experience was 8.3 years. This experience is expected to assist the ruminant farmers to adapt to climate change and adopt necessary strategies as preventive or control measures.

Respondents' adaptation strategies, their frequency of use and ASUI (Adaptation Strategies Use Index).

From Table 2, the ASUI shows that provision of housing for animals (0.84) ranked best among the adaptation strategies, followed by frequent cleaning of animal house (0.82), keeping and feeding animals indoor during rainfall and cold/ harmattan (0.80) ranked third while prayer for God's intervention and provision of shade for animals during the day (0.76) and (0.75) were ranked fourth and fifth respectively. In a study carried out by Tolongbose *et al.* (2011) in North Central part of Nigeria almost all the farmers adopted the provision housing for their animals as a means of coping with the effect of climate change. Frequent cleaning of the pens and prayer for God's intervention were commonly used perhaps due to the low or no cost attached to them. Livestock insurance was ranked the least implying that livestock farmers did not adopt livestock insurance which could be due to its low awareness among farmers. This situation calls for increased awareness due to the fact that agricultural enterprises particularly livestock farming is not without uncertainties and risks.

Constraints to use of adaptation strategies

Table 3 shows that absence of government policy (2.34), high cost of equipment (2.34) and high cost of feeding (2.34) were the most serious constraints faced by the respondents, followed by lack of credit facilities (2.32), lack of improved breeds of goats and sheep (2.16) and shortage of water (2.00) as it is based on their mean. This implies that the most constraints to the use of adaptation strategies by respondents were absence of government policy, high cost of equipment and high cost of feeding. Salau *et al.* (2012) reported low income level, no government support and poor technology as the factors militating against adaptation strategies.



Table 1: Personal characteristics of the respondents

Variable	Frequency (n=88)	Percentage (%)	Mean	Standard Deviation
Sex				
Male	74	84.1		
Female	14	15.9		
Age (years)				
≤30	3	3.4	46	8.9
31-40	17	19.3		
41-50	53	60.3		
>50	15	17		
Marital status				
Single	13	14.7		
Married	67	76.1		
Divorced	7	18.1		
Widowed	1	1.1		
Educational level				
No formal education	42	47.8		
Primary education	5	5.7		
Secondary education	19	21.6		
Tertiary education	22	25		
Family size (persons)				
1-10	61	69.4		
11-20	23	26.1	9.3	5.7
21-30	4	4.5		
Farming experience (years)				
1-15	78	88.7		
16-25	8	9	8.3	6.9
26-35	2	2.3		

Source: Field survey, 2014

Table 2: Respondents' adaptation strategies, their frequency of use and ASUI (Adaptation Strategies Use Index)

Adaptation strategies	Frequently used	Occasionally used	Rarely used	Not used	ASUI	Rank
Provision of housing for animals	63(71.6)	12(13.6)	11(12.5)	2(2.3)	0.84	1 st
Reduction in the number of animals	21(23.9)	37(42.0)	27(30.7)	3(3.4)	0.62	11 th
Increasing number of animals	28(31.8)	26(29.5)	17(19.3)	17(19.3)	0.58	12 th
Livestock insurance	9(10.2)	3(3.4)	26(29.5)	50(56.8)	0.16	17 th
Use of traditional health care	14(15.9)	25(28.4)	10(11.4)	39(44.3)	0.39	14 th
Seeking the help of veterinary doctors	44(50.0)	28(31.8)	6(6.8)	10(11.4)	0.73	7 th
Prayer for God's intervention	50(56.2)	20(22.5)	11(12.5)	7(8.0)	0.76	4 th
Use of feed supplements	29(33.0)	36(40.9)	13(14.8)	10(11.4)	0.65	9 th
Seeking and listening to information about climate change	37(42.0)	24(27.3)	20(22.7)	7(8.0)	0.69	8 th
Combining goat and sheep	17(19.3)	12(13.6)	21(23.9)	38(43.2)	0.36	15 th
Change from goat and sheep farming to other business	7(8.0)	18(20.5)	30(34.1)	33(37.5)	0.33	16 th



Planting trees around animal house for cooling and shade	32(36.4)	17(19.3)	19(21.6)	20(22.7)	0.56	13 th
Frequent cleaning of animal house	60(69.0)	15(17.2)	6(6.9)	6(6.9)	0.82	2 nd
Provision of shade for animals during the day	48(55.8)	24(27.9)	7(8.1)	7(8.1)	0.75	5 th
Keeping and feeding animals indoor during rainfall and cold/harmatan	54(61.4)	20(22.7)	10(11.4)	4(4.5)	0.8	3 rd
Preservation of fodder/hay	44(50.0)	24(27.3)	17(19.3)	3(3.4)	0.75	5 th
Free animals during dry weather to search for feed and water	35(39.8)	20(22.7)	27(30.7)	6(6.8)	0.65	9 th

Source: Field survey, 2014

Table 3: Constraints to use of adaptation strategies

Constraints	Serious	Mild	Not a problem	Mean	Rank
Lack of credit facilities	42(47.7)	33(37.5)	13(14.8)	2.32	4 th
Lack of information on climate change	14(15.9)	50(56.8)	24(27.3)	1.89	10 th
Lack of improved breeds of goats and sheep	33(37.5)	36(40.4)	19(21.6)	2.16	5 th
Absence of government policy on climate change	47(53.4)	24(27.3)	17(19.3)	2.34	1 st
Shortage of water	27(30.7)	34(38.6)	27(30.7)	2	7 th
Erratic/irregular power supply	28(31.8)	20(22.7)	40(45.5)	1.86	10 th
High cost of equipment	44(50.0)	30(34.1)	14(15.9)	2.34	1 st
High cost of feed supplements	44(50.0)	30(34.1)	14(15.9)	2.34	1 st
Poor or low extension services	28(31.8)	41(46.6)	18(20.5)	2.09	6 th
Inadequate knowledge to cope with climate change	20(22.7)	50(56.8)	18(20.5)	1.81	12 th
Limited availability of adaptation measures	17(19.3)	50(56.8)	21(23.9)	1.95	9 th
Risk of adaptation	18(20.5)	41(46.1)	29(33.0)	1.888	11 th
Lack of access to weather forecasts	23(25.8)	41(46.1)	22(25.6)	1.97	8 th

Conclusion and Recommendations

The study shows that respondents adopted some adaptation strategies to cope with the challenges of climate change. According to the ASUI, the most frequently used strategies include provision of housing for animals, frequent cleaning of animal house, keeping and feeding animals indoor during rainfall and cold/harmatan. The constraints to the use of adaptation strategies were absence of government policy, high cost of equipment and feeding. Based on the findings of this research the following recommendations are made:

- Policy makers through agricultural extension should make efforts in educating the small ruminant farmers on the use of other adaptation strategies.
- Assistance should be made available by the government through provision of credit facilities and subsidies to the small ruminant farmers.

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