IMPACT OF CLIMATE CHANGE PERCEPTIONS ON THE LIVELIHOOD OF SHEEP AND GOAT FARMERS IN OSUN STATE, NIGERIA

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ABSTRACT

This study was conducted in the three Senatorial districts of Osun State with four Local Government Areas (LGAs) randomly selected within each Senatorial district to give a total of 12 LGAs with the objective of studying the perception of small ruminant farmers about climate change and its impact on their livelihood. 120 structured questionnaires were used through a multi-stage sampling technique. Result presentation and analysis were by percentages, frequency tables, Chi-square test and Kendall's coefficient of concordance.

Findings revealed that majority (57.3%) of the respondents were within the age range of 45-64 years. About 52.1% of the respondents were males, while 47.9% were females. Most (86.5%) of respondents were married and 4.2% were single. 10.4% had no formal education, while 89.6% had various levels of formal education. Highest flock sizes of between 10-19 were owned by about 44.8% of respondents. Lower years (1-10) of farming experience were indicated by more (65.6%) of the respondents. 50% of respondents strongly believed that rainfall patterns has been unpredictable recently while 62.5 % strongly believed that climate change has caused a reduction in the total number of small ruminants reared. The Kendall's coefficient of concordance (W) was 0.64 with a calculated chi value of 31.41 implying that farmers did apply the same standard in ranking the statements related to their perceptions on climate change and agreed that small ruminants are affected by changes in weather condition

It was concluded that small ruminant farmers in Osun State are knowledgeable about climate change and its impact on their livelihood and further recommended that this should be considered in policy formulation on adaptation of livestock production systems to climate change.

Keywords- Climate change, perception, sheep and goat farmers, livelihood, Osun State.

Introduction

Climate change continues to have profound effects on agriculture and agricultural development all over the world as we have never experienced in the past. These are exemplified by growth in drought affected areas, lower water availability for large numbers of people and increases in events such as heat waves, drought and storms in several places (IPCC, 2007).

It is as a result of drastic changes in the following meteorological variables: Temperature, humidity, atmospheric pressure, wind flows, precipitation, atmospheric particle count and

other meteorological variables over time (Uprety, 1998). Though it is not possible to predict precise future climate conditions, but the scientific consensus is that global land and sea temperatures are warming under the influence of greenhouse gases and will continue to warm regardless of human interventions for at least the next two decades (Intergovernmental Panel Climate Change, IPCC, 2007). According to the Ministry of Environment of the Federal Republic of Nigeria, MOE FRN (2003), climate change has become a global issue in recent times, manifesting in different climate parameters including cloud cover, precipitation, temperature ranges, sea level and vapour pressure. Climate change impact has been projected to be immense and varied on the environment and human lives. However, such impacts will depend on the extent of adaptation, rate of temperature change and socio-economic conditions (IPCC, 2007). These impacts are projected to affect agriculture, water availability, coastal areas and human health, thus affecting all natural and man-made systems to an extent (SACAU, 2009). Agriculture which constitutes the backbone of most African economies is the dominant occupation in the rural areas (Ekong, 2003). Agriculture makes the largest contribution to GDP and is the biggest source of foreign exchange earnings (Eva, 2009). In addition, Agriculture supplies up to 50% of household food requirements and up to 50% of household incomes. Most of the income is generated by beef cattle, dairy cattle, goats, sheep and chickens (Desanker et al 2001). In many communities, livestock is the only asset of the poor, but it is highly vulnerable to variability and extremes (Easterling *et al*., 2007; FAO, 2007; Thornton *et al*., 2007, IFAD, 2010). Without any doubt, the negative effect of climate change is evident in the financial turn over attributable to Agriculture around the world (Rust and Rust, 2013). Climate change negatively affects livestock production by reducing the availability of feed and fodder as a result of predicted impact of climate change (Rust and Rust, 2013).

The negative impact of climate change on livestock production can only be ameliorated when farmers are aware of the effect of climate change on their animals and their productivity and hence, develop mitigation strategies to ameliorate the impact. Sheep and goats are the major ruminants reared by small holder farmers in Osun State, Nigeria. These farmers are resource-poor and they depend on the animals for their livelihood. Ayanwuyi *et al*. (2010) reported that to approach the issue of climate change appropriately, one must take into account local communities' understanding of climate change, since they perceive climate as having a strong spiritual, emotional, and physical dimension. It is therefore assumed that these communities have an inborn, adaptive knowledge from which to draw and survive in high-stress ecological and socio-economic conditions. Therefore, this work was designed to investigate the perceptions and climate change awareness of small ruminant farmers and its impact on sheep and goat production in Osun State.

Materials and Methods

Area of Study

The study was carried out in Osun State, Nigeria. The state lies between latitude 7º 30'N and longitude 4º 30'E. Osun state consists of 3 senatorial districts, namely, Osun East, Osun West and Osun Central. Each district consists of 10 Local Government Areas, making a total of 30 LGAs altogether. Four Local Government Areas

were randomly selected within each senatorial district to give a total of 12 Local Government Areas used for this study.

Data collection

Interview schedules were carried out with the aid of well structured questionnaires and one-on-one interview with the sheep and goat farmers. 120 questionnaires were prepared with 94 returned from the sheep and goat farmers across the 12 LGAs. The questionnaires contained four sections: a. Personal and socio-economic characteristics of the respondents. b. Small ruminant production pattern practiced by respondents c. Knowledge of sheep and goat farmers on climate change. d. Perception of small ruminant farmers on climate change.

Method of Data Analysis

Data collected were interpreted using simple descriptive statistical tools such as frequency tables, percentages using SPSS Version 18 (2009) and Chi square statistics. The qualitative data were also analysed with Kendall's coefficient of concordance to determine the degree of association among the rankings given by the small ruminant farmers. This coefficient indicates whether there is perfect agreement or no agreement among the set of rankings. When perfect agreement occurs between the rankings, Kendall's coefficient is equal to 1 but when there is maximum disagreement, it is equal to 0. It was computed using the formula:

Kendall's coefficient

$$W = \frac{s}{\frac{1}{12}k^2\ (N3 - N)}$$

Where s is the squared deviation of sum of ranks for each statement from the mean rank sum, k is the number of respondents and N is the number of statements ranked. The significance of W is tested for with chi-square value. The null hypothesis of independence is rejected if the calculated chi value is greater than the chi-square table value at a 5 per cent level of significance (Elum and Simonyan, 2016). All analyses were done with SPSS (Version 19).

Results and Discussion

Results of personal characteristics of small ruminant farmers are presented in Table 1. Majority (57.3%) of the respondents were within the age range of 45-64 years. According to Ismaila *et al*. (2010) farmers at this age level are incapable of handling tedious agricultural farming activities and as such, revert to less tedious agricultural ventures such as sheep and goat farming. This may have accounted for the higher percentage of sheep and goat farmers at this age level. Result also indicates that younger people are less interested in sheep and goat production. The lower level (36.5%) of youth in the age bracket of 25 to 44 years involved in sheep and goat production showed that there is a possibility that the youth diversified into other areas of the economy for their livelihood. Age is thus an important factor in agricultural production. Lowest level (6.0%) of adults in the age level 65-84 years indicates that the work of sheep and goat production may have become too tedious for older people. This however does not support the report of Ayanda, (2013) who

reported that age factor might inform the basis for diversification into other enterprises that require less of wandering and favour sedentary life since sheep and goat farming in Osun state is practiced using the semi intensive production system. This is because age is expected to have a direct relationship with productivity. This result suggests that the ages of individuals affect their level of involvement in agriculture that can make impact on livestock production.

Table 1: Personal characteristics of the small ruminant farmers

Variables	Frequency	Percentage
Age		
25-64	35	36.5
45-64	55	57.3
65-84	6	6.2
Sex		
Male	50	52.1
Female	46	47.9
Marital status		
Married	83	86.5
Single	4	4.2
Widowed	8	8.3
Divorced	1	1.0
Religion		
Christianity	54	56.3
Islam	41	42.7
Traditional	1	1.0
Educational level		
Non- formal education	10	10.4
Primary education	38	39.6
Secondary education	29	30.2
Tertiary education	19	19.8
Household size		
1-5	26	37.5
6-10	38	44.8
>10	12	17.7

Source: Field survey

More (52.1%) males were involved in small ruminant production. This finding agrees with report of Ajala, (2005), although the role of women in livelihood activities is very important, majority of the respondents were males, this must have affected the findings in this study. Ojo *et al*. (2016) reported that small scale livestock keeping is practiced by *Moringa Oleifera* farmers, especially the female members of the household in Oyo State. Majority (86.5%) of the respondents were married, most (56.3%) of them are Christians. Majority (69.8%) of the respondents had attained primary and secondary education. This implies that respondents may not find it

difficult to access information on livestock production from a wide range of sources. Most (44.8%) of the respondents had household size between 6 -10.

Table 2: Small ruminant production pattern by the respondents

Variables	Frequency	Percentage
Flock size		
1-9	15	15.6
10-19	43	44.8
20-29	29	30.2
>29	9	9.1
Years of experience		
1-10	63	65.6
11-20	27	28.1
21-30	6	6.3
Goals of small ruminant production		
Source of income	48	50.0
Social or cultural values	20	20.8
Consumption	2	2.1
Source of income and consumption	26	27.1
Sources of information on climate		
Friends	20	20.8
Radio	44	45.8
Television	13	13.5
Newspaper	2	2.1
Extension paper	4	4.2
Friends and Radio	6	6.3
Radio and Extension agents	4	4.2
Television and Extension agents	3	3.1
Earnings from small ruminant (₦)		
5,000 - 15,000	10	10.4
15,001 – 25,000	35	36.5
25,001 – 35,000	41	42.7
>35,000	10	10.4

Source: Field survey

The results of small ruminant production pattern by the respondents are presented in Table 2. The results showed that majority (44.8%) of the respondents had between 10-19 animals; majority (65.6%) had been raising small ruminants between 1-10 years. Also half (50%) of the respondents were raising these animals purposely to generate income. This agrees with Sodiya (2005) who reported that in the traditional Fulani agro-pastoral production system, the importance of small ruminants, especially goats are clearly demonstrated as being a source of quick cash for the purchase of minor household requirements and as slaughter animals for home consumption. Majority (45.8%) of the respondents sourced information about small ruminant production and about climate change from radio. This finding agrees with report of Yekinni (2010) that

popularity of local radio stations stems from a sense of proximity with the listening community, which other media have not been able to achieve. The implication of this is that radio as source of information can easily be used to reach out to the grassroots communities in the country; this could be due to the fact that radio is accessible across the agricultural zones in Nigeria. Generally, the respondents made use of information sources that were available and accessible to them for their livestock production activities, based on their financial and educational abilities. Most (42.7%) of them earned between ₦25, 001- N35, 000.

Table 3: Perceptions of small ruminant farmers on climate change

Perceptional statements	SA (%)	A (%)	D (%)	SD (%)	Mean Rank
There are visible changes in climate conditions over some years	44 (45.8)	50 (52.1)	1 (1.0)	1(1.0)	22.92
Rainfall pattern has been unpredictable recently	48 (50.0)	44 (45.8)	3 (3.1)	1 (1.0)	35.59
There are visible environmental changes in my community	29 (30.2)	60 (62.5)	5 (5.2)	2 (2.1)	27.56
Human activities cannot influence weather conditions	19 (19.8)	22 (22.9)	31 (32.3)	24 (25.0)	37.38
Small ruminants are affected by changes in weather condition	31 (32.3)	41 (42.7)	21 (21.9)	3 (3.1)	42.02
Climate change causes reduction in animal yield	48 (50.0)	42 (43.8)	3 (3.1)	3 (3.1)	35.59
Climate change has caused a reduction in total number of small ruminants being reared	60 (62.5)	30 (31.3)	4 (4.2)	2 (2.1)	27.56
Climate change causes increase in cost of small ruminant production	50 (52.1)	40 (41.7)	4 (4.2)	2 (2.1)	25.82

Source: Field survey

The perception of small ruminant farmers on climate change is presented in Table 3.Half (50%) of the respondents strongly agreed that rainfall pattern has been unpredictable recently; half (50%) of the respondents also strongly agreed that climate change causes reduction in animal yield. Also majority (52.1%) of the respondents strongly agreed that climate change causes an increase in cost of small ruminant production. This may be as a result of dwindling feed resources which can have a significant impact on livestock productivity, the carrying capacity of rangelands, the buffering ability of ecosystems and their sustainability, and the distribution of livestock diseases and parasites (Thornton et al., 2007). Most (52.1%) agreed that there were visible changes in climatic conditions over the years such as higher temperatures, changes in rainfall patterns, less access to water etc. Majority (62.5%) of respondents agreed that there were visible environmental changes in their communities; most (42.7%) of the farmers indicated that small ruminants are affected by changes in weather condition.

Table 4: Test of degree of association among the rankings given by the small ruminant farmers

Variables	Values
N	120
Kendall's W[a]	0.635
Chi-Square	31.41
Df	85
Asymp. Sig.	0.000

[a]Kendall's Coefficient of Concordance; d
f – degree of freedom , N- sample size

Table 4 shows a test of degree of association among the rankings given by the small ruminant farmers. A Kendall's coefficient of concordance was done to ascertain the degree of agreement among the respondents on the statements related to their perceptions on climate change. The Kendall's coefficient of concordance (W) was 0.64 with a calculated chi value of 31.41, as shown in Table 4. Therefore, the null hypothesis of independence among rankings was rejected and it was inferred that the farmers did apply the same standard in ranking the statements related to their perceptions on climate change. It was also observed that among the statements rated most highly and regarded as most important by all the farmers was that small ruminants are affected by changes in weather condition (Table 3). This shows the importance of the farmers' knowledge of climate change effects. Schipper *et al*. (2008) reported that if it is not recognised that climate change poses new threats, then measures to prevent loss will not be prioritized.

Table 5: Relationship between small ruminant production and the knowledge about climate change by farmers

Small ruminant production patterns	df	χ^2	p-value
Flock size	3	27.399	0.497^{ns}
Years of experience	2	14.224	0.029*
Goals of small ruminant production	3	2.008	0.366^{ns}
Sources of information	7	44.202	0.027*
Earnings from small ruminant production	3	60.610	0.025*

Source: Field survey.

The results of relationship between small ruminant production and knowledge about climate change by the respondents is presented in Table 5. The result showed that there were significant ($p<0.05$) relationship between years of experience, sources of information, earnings from small ruminant production and knowledge about climate change. This significant relationship indicates that knowledge about climate change is a function of experience in the livestock production and proper information, this also helps the sheep and goat farmers to be better adapted and to build adaptation and resilience to the effects of climate change on their livestock production which by extension reflects in their earnings from the venture since adaptation brings

about sustainability of production and when this is the case, more animals are available for sale. It was observed however, that there were no significant ($p>0.05$) relationships between flock size, goals of small ruminant production by the farmers and their knowledge about climate change.

Conclusion and Recommendation

The study concluded that sheep and goat farmers are knowledgeable about climate change effects and its impact on their livelihood. These farmers utilize certain mitigation strategies to reduce the effect of climate change on their livestock production. It is recommended that the adaptation strategies utilized by these smallholder livestock farmers to cushion climate change effects in their communities be assessed and considered in policy formulation on adaptation of livestock production systems to climate change.

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