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The Effects of Climate Change on the Livelihood of Fulani Herdsmen in Niger State Nigeria

By

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Abstract: This study aims to show that climate change has affected the livelihoods of Fulani herdsmen. It investigated the effect of climate change as it impacts on production of herdsmen and their alternative means of livelihood. Through a multi-stage sampling technique, 90 herdsmen were randomly selected. Data were collected using interview schedule and analyzed by percentages, frequency, tables and PPMC (Pearson Product Moment Correlation) statistical tools. The results of the study showed that majority of the respondents were between the age ranges of 16-45 years. 3 and 4% of the herdsmen had primary and secondary education, respectively. Furthermore, 67.5% of the herdsmen strongly agreed the milk produced by their animals have reduced while 38.8 and 47.5% respectively reported increase in mortality and abortion in herds. Fulani herdsmen indicated reduction in income, herd size and production as some of the effects of climate change on their livelihood. A significance relationship was established between selected socioeconomic characteristics and their alternative means of livelihoods (age, marital status and educational level). The study thus recommended that Fulani herdsmen should be encouraged, through extension services, to increase their participation in crop and other enterprises as alternative ways of enhancing the decreasing income from livestock rearing. This, in turn, will help reduce the impact of climate change on their livelihood.

Introduction

Fulani herdsmen are found in a large portion of Northern Nigeria and they have been known to manage herds of cattle, sometimes including sheep and goats. Their pattern of management involves moving the animals across rangelands during which water and food in form of forage from vast pasture are exploited. The most interesting aspect of their continued existence is that they do not have permanent homes. The idea, until very recently was to camp around flourishing pastures until they run out of food for the animals. There was also a lot of transhumance activity as they could move (wander) very long distances from

north to south alternating between these two ecologically different zones between raining and dry seasons (Aderinoye-Abdulwahab and Adefalu, 2012). In recent times, movement has been well restricted as Fulani herdsmen do not travel long distances as they tend to stay within areas very rich in feed for animals and an abundant water source. Secondly, they have also begun to imbibe other agricultural activities especially planting of arable crops; this may be one of the reasons for permanency in their movement pattern. Their women are known to collect cow milk "*nunu*" which is processed into local cheese popularly known as *wara*.

Elements of climate have direct and indirect effects on grassland distribution available for grazing animals. In Nigeria, this means that some stable ecosystems such as the Sahel-Savannah may become vulnerable because warming will reinforce existing patterns of water scarcity, increasing the risk of drought in regions where Fulani herdsmen are found. It is obvious from the definition that climate change is an inherent attribute of climate, which is caused by both human activities (anthropogenic) and natural processes (bio-geographic) (IPCC, 2001). Climate change as suggested by some researchers could impact the economic viability of livestock production systems worldwide. Surrounding environmental conditions directly affect mechanisms and rates of heat gain or loss by all animals (NRC, 2002). Lack of prior conditioning of livestock to weather and climatic events often results to catastrophic losses in the domestic livestock industry. It also affects the feed intake of the animal because ingestion of food is directly related to heat production, any change in feed intake and/or energy density of the diet will change the amount of heat produced by the animal. The ambient temperature has the greatest influence on voluntary feed intake. The unpredictable changes in seasons coupled with the ever growing pressure on land in the past few years has been described by many experts as a clear manifestation of the impact of climate change across Nigeria with most states in the far North being the worst affected by these changes. This has put the pastoralists in a state of dilemma (Omotayo, 2010). In recent times, drought and flood are unpredictable and are more frequently occurring. This had a cumulative effect on natural resources and disruption of eco-system. Climate change has reduced available land for livestock production purposes because of desert encroachment currently moving at 600 m/annum (or 350,000 ha per annum) (IPCC, 2007, Oyetade, 2007).

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In spite of the advent of monetized economy, pastoralism has remained a veritable source of livelihood and food security as cattle, goats and sheep perform economic, as well as traditional, social and exchange functions and its importance in sustaining the production of meat in the country cannot be overemphasized. The bulk of locally produced meat and milk in Nigeria are produced by Fulani herdsmen. The diminishing pastoral and water resources such as open rangelands, wetlands (Fadama land), watercourses and rivers present a new challenge to Fulani herdsmen. This could be held responsible for the low productivity of their cattle over the years. The situation is motivated by climate change which exposed the Fulani herdsmen and their herds to tougher weather situations especially drought, poor quality pasture, diminishing rangelands, risk of contracting diseases, pests, conflict between the pastoralists and crop producers over land use. The ever growing pressure on land in the past few years arising from population explosion, industrialization and institutional development has been described by many experts as a clear manifestation of the impact of climate change across Nigeria (Heinrich Boll Foundation, 2000). Increasingly, however, Fulani herdsmen discovered that the rivers where they grazed their animals are now blocked off by farms and gardens.

Experiences revealed that the impact of climate change on pastoralists have serious implications on the socio-economic sectors of the Fulani, thereby threatening the survival of millions of Africans, particularly the Fulani herdsmen. One of the major problems that have been reoccurring in recent time is that of climate change, evident in the fluctuating weather pattern, extremely high and low temperatures, irregular rainfall patterns, floods, drought and desertification, as well as heat stress on the animal, which affects many physiological and metabolic processes. All these affect the production of beef, chevon and mutton, including milk, hides and skin, consequently affecting the livelihood of Fulani herdsmen that rear the livestock and depend on their by-products for survival. Therefore this study will attempt to investigate the socio-economic characteristics of Fulani herdsmen and find out the effects of climate change on the production of the herdsmen. The study will also examine how climate change affect the livelihood of Fulani herdsmen and investigate the alternative means of livelihood adopted by Fulani herdsmen given the disruption in livelihoods as a result of the impact of climate change in their livelihoods. The study tested a hypothesis which

states that there is no significant relationship between selected socio-economic characteristics and alternative means of livelihood of Fulani herdsmen.

Materials and Methods of Study

Niger state came into existence on 3rd February 1976. It has a population of 3.9 million with a total land area of 76,363 km² (2006 census). The capital of Niger state is Minna and the major language spoken there is Nupe. The annual rainfall ranges from 800 to 1000mm. The average number of rainy days ranges from 187 days to 220 days. The rain starts in April to October with the peak in July. The dry season lasts for six months from November to April. The average mean relative humidity ranges from 60°C (January to February) and 80°C (June to September). The State falls between the guinea-savannah vegetation belt. The target population for the study was the Fulani herdsmen in the study area. The study used a multi stage sampling technique to select the respondents. Stage one involves a purposive selection of three LGAs where Fulani herdsmen are mostly located and they are; Bida, Lavun, and Gbako LGAs. The second stage involves the random selection of three Fulani settlements in each of the LGAs. The final stage was the random selection of 10 Fulani per settlement to make up a sample size of 90. Data was analyzed using percentages, frequencies and PPMC statistics.

Data Analysis and Discussion of Results

This section shows the findings from the research. It explains the analysed data and the implication of the study to livelihood of Fulani herdsmen. The result of the study as shown in Table 1 indicated that 74% of the respondents were in the age range of 16-45 which means that majority of the respondents are in their active age. These supported the work of Ismaila et al. (2010) who reported that at this age range farmers are active and are capable of handling tedious farming activities. This is evident in the act of covering long distances to graze the animals as consistently practiced by herdsmen. Majority (87%) of the pastoralists were male. This implies that majority of the listed respondents were male; and this does not mean that the roles of females are not important, especially in processing and marketing of livestock products. About half (81%) of the respondent acquired quranic education suggesting that Fulani herdsmen in the study area are mostly of the Islamic faith. However, 4 and 3% had primary and secondary education respectively. This is a reflection of the level of formal

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education among the herdsmen in the study area. It was also revealed that 47% of the respondents spent 21 to 30 years in transhumance pastoralism. This result is of great significance as the implication is that respondents have been herding livestock for quite a while, this might suggest that pastoralists may be reluctant to diversify into alternative source of livelihood. The result also showed that 40% of Fulani herdsmen have a family size of between 11-15 members which may mean that there are more hands to achieve home and farm activities. This study supports the finding of Rogers and Mallam (2003) who reported that the larger the size of the household the ease with which tasks can be accomplished in the house. It was also found that 40% of the herdsmen had a range of 30 to 40 cattle in their herd. The inability to maintain larger herd size could be linked to climate change in Nigeria. The table further shows that 60% of the respondents made between #100001 to #200000 in the last three months majority of which was gotten from selling of their livestock.

Table 1: Socioeconomic Characteristics of Fulani Herdsmen

VARIABLES	FREQUENCIES	PERCENTAGES
Age		
<15	5	6
16-30	40	44
31-45	32	30
Above 45	13	14
GENDER		
Male	73	87
Female	17	13
Marital status		
Single	7	8
Married	60	66
Divorced	2	2
Widowed	6	7
Separated	16	18
Educational level		
Primary education	4	4
Secondary education	3	3
Tertiary education	--	0
Quranic education	73	81
No formal education	10	11
Years of herding exp.		
0-10	5	6
11-20	42	47
21-30	23	26
31-40	15	17
Above 40	5	6
Household size		
0-5	3	3
6-10	32	36
11-15	36	40
Above 15	19	21
Herd size		
1-10	11	12
11-20	20	22
21-30	36	40
31-40	15	17
Above 40	8	9
Income from herds (3 months)		
0-#100000	16	18
#100001- #200000	54	60
#200001- #300000	12	13
#300001- #400000	1	1
Above #400000	7	8

Source: Field survey 2014

Climate Change on Livelihood

The effect of climate change on the livelihood of Fulani herdsmen is summarised in Table 2. The results showed that many (67.5%) of the herdsmen strongly agreed that the reduction in milk production in recent times has affected their livelihood. This implies that the income gotten from milk production has reduced over the years.

Table 2: Effect of Climate Change on the production of Herdsmen

Variables	SA	A	N	D	SD
Reduction in milk production	61(67.5)	21(24.2)	2(2.5)	3(3.3)	3(3.3)
Increase in herd mortality	35(38.8)	19(21.2)	0	34(37.5)	2(2.5)
Increase in abortion	43(47.5)	38(42.5)	0	7(7.5)	2(2.5)
New types of diseases noticed	45(50)	18(20.0)	1(1.2)	24(25.3)	2(2.5)

Source: field survey 2014

However, 38.9% of the herdsmen reported that increase in the mortality of their herds have also affected them because the livestock are their main source of livelihood. Moreover, about 49% of the herdsmen strongly agreed that the abortion rate of their herds have also increased. This might not be unconnected to the quality of existing pasture and the need to cover long distances for grazing under harsh weather. The findings agreed with NRC (2002) that climate change could impact the economic viability of livestock production systems worldwide.

Table 3: Effect of Climate Change on the Livelihood of Fulani Herdsmen

VARIABLES	SA	A	N	D	SD
Reduction in income	32(35.5)	49(54.3)	5(5.6)	3(3.3)	1(1.2)
Reduction in herd size	40(44.4)	33(36.7)	17(18.9)	0	0
Increase in rural-urban migration	14(15.6)	2(2.2)	54(60.0)	13(14.4)	7(7.8)
Reduction in production	44(48.9)	20(22.2)	14(15.6)	9(10)	3(3.3)

Source: Field survey 2014

Climate change has also affected the production of Fulani herdsmen, 54.3% of the respondents agreed that their income has reduced as a result of changes in climate. Also 48.9% and 44.4% of the respondents strongly agreed that their

production and herd size has reduced. These are all as a result of the surrounding environmental conditions having direct effect on their livestock.

Table 4: Alternative Means to Livelihood for Fulani Herdsmen

ALTERNATIVE MEANS OF LIVELIHOOD	YES(%)	NO(%)
FARMING	48(53.3)	42(46.7)
PETTY-TRADING	31(34.4)	59(63.6)
DRIVING	11(12.2)	79(87.8)
CARPENTERING	3(3.2)	87(96.7)
MECHANIC	17(18.9)	73(81.1)
SECURITY GUARDS	30(33.3)	60(66.7)

Source: field survey 2014

Table 4 summarized the alternative means to livelihood undertaken by Fulani herdsmen in view of the existing adverse effect of climate change on livestock production in the study area. The result indicated that 53.3% of the herdsmen engaged in crop farming while 34.4, 12.2, 3.2, 18.9 and 57.8% engaged in petty trading, driving, carpentering mechanic and security guards' respectively to enhance the declining income from cattle production. However, it was observed that the herdsmen undertake these alternative livelihood economic activities on a small scale basis.

Table 5: The significant relationship between selected socioeconomic characteristic and alternative means of livelihood of Fulani herdsmen

VARIABLES	R value	P value	Significance
Age	0.252	0.007	Significant
Gender	0.421	0.372	Not Significant
Marital status	0.039	0.021	Significant
Level of education	0.346	0.039	significant
Family size	0.125	0.016	Significant

Source: Field survey 2014

The correlation between selected socio-economic characteristics of the respondents and their alternative means to livelihoods for Fulani herdsmen shows that age is significant at ($r=0.252$). This might signify that the older a

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Fulani herdsman is, the more he is likely to understand the need for an alternative means of maintaining his livelihood. Again, level of education is also significant at ($r=0.346$). It could be said that the acceptance of a dire need for an alternative means of livelihood goes in line with the level of education. It is expected that the educated pastoralists would have realised the need to diversify from livestock-only income generating activities due to the impact of climate change on their livelihood. This finding confirms the report of Ayanda et al. (2013) that both age and educational attainment are some of the important contributory factors to exposure of the herdsmen that can assist them to mitigate the adverse effects of climate change. Marital status ($r=0.039$) and family size ($r=0.125$) also have a significant relationship to respondents alternative means to livelihoods. The implication of this is that a married pastoralist with a large family size will more easily understand the need for an alternative means to livelihood as there is likely to be much pressure on the existing means of sustenance. However, the result showed that there is no significant relationship between gender and alternative means of livelihoods. By implication, the need for an alternative means of livelihood is not dictated by gender.

Recommendations and Conclusion

The importance of Fulani herdsmen in meeting the protein need of the Nigerian population is evident in the quantity they contribute to the total meat in the food chain. Consequently, it is important to review the problems they encounter during production on a regular basis so as to structure new programmes to support them as well as ensuring that these programmes answer their basic problems. The study has shown that climate change has reduced herd size and milk production. It has also increased mortality rate among livestock. The Fulani herdsmen are therefore diversifying into crop production and other enterprises, albeit on a small scale, to supplement their incomes from declining herd population. This is in line with the suggestion of Aderinoye-Abdulwahab et al. (2013) who reported that herdsmen need to diversify in order to reduce their socio-economic vulnerability so as to lead to improved livelihood.

The study recommends that Fulani herdsmen should be encouraged, through extension services, to increase their participation in crop and other enterprises as alternative ways of enhancing the decreasing income from livestock rearing. This, in turn, will help reduce the effect of climate change on their livelihood.

Moreover, Nigeria as a country should invest more in combating climate change by mounting agricultural and climatologic research programmes that could help to combat desert encroachment. Additionally, the research will also serve as guide to the academia and research institutes in making decision on how to help ease the effects of climate change on the livelihood of Fulani herdsmen while extension service providers could design programmes that will help pastoralists to better manage and cope with the impact of climate change.

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