

Climate Change's Impacts on Livestock Keepers in Mundri East County of South Sudan

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Abstract:- A study was conducted to determine the impacts of climate change on livestock keepers in Mundri East County of Western Equatoria State, South Sudan. Data was collected by using a cross-sectional questionnaire administered to 120 households who used to rear livestock in two Payams of Kediba and Lakamadi respectively. Majority of the households were male (75%) and had more than twenty years' experiences in livestock production. Most of these farmers were aware about climate change (68%) and more than half of them (51%) believed cutting grasses were considered to be the main causes of climate change been observed in their area. the level of literacy was so high (85) who attended a primary education. In conclusion, adaption of farmers to climate changes is the best ways to sustain their livelihoods through using available local resources.

Keywords:- Climate Change, Farmers, Mundri East, Adaption.

I. INTRODUCTION

Climate change has a wide-ranging impact on livestock production. Because they are dependent on the natural environment, these are the most anticipated in pastoral grazing systems. Mundri East County, located in South Sudan, is one of the areas where livestock farming is a major source of livelihood for many households. As such, any changes in the climate have a direct impact on farmers and their animals. One of the most significant implications of climate change on livestock producers in Mundri East County is the scarcity of water and pasture. This leads to reduced animal productivity and increased mortality rates. Additionally, floods and droughts are extreme weather phenomena that are influenced by climatic conditions, their natural resource-based character, and limited response options. Higher temperatures and less rainfall are anticipated to limit rangeland yields and worsen land degradation in dry and semi-arid grazing systems at low latitudes, where climate impacts are anticipated to be more severe (Thornton & Gerber, 2010) and according to (Thornton & Gerber, 2010) also reported the implications of climate change on livestock production systems, such as heat stress-related productivity losses and decreased access to water and fodder. These impacts will likely have significant economic and social consequences for communities that rely on livestock for their livelihoods. Policymakers and stakeholders must implement adaptation strategies and support sustainable land management practices to mitigate the negative impacts of climate variability on rangelands and animal production, most likely to be exacerbated in regions with high poverty levels and limited adaptive capacity, highlighting the need for targeted interventions to support vulnerable communities.

Livestock farmers face many challenges due to climate change's effects, including drought, flooding, and other factors. Heavy rains in South Sudan during the rainy season resulted in flooding that destroyed livestock farmers' homes and crops (WES). In Western Equatoria, cattle farmers struggle to access water and pasture due to prolonged droughts, leading to malnutrition and death among their animals. These challenges not just threaten the living conditions of livestock farmers it also broadening effects on food security and economic stability in affected regions. Therefore, it is crucial to implement sustainable solutions that address the root causes of these challenges and provide support to vulnerable communities. In Western Equatoria State, flooding brought on by climate change obstructs the cattle herders' traditional migration routes, leading to conflicts with farmers and the loss of crops and livelihoods for both farmers and cattle herders (WES). Flooding brought on by climate change is obstructing South Sudan's cattle herders' traditional migration routes, leading to conflicts with farmers, the loss of crops, and the loss of both farmers' and cattle herders' livelihoods. According to Egeru (2015), one of the farmers' adaptive strategies is to plant mixed crops during the cultivation period to avoid challenging environmental conditions. Droughts, floods, and other issues are just a few of the challenges livestock farmers face due to climate change (Henry et al., 2012). During the rainy season, Western Equatoria State (WES) livestock farmers suffered severe flooding that destroyed their homes and crops. Due to flooding brought on by climate change, South Sudan's cattle herders cannot travel along their traditional routes, which has resulted in conflicts with farmers and the loss of crops and livelihoods for both farmers and cattle herders. Farmers have developed coping mechanisms that include incorporating mixed cropping during the cultivation period to avoid harsh environmental conditions (Henry et al., 2012). The study, therefore, aimed to provide details on the climate change's consequences on livestock production, specifically in Eastern Mundri areas.

II. MATERIALS AND METHODS

A. Study Area

The research was carried out in Mundri East County., Western Equatoria State, from March to April 2022. The county is composed of two Payams, namely Kediba and Lakamadi. The area is characterized by a greenbelt of agro ecological zones that receive high rainfall between 1,200 and 2,000 mm annually, usually happening around these two different seasons: the dry season (November to March) and the rainy season (April to October). The study focused on livestock production in Eastern Mundri County due to its importance as a source of livelihood for the local population. The county has a population estimated at 82,461 people.

Mundri East County is one of the counties in Western Equatoria State, covering an area of 477,799 hectares (4,779 km²). For the Mundri East communities, raising livestock and growing crops are the primary sources of income; the

livestock is entirely dependent on grazing naturally in rangeland areas, as seen in Figure 1. (*Statistical Yearbook for Southern Sudan, n.d.*).



Fig. 1: Map of Western Equatoria State showing Study County

B. Sampling and Data Collection

One hundred family samples was selected from the two Payams of Mundri County, Kediba (n = 60) and Lakamadi (n = 60), using a multi-stage sampling technique. Structured questionnaires were used to collect information. The research aimed to assess the socio-economic factors affecting livestock production in the area and identify potential interventions to improve the livelihoods of those who keep livestock as a source of livelihood. A questionnaire was used to interview the respondents between April and May 2022 to assess how they adapt to and survive in the climate effects in the two Payams (Kediba and Lakamadi). The questionnaire consisted of both open-ended and closed-ended questions.

C. Statistical Analysis

Charts and graphs of the livestock farmers' knowledge and perception related to impact of climatic conditions on livestock production in Mundri East, Kediba, and Lakamadi Payams were generated using descriptive statistics in Microsoft Excel 2013. Chi-square (X²) values and Pearson correlation coefficients were used to test the associations between factors influencing the livestock farmers' choice to mitigate the various climatic conditions, which were also determined by application of the Statistical Package for Social Science (SPSS). Charts and graphs of the livestock

farmers' knowledge and perception of the effects of climate variability on animal production in Mundri East were generated using descriptive statistics in Microsoft Excel 2013. The factors influencing the livestock farmers' choice to mitigate the various climatic conditions were also determined. The Chi-square analysis was used to determine whether or not was a significant difference between the proportions of farmers who had adopted mitigation measures and those who had not.

III. RESULTS AND DISCUSSIONS

A. Basic household information

120 households owned by livestock farmers were chosen at random from among various families for the cross-sectional survey, and their knowledge, perceptions, and methods for coping with and adapting to climate change were all assessed. Most livestock producers who were interviewed were adults older than 40 years old (Table 1). The majority of those surveyed had been raising livestock more than 10 years. Several researches had shown the age of a farmer is a considerable factor in the uptake of new technologies, younger farmers are more likely than older farmers to adopt new technologies (Laven, 2013), (Henry et al., 2012) and (Jubara et al., 2021).

Table 1: Household Information

Household	Number	Percent
Age of Respondents		
18 – 30	15	20
31 – 40	65	55
41 – 50	35	26
51 – 60	5	3
Total	120	100
Literacy Level		
No Formal Education	15	10
Primary Level	68	85
Secondary Level	8	4
Tertiary Education	3	1
Total	120	100
Experience in Shoat Production (Years)		
0 – 5	11	8
6 – 10	25	18
11 – 20	39	40
≥ 20	55	54
Total	120	100

B. Causes of Climate Change

The most common factor causing climate change is believed to be the burning of grass (51%), while cutting down trees (21%), representing a second major factor among the rest, such as overstocking (18%) and not being aware (10%), is shown in Figure 3. The study also discovered that the vast majority of families were aware of climatic conditions and its

causes. This is a major concern, as it shows that people are unknown to the causes and effects of climatic variability. In other studies, it was also observed that considerable number of people do not have knowledge on the consequences of climate change on their lives been mentioned by Mayanja et al. (2022), Ibrahim et al. (2013), Abegunde, (2016) and McPeak et.al (2017).

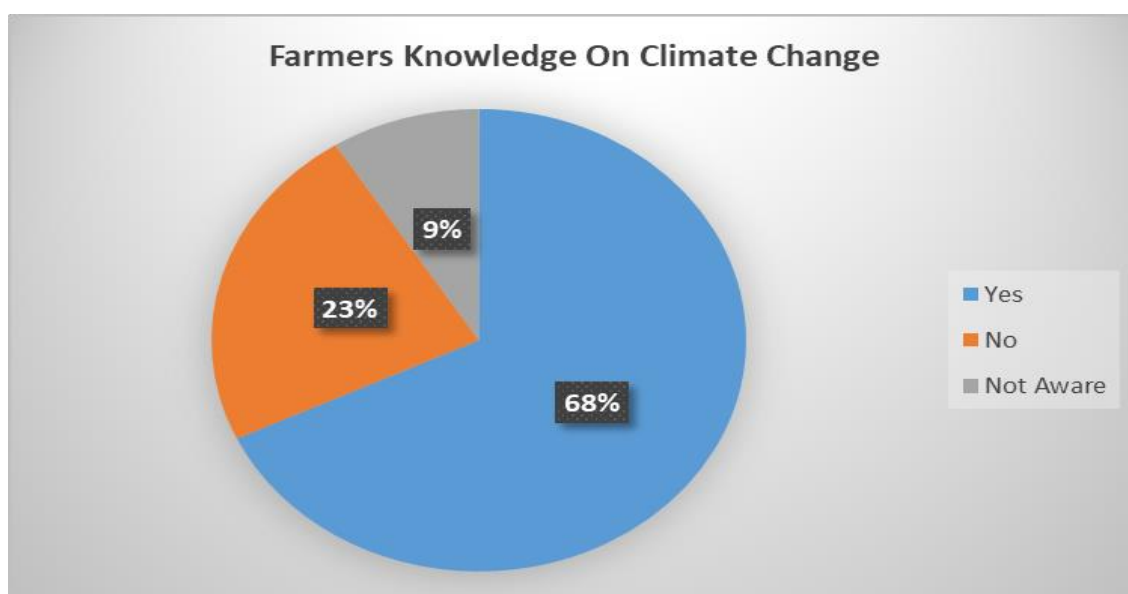


Fig. 2: Farmers Knowledge on Climate Change

Table 2: Factors Influencing Livestock Farmers Knowledge on Climate Change

Explanatory variables	Yes		No		Not Aware	
	Exp. (B)	P-Value	Exp.(B)	P-Value	Exp.(B)	P-Value
Sex	1.28	0.825	0.423	0.215	1.324	0.452
Age	0.933	0.734	1.356	0.261	0.939	0.786
Literacy level	1.47	0.276	0.401	0.295	0.856	0.708
Livestock production experience	1.221	0.169	0.819	0.724	0.754	0.237

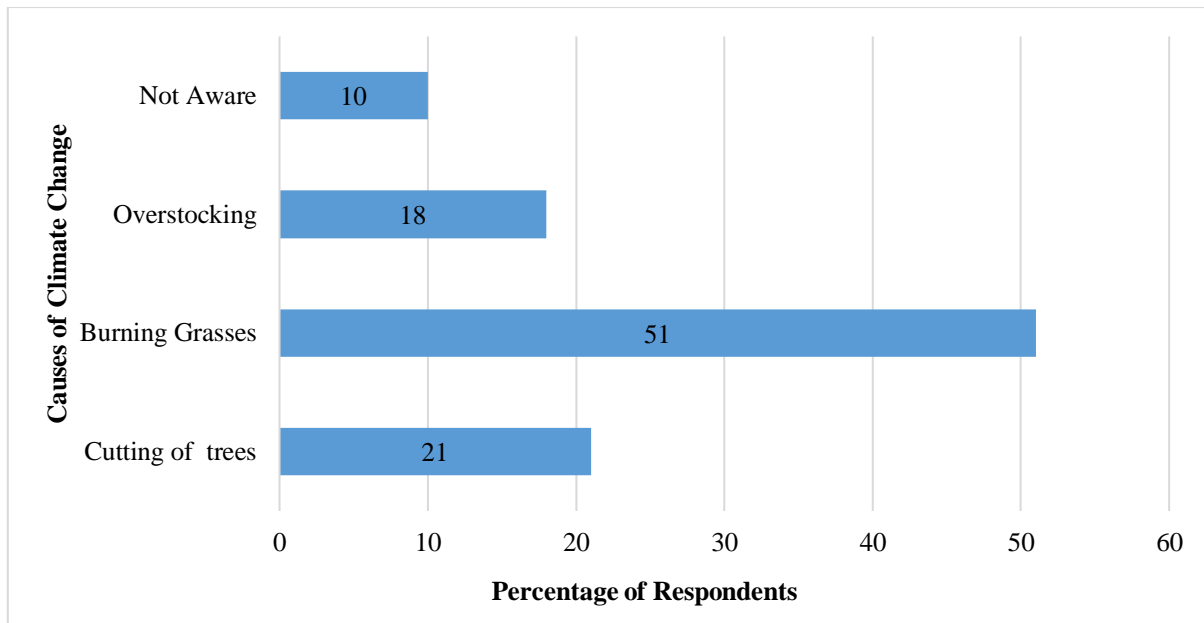


Fig. 3: Causes of Climate Change Percentage by Respondents

C. Adaptation Strategies Used by the Farmers

The livestock farmers in this study have adopted different methods of adaptation to deal with climate change, among these methods is minimizing the size of the herd by selling the extra adult males. This strategy enables the farmers to survive the bad years and maintain their livelihoods. (Tyler, 1983). The study in other African countries also found that in some areas, such as in northern Ethiopia, farmers have adopted a different strategy: they have increased their herd size by buying more cows from other herds according to Pingali et.al (1995) and McPeak et. al (2017), which is the complete opposite as seen in this study.

IV. CONCLUSION

The effect of climate change is widely observed in this study, as it happens in other parts of the world. The results also showed that the majority of the farmers had experienced the effects of climate change, while a minority were not aware of them. The research further found that livestock keepers who were informed of climate change were more likely to adopt new technologies and practices to adapt to it.

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CONFLICT OF INTEREST

Author declared there are no competing interests.

REFERENCES

- [1.] Abegunde, A. A. (2016, June 2). Local communities' belief in climate change in a rural region of Sub-Saharan Africa. *Environment, Development and Sustainability*, 19(4), 1489–1522. <https://doi.org/10.1007/s10668-016-9816-5>
- [2.] Egeru, A. (2016). Climate risk management information, sources and responses in a pastoral region in East Africa. *Climate Risk Management*, 11, 1–14. <https://doi.org/10.1016/j.crm.2015.12.001>
- [3.] Henry, B., Charmley, E., Eckard, R., Gaughan, J. B., & Hegarty, R. (2012). Livestock production in a changing climate: adaptation and mitigation research in Australia. *Crop and Pasture Science*, 63(3), 191. <https://doi.org/10.1071/cp11169>.
- [4.] Henry, B., Charmley, E., Eckard, R., Gaughan, J. B., & Hegarty, R. (2012). Livestock production in a changing climate: adaptation and mitigation research in Australia. *Crop and Pasture Science*, 63(3), 191. <https://doi.org/10.1071/cp11169>
- [5.] Ibrahim, A. M., Shiwei, X., & Wen, Y. (2013, November 6). The Impact of Social Factors of Rural Households on Livestock Production and Rural Household Income in White Nile State of Sudan. *International Journal of Agricultural and Food Research*, 2(4). <https://doi.org/10.24102/ijafr.v2i4.343>
- [6.] Jubara, A. S., Danga, J., Deng, J. A., & Ochi, E. B. (2021, October 30). Chicken housing among the rural community of Tonj County in South Sudan: Types and designs. *Journal of Animal Science and Veterinary Medicine*, 153–158. <https://doi.org/10.31248/jasvm2021.289>
- [7.] Laven, R. (2013, March). Traceability, farmers and livestock vets. *Livestock*, 18(2), 5–5. <https://doi.org/10.12968/live.2013.18.2.5>
- [8.] Mayanja, M. N., Morton, J., Bugeza, J., & Rubaire, A. (2022, July). Livelihood profiles and adaptive capacity to manage food insecurity in pastoral communities in the central cattle corridor of Uganda. *Scientific*

- African*, 16, e01163.
<https://doi.org/10.1016/j.sciaf.2022.e01163>
- [9.] McPeak, J. G., & Little, P. D. (2017, June 15). Applying the concept of resilience to pastoralist household data. *Pastoralism*, 7(1).
<https://doi.org/10.1186/s13570-017-0082-4>
- [10.] Pingali, P. L., & Rosegrant, M. W. (1995, June). Agricultural commercialization and diversification: processes and policies. *Food Policy*, 20(3), 171–185.
[https://doi.org/10.1016/0306-9192\(95\)00012-4](https://doi.org/10.1016/0306-9192(95)00012-4)
- [11.] *Statistical Yearbook for Southern Sudan*. (n.d.). Retrieved May 29, 2023, from <https://www.sccse.org>
- [12.] Thornton, P. K., & Gerber, P. J. (2010, January 13). Climate change and the growth of the livestock sector in developing countries. *Mitigation and Adaptation Strategies for Global Change*, 15(2), 169–184.
<https://doi.org/10.1007/s11027-009-9210-9>.
- [13.] Tyler, L. (1983, January). Livestock production systems and livestock development in tropical Africa. *Agricultural Systems*, 12(3), 188–190.
[https://doi.org/10.1016/0308-521x\(83\)90080-x](https://doi.org/10.1016/0308-521x(83)90080-x).