



Climate Variability and Its Effects on Gender and Coping Strategies in Baringo County, Kenya

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ABSTRACT: Climate variability has often been described as one of the most pressing environmental challenges. Our lifestyles, economy, health, income, livelihood and our social well-being are all affected by climate. This paper therefore, assessed climate variability, its effect of gender and coping strategies they adopt in Baringo County, Kenya. Descriptive and inferential statistics were used in analyzing the data obtained for the study. Findings show that there is consistent decrease in rainfall and increase in temperature in recent times. Male gender dominates household decisions and roles such as land preparation, livestock keeping/feeding, pesticide application and fence construction in Baringo County, Kenya while the female gender dominates household roles such as water supply, domestic home chores and more of agricultural activities. Livestock migration was the major traditional coping strategy adopted in Baringo County. 56.8% of the respondents shows that cutting grasses for livestock was the major short term coping strategy adopted while Rainfall harvesting and storage (5.92%) was the least adopted in the studied area. Long term coping strategy to climate variability mostly adopted by the rural populace in is livestock migration (48.52%), it was also observed here that the least long term coping strategy adopted is finding alternative job as reputed by 4.44% of the respondents. Special intervention projects such as rain water harvesting techniques, drought resistant crops, short term crops etc, should be provided to rural populace/dwellers in Baringo County, and other parts of Kenya experiencing severe variability in climate, resulting to drought.

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The African continent is one of the most vulnerable regions to climate change and climate variability and it is already subject to frequent droughts and resultant famine. Climate variability has considerably impeded Africa's development and it is expected that climate variability will increase and climate extremes will become more intense or more frequent (DFID, 2004). The reality of climate variability has gained acceptance in scientific and political communities (Dube and Phiri, 2013; Fisher *et al.*, 2010). Climate variability is considered by many in the society to be one of the most pressing challenges facing humankind. It is thus a significant addition to the spectrum of environmental hazards faced by man. It affects eco systems, water resources, food, gender, health, coastal zones, industrial activities and human growth. This vulnerability of households in Africa is caused not only by exposure to climate variables but also by a combination of social, economic and environmental factors that interact with it (David *et al.*, 2007). The widespread poverty, recurrent droughts, floods, inequitable land distribution, overdependence on rain-

fed agriculture, and few coping mechanisms all combine to increase people's vulnerability to climate change. For instance, disadvantaged people are highly vulnerable towards intense climatic actions. They have few resource reserves, poor housing and depend on natural resources for their livelihood. The direct and indirect impacts of climate variables are envisaged to have severe consequences in African societies and economies (Dube and Phiri, 2013; Somorin, 2010; Ajani *et al.*, 2013). Floods and droughts have caused damage to property and loss of life, reduced business opportunities and increased the cost of transacting business as recently witnessed in most parts of the country.

Climate change-induced extreme weather events, coupled with low adaptation capabilities and capacities of affected communities threaten sustainable development and economic livelihoods. However, Baringo County, Kenya, is in a semi-arid environment receiving an annual rainfall between 400mm and 1000mm and has experienced negative

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impacts of climate variability in the recent past. In 2006/2007, there was an outbreak of Rift valley fever which resulted to a number of livestock and people succumbing to the disease in Baringo County, Kenya (Nguku *et al.*, 2010; Anyangu *et al.*, 2010).

According to the Intergovernmental Panel on Climate Change, extreme weather events such as droughts and floods will increase in magnitude in future if not controlled (mitigated). Most parts of Kenya have recently experienced what is considered to be the most severe drought in living memory. Rainfall has been sporadic and poorly distributed. In high potential areas of the Rift Valley for instance, rainfall was lower than average whereas in the Eastern Central and Coast Provinces, it was less than 40 per cent of the normal rainfall. Both the rural and urban dwellers have called the recent drought, resulting from below normal average rainfall for four consecutive seasons, the most severe in living memory.

This study was carried out to provide important information towards understanding climate variability, trend of climate variability, identify gender roles and decisions in the rural populace, and to map climate smart coping strategies.

MATERIALS AND METHODS

Study Area: The study was carried out between March and July, 2017 in Baringo County (Marigat and Mogotio sub-county) which is located in Northern Kenya. With an area of 11,075.3 km², Baringo County has an estimated population of 555,561. It is a semi-arid area situated at the altitude of 1067 metres above sea level and lies within longitude 35° 30' East and 36° 30' West and latitude 0° 10' South and 1° 40' North. The area has a mean temperature of about 32.8°C ± 1.6°C with annual average rainfall of 512 mm occurring in two seasons: March to August and November to December. Baringo is one of the 47 counties in Kenya, situated in the Rift Valley region. It borders Turkana and Samburu counties to the North, Laikipia to the East, Nakuru and Baringo to the South, Uasin Gishu to the Southwest, and Elgeyo - Marakwet and West Pokot to the West. Figure 1 below shows the location of Baringo County, where Marigat and Mogotio are the study areas. In this study, a multi-stage sampling technique was applied, using both quantitative and qualitative methods of data collection. Primary data was collected using a well-structured questionnaire while secondary data (31 year-old climatic data) was obtained from the Kenya Meteorological Department. The validity of the semi-structured questionnaire was pre-tested before it was used in collecting data from the sampled communities and villages.

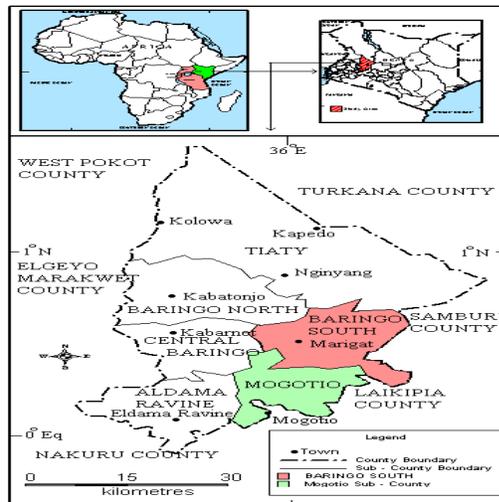


Fig 1: Map of Baringo County showing Marigat and Mogotio as the study areas

Random numbers were generated from the sub-county local chiefs' records, which was used to identify target population. The target population comprised of household heads, either the father or mother or any adult person in charge (aged 18 years and above) of the household. The qualitative data was obtained using focus group discussions (FGDs). A focus group discussion was held in different villages to elicit information concerning climate variability impact of drought, livelihood activities as it relates to men and women in the study area. This served as a guide in checkmating the information that was supplied by each male headed and female headed household in the study area.

Data obtained were analysed using descriptive statistics such as frequency distribution, trend analysis, percentage and means; and inferential statistics such as multiple regression analysis. These data obtained was compiled, processed and analysed using SPSS version 23 and Eview 9 computer statistical software.

RESULTS AND DISCUSSION

Socio-economic characteristics of the rural populace in Marigat and Mogotio, Baringo County, Kenya: The gender distribution of the respondents showed that 60.95% were males while 39.05% were females. The age distribution of the respondents showed that majority (38.46%) of the rural population were within the age bracket of 41 -50 years while 2.96% of the rural population were older than 60 years in age. The result further shows that majority (54.73%) of the respondents were married, followed by 17.75% that were single, 12.72% were widowed while the divorced and separated individuals were each 7.4% as presented

in table 1a. In table 1b below, the household heads were mainly Pastoralists (45.27%), followed by Agro-Pastoralist (35.5%), Business (10.36%) and least were of employed individuals (8.88%). The spouses were mainly Agropastoralists as reputed by 82.84% of the sampled populace in Marigat and Mogotio, Baringo County, Kenya. Large proportion (93.2%) of the rural populace in Baringo County, Kenya owned land while small proportion (6.80%) do not own a land in the study area. This implies that there is availability of land to meet the land demand of a great number of individuals in the study area. Land ownership in the study area was mostly Issued by the government as reputed by 61.24% of the respondents. This was followed by 17.75% that bought their land, 17.46% that rented the portion of land they are using while the least proportion (0.89%) of the respondents acquired land from National Irrigation Board in the study area. The size of the land in the study area mostly ranges between 1ha and 3ha as reputed by 42.90% of the sampled rural populace. This was followed by 26.04% of the respondents that owned land size of 3.1ha while the least proportion (7.1%) of the respondents owned between 6.1ha and 9ha of land.

Table 1a: Socio-economic characteristics of the sampled rural populace in Marigat and Mogotio, Baringo County

Distribution of Socioeconomic characteristics	Frequency	Percentage
Gender		
Male	206	60.95
Female	132	39.05
Total	338	100.00
Age of respondents		
18 – 30	38	11.24
31 – 40	119	35.21
41 – 50	130	38.46
51 – 60	41	12.13
> 60	10	2.96
Total	338	100.00
Level of Education		
No School	64	18.93
Primary	103	30.47
Secondary	128	37.87
Tertiary/College	33	9.76
University	10	2.96
Total	338	100.00
Marital Status		
Single	60	17.75
Married	185	54.73
Divorced	25	7.40
Separated	25	7.40
Widowed	43	12.72
Total	338	100.00
No. of Family Members		
1 – 5	169	50.00
6 – 10	149	44.08
11 – 15	15	4.44
16 – 20	2	0.59
> 20	3	0.89
Total	338	100.00

Source: Field Survey Data, 2017

Table 1b: Socio-economic characteristics of the sampled rural populace in Marigat and Mogotio, Baringo County (continued)

Socioeconomic characteristics	Frequency	Percentage
Occupation of HH Head		
Pastoralist	153	45.27
Agro-Pastoralist	120	35.50
Business	35	10.36
Employed	30	8.88
Total	338	100.00
Occupation of Spouse		
Pastoralist	16	4.73
Agro-Pastoralist	280	82.84
Business	30	8.88
Employed	12	3.55
Total	338	100.00
Do you have Land		
Yes	315	93.20
No	23	6.80
Total	338	100.00
If Yes, was it		
Bought	60	17.75
Rented	59	17.46
Issued by Govt. Ranch	9	2.66
Issued by National Irrigation Board	3	0.89
Issued by Government	207	61.24
Total	338	100.00
Size of the Land (ha)		
1 – 3	145	42.90
3.1 – 6.0	88	26.04
6.1 – 9.0	24	7.10
9.1 – 12.0	25	7.40
>12.0	56	16.57
Total	338	100.00

Source: Field Survey Data, 2017

From the study it was observed that most of the respondents were within the youthful age, this may be due to the average working age of people in Kenya, as teenagers and youths may still be in schools outside the studied counties and the older ones may have retired from participating in some economic activities due to age. This, according to Momanyi, *et al.* (2012) is contrary to the average age of a Kenyan farmer that is put at 57 years. Majority of the populace in Baringo County are primary and secondary school graduates, with very low tertiary education. This result agrees with the report of EKIBC, (2009) that Baringo County has 656 primary schools with remarkable improvements in enrolments, on the other hand there are 125 secondary schools, of which 16% of the population have a secondary level of education or above, those with primary education take 48% while 36% of the population have no formal education. Also

other researchers in Kenya have reported similar observations of low levels of education and attributed it to high dropout at secondary level, which is in agreement with the report of Glennerster, *et al.* (2011). Majority of the children drop out of school due to lack of school fees, or the need to assist at home during extreme climatic conditions (drought) and the resultant effect of this action is the high level of illiteracy as well as early marriages. Many of them end up working as casual laborers in construction companies, or in transportation sector (popularly known as bodaboda).

The household heads were observed to be mainly pastoralists and agro pastoralists as it is believed that people make livelihood choices according to the level of their household assets or availability of infrastructure in their community (Geburu and Beyene, 2012). The sub-counties sampled do not have wide range of livelihood options as most of them indicated to have little or no significant secondary livelihood sources. This implies that these counties will have reduced resilience to the effects of climate variability due to lack of wide range of livelihood options. However, from the observation in the study, the sampled persons largely accept they own some portion of land, of which they agreed that the land was issued to them by government.

Trend of climate variability in Baringo County, Kenya: The result in figure 2 showed that 93.5% of the

rural population reputed that there is a decrease in rainfall in the county in the last raining season while 94.1% of the respondents averred that there is increase in temperature in the study area.

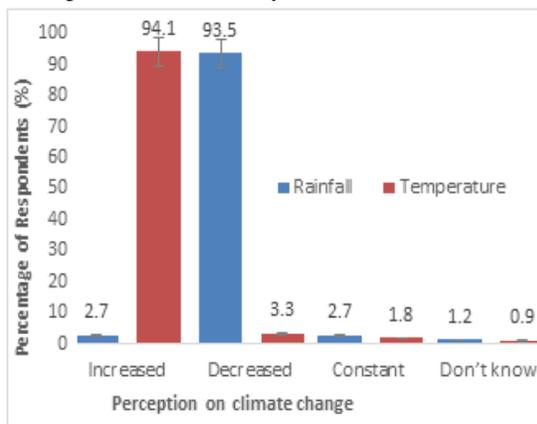


Fig 1: Perception on climate variability in Baringo County, Kenya

Rainfall Trend: The trend analysis of the annual rainfall from 1985 to 2016 shows fluctuations with constant decrease and increase in annual rainfall (Figure 3). This volume of rainfall declined from 80.1 millimetres in 1985 to 58.7 millimetres of rainfall in 1986, and increased to 104.3 millimetres in 1988. Before decreasing again to 76.3 millimetres in 1991. However there have been a constant fluctuation in the volume of rainfall in the area since 2000. A 6.31% variation in volume of rainfall in the area was explained by changes in time (figure 3).

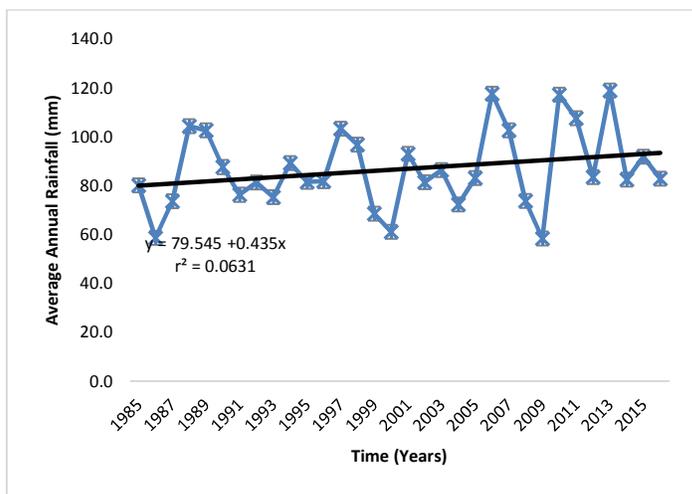


Fig 2: Mean variation in the annual rainfall (mm) in Baringo County, Kenya

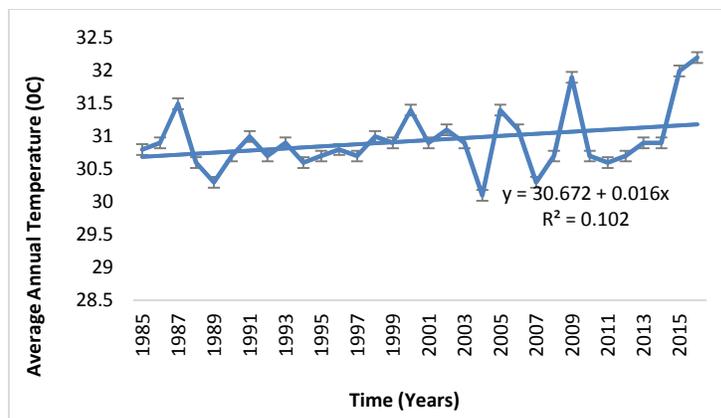


Fig 3: Mean Variations in the annual temperature in Baringo County, Kenya

Temperature Trend: The trend analysis of the temperature from 1985 to 2016 showed fluctuations with increased temperature (Figure 4). The maximum temperature of the area increased from 30.8^oC in 1985 to 31.5^oC in 1987, but dropped to 30.3^oC in 1989 before it vaults up to 31^oC in 1991. The maximum temperature of the area fluctuated steadily between 1992 (30.7^oC) and 2001 (31.4^oC) and increased to 30.1^oC in 2004. The maximum temperature of the area vaults up to 32^oC in 2015 and 32.2^oC in 2016. A 10.2% variation in the maximum temperature in the area was explained by changes in time. A unit change in time causes the maximum temperature to slightly change by 0.016^oC. The people’s perceptions on temperature variations in the studied area were in line with the climatic data records (figure 4). From the study, preponderance of the respondents reported that over time, temperature has increased radically while rainfall has decreased. The increase in temperature and decrease in rainfall was also observed by Dore (2005) who in his study stated that irregular rainfall patterns and variance is attributed to climate change. The inconsistency as reported by the respondents in rainfall decrease and increase may have been fully buttressed

with the average annual rainfall in the last 31 years (Figure 2) and the rise in temperature as reported by the respondents, could have been as a result of consistent increase in temperature from 2014 to 2016 (Figure 3). Nhemachena and Hassan (2007) reported comparable results during their study on Micro- level analysis of farmers’ adaptation to climate change in South Africa.

Gender Roles and Decisions in Household Agricultural and Socioeconomic Activities

Socioeconomic and Agricultural Activities: There exist disparity in gender roles as it pertends to household agricultural and socioeconomic activities among the rural populace in the choice locations. In Baringo county Kenya , males played dominant roles in land preparation (59.5%), livestock keeping/feeding (56.2%), pesticide application (69.5%) and fence construction (73.1%) while females played dominant roles in seed planting (58.6%), water supply (55.9%), domestic chores (76.9%) and sales of agricultural produce (60.7%). Gender equality was only observed in harvesting of agricultural produce (59.5%) (figure 4).

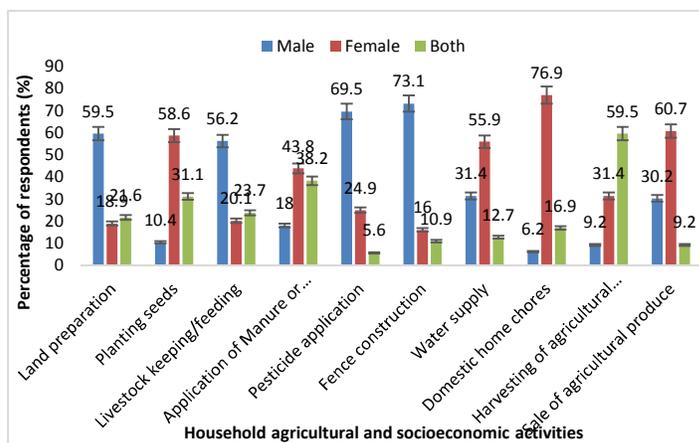


Fig 4: Gender primarily responsible for household agricultural and socioeconomic activities in Baringo County, Kenya

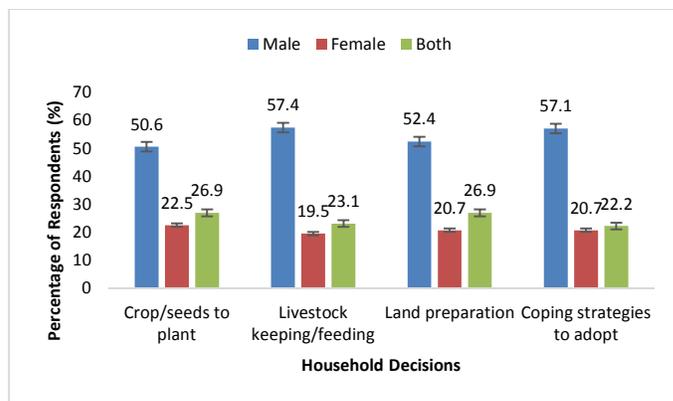


Fig 5: Gender primarily responsible for making household decisions in Baringo County

Household Decisions: In household decision making in Baringo County, Kenya, males took the most decisions on crops/seed to plant (50.6%), livestock keeping/feeding (57.4%), land preparation (52.4%) and coping strategies to adopt in Baringo County (57.1%) (figure 5).

The dominance of female counterparts in agricultural activities (such as seed planting, application of manure, sale of agricultural produce) and household activities (such as water supply, domestic home chores etc) as shown in the study conforms with the earlier postulation by Nhemachena and Hassan (2007) that came up with the same discovery which was attributed to the fact that in most rural smallholder farming communities, most of the agricultural activities is done by women because men are more interested with other sources of income such as livestock breeding, alternative businesses and employment in towns.

The respondents in the sampled study area stated that severe droughts had brought about different environmental changes, thereby affecting their accessibility to basic necessities such as water, food and fuel which are mostly the roles of women. Focus group discussions held similar views that women had many activities to attend to such as looking for family food and its preparation, fetching water, searching for fuel, childcare and supporting income-generating activities including small-scale farming and businesses.

During the focus group discussion, the respondents explained that the middle-aged men looked after the livestock, while the women and children attended to chicken, smaller ruminants and weak/sick animals. They also used to fetch water and firewood from very far distances, prepare food for the family and are left to take care of the home, alone. According to Kipuri and Ridgewell (2008), until recently, the roles of men had always been restricted to taking care of livestock

production and it often included caring for and migrating with herds, managing grazing and water resources, livestock trading, controlling predators and ensuring security. However, in recent years the labour of men has shifted, with their increasing involvement in alternative activities. This has occurred as a result of disasters such as drought, which has contributed to the death of livestock and as a result affected their major source of income negatively.

Furthermore, women lack necessary rights and access to resources, information and decision making vital to overcoming the challenges posed by climate variability, as they are always found at home, engaged in one household chore or the other.

Climate SMART Coping Strategies: The result showed that in Baringo County, Kenya, the major traditional coping strategy adopted till date is moving livestock from one point to another as reputed by 48.52% of the respondents. Other traditional coping strategies adopted by the respondents include use of animal manure for soil enhancement (30.47%), reduction in the number of livestock reared (21.01%) and indigenous knowledge (44.67%). In modern times, the most practiced coping strategy among the rural populace in Baringo county, Kenya is irrigation farming as reputed by 19.23% of the respondents, while the modern coping strategy least practiced is planting of drought resistant/short term crops (4.73%) in the study area. In the short term, the most practiced coping strategy in Baringo county Kenya was cutting of grasses for livestock as reputed by 56.8% of the respondents while the least practiced short-term coping strategy was rainfall harvesting and storage as reputed by 5.92% of the respondents. In the long-run, the most practiced coping strategy in Baringo county Kenya was moving/migrating with livestock as reputed by 48.52% of the respondents while the least practiced long-term coping strategy was finding alternative job as reputed by 4.44% of the respondents.

Table 2: SMART Coping Strategies adopted by the sampled rural populace in Marigat and Mogotio sub-county, Baringo County

Mapped SMART coping strategies	Frequency	Percentage
Traditional Coping Strategy		
Use of animal manure	103	30.47
Moving around livestock	164	48.52
Reduction in number of livestock	71	21.01
Indigenous knowledge	151	44.67
Modern coping strategies		
Use of fertilizers	52	15.38
Irrigation farming	65	19.23
Planting of drought resistant/short term crops	16	4.73
Short term coping strategies		
Cutting grasses for livestock	192	56.80
Livestock migration	128	37.87
Cultivate fast-growing varieties	49	14.50
Planting resistant varieties	118	24.91
Rainfall harvesting and storage	20	5.92
Early planting	32	9.47
Long term coping strategies		
Gathering & storage of grasses/fodder	88	26.04
Livestock migration	164	48.52
Irrigation	57	16.86
Finding alternative job	15	4.44
Complete migration of household members	16	4.73

Source: Field survey data, 2017

From the study, it was observed that moving livestock around from one point to another in search of food was the highest kind of traditional coping strategy adopted by the rural dwellers in Baringo County. This is followed by indigenous knowledge of the people. During the focused group discussion, the respondents further explained how the elderly men in the village would kill an animal (goat, sheep or cow) and open it up, this act enables them forecast the weather (ability to tell if it will rain or if there will be longer dry days) and adapt to changes associated with climate. This conforms with the study of Gyampoh *et al.*, (2009), who observed that the wisdom, knowledge and practices of indigenous people gained over time through experience and passed on from generation to generation – has over the years played a significant part in solving problems, including problems related to climate change and variability.

Also from the study, it was observed that the respondents go out in search of pasture to cut and gather for livestock feed, from one point to another, this was their major coping strategy against drought in the study area within a short period of time. However, when climate variability persists for a longer season, the rural dwellers in Baringo County migrate with their livestock from one community to another in search of pasture regardless of the difficulties this action may cause them and the family they left behind. This supports the observation made by Gebresenbet and Kefale (2012) who said that the Nyangatom elder asserted that, in times of drought, “we will go wherever there is grass, to the lands of the Dassanech, Hamar, Karo and Mursi. We also go to Kenya and

Sudan. We do that irrespective of the conflict that our movement brings to us”.

Conclusion: his study focused on understanding climate variability, its effect on gender and coping strategies adopted in Baringo County Kenya. In conclusion, the study shows that climate variability as a result of increase in temperature and decrease in rainfall affects the rural populace in Baringo County, thereby, exposing them to the challenges of Gender-differentials in agricultural and economic roles/decision-making. However, there is a great need to ensure that gender-perspective is applied in the implementation of climate variability mitigation policies as gender mainstreaming is highly necessary while coping with climate variability. This will eliminate any adaptation measures or mitigation actions that discriminate against gender responsiveness. Women can be important players in climate change policy because they have knowledge about most of the actions happening in their immediate environment.

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