Impact of Drought on Food Security in West Pokot County, Kenya

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***Abstract*-**Drought and food security are of global concern and require urgent interventions to ensure that they do not jeopardize the lives of many people and the ecosystem. West Pokot County is among the most prone counties to droughts that threaten food security in the area; this is exacerbated by climate change. The main objective of this study was to examine the impact of drought on food security in West Pokot County. The study used mixed research designs including descriptive survey and evaluation. Respondents were identified through random and purposive sampling methods. Questionnaires were used to collect data from 398 respondents randomly selected from different strata of the stakeholders in the drought management and food security sector. Interview guides were used to collect data from key informants and focus group discussions. Quantitative data obtained from relevant institutions was analyzed using SPSS package. The results reveal that 96% of the respondents who planted maize had no harvest during the recent drought of 2015, 2.6% of the respondents who planted sorghum received some harvest, while 32% indicated that growing of drought tolerant crops and limiting the portion size at meals time were suitable coping strategies used to reduce effects of drought on food security. These results are useful in developing mitigation measures to reduce risks from drought and enhancing the communities' resilience to drought and food insecurity.

Index Terms- Household livelihoods, food security, coping strategies, drought resilience, ASALs

I. INTRODUCTION

Drought is a naturally reoccurring climatic variability. With the changing climate, droughts are likely to become more severe and occur more often. Drought in contrast to aridity, affects almost all climates in the world (WMO, 2006). The situation is exacerbated in many parts of the third world countries by the prolonged droughts. During the period (2007/08) a third of the 35 million people in Kenya were said to be in a state of high food insecurity (GOK, 2009). Drought has become more frequent and more severe in recent years and drought affected areas are projected to increase in extent and severity. Drought ranks as the single most common cause of severe food shortages, particularly in developing countries and represents one of the most important natural triggers of malnutrition and famine. It affects the four dimensions of food security-availability, stability, access and utilization (FAO, 2011). Food security in Africa has substantially worsened over the last 30 years, with high population and food demand growth consistently exceeding modest agricultural production growth (Byerlee and Eicher, 1997).

It is estimated that out of the world's 800 million people that are food insecure, about 180 million (or 23%) live in Sub-Saharan Africa (Anderson, 2001). Drought has plunged East Africa into the worst food security crisis that Africa has faced in 20 years as more than 11.5 million people are currently in need of food aid in Djibouti, Kenya, Somalia and Ethiopia **(**IGAD, 2008**).** In January 2014, the Government of Kenya declared an impending drought as a national disaster, with an estimated 1.6 million people affected. After the poor performance of the long rains between March and May 2014 in the arid and semi-arid zones, the drought situation continued to affect both pastoral and marginal agriculture based livelihood zones and the impact on household's food availability as well as livestock productivity. The situation continued to worsen due to the increase in food prices (IFRC, 2014).

Household food insecurity is a critical issue in Kenya due to its magnitude especially in ASALs that comprise of 88% of Kenya's land area (Gitu, 2004). The arid and semi-arid lands of North Rift and Northern Kenya are prone to drought and have suffered recurrent extreme climatic conditions with long-term devastating effects on livelihoods according to Agency for Technical Cooperation and development (ACTED, 2013)

Frequent drought episodes have gripped most parts of West Pokot, with the worst hit areas being Pokot North and Pokot central. Most dams and water basins in West Pokot remain dry and the little water collected has since been exhausted. Most permanent rivers including Suam, Kanyagareng in Pokot North and Sighiya, and Wakor in Pokot Central normally dry up during severe drought (Red Cross, 2011). The drought situation has aggravated livestock health related epidemics, which has subsequently affected the health of communities since most people depend on livestock products. Women, children and the elderly are the most vulnerable, since the few healthy livestock have been migrated to Uganda, leaving them with no source of food except reliance on relief food (NDMA, 2014).

Droughts are likely to occur, and are relatively chronic particularly in the predominant pastoral zones of Pokot north and Pokot central sub-counties. High poverty levels that stand at 69% in the county exposes the populations to high drought risks as their coping capacities are compromised. Overdependence on livestock coupled with insecurity makes the community more susceptible to drought and other livelihood shocks. Access to forage resource and markets for both livestock and food

commodities is majorly constrained by insecurity related to cattle rustling (ACTED, 2013). This study was aimed at examining the impact of drought on food security in west Pokot County, Kenya.

II. MATERIALS AND METHODS

2.1 Study area

The study was carried out in West Pokot County that is one of the 14 Counties in the Rift Valley region. It is situated in the North Rift along Kenya's Western boundary with Uganda border. It borders Turkana County to the North and North East, Trans Nzoia County to the South; Elgeyo Marakwet County and Baringo County to the South East and east respectively. The County lies within Longitudes 34^0 47'and 35^0 49' East and Latitude 10^0 and 20^0 North. The County covers an area of approximately 9,169.4 km^2 stretching a distance of 132 km from North to South (Figure 2.1). Pokot community is the predominant community in the County, Sangwer is the second largest community, and the Turkana, Luo, Kikuyu and Luhya are the minority in the county. The main social-economic activity in West Pokot County is agro-pastoralism. According to the (IEBC 2012), the County has four constituencies namely Kacheliba, Sigor, Kapenguria and Lelan (NDMA, 2013).

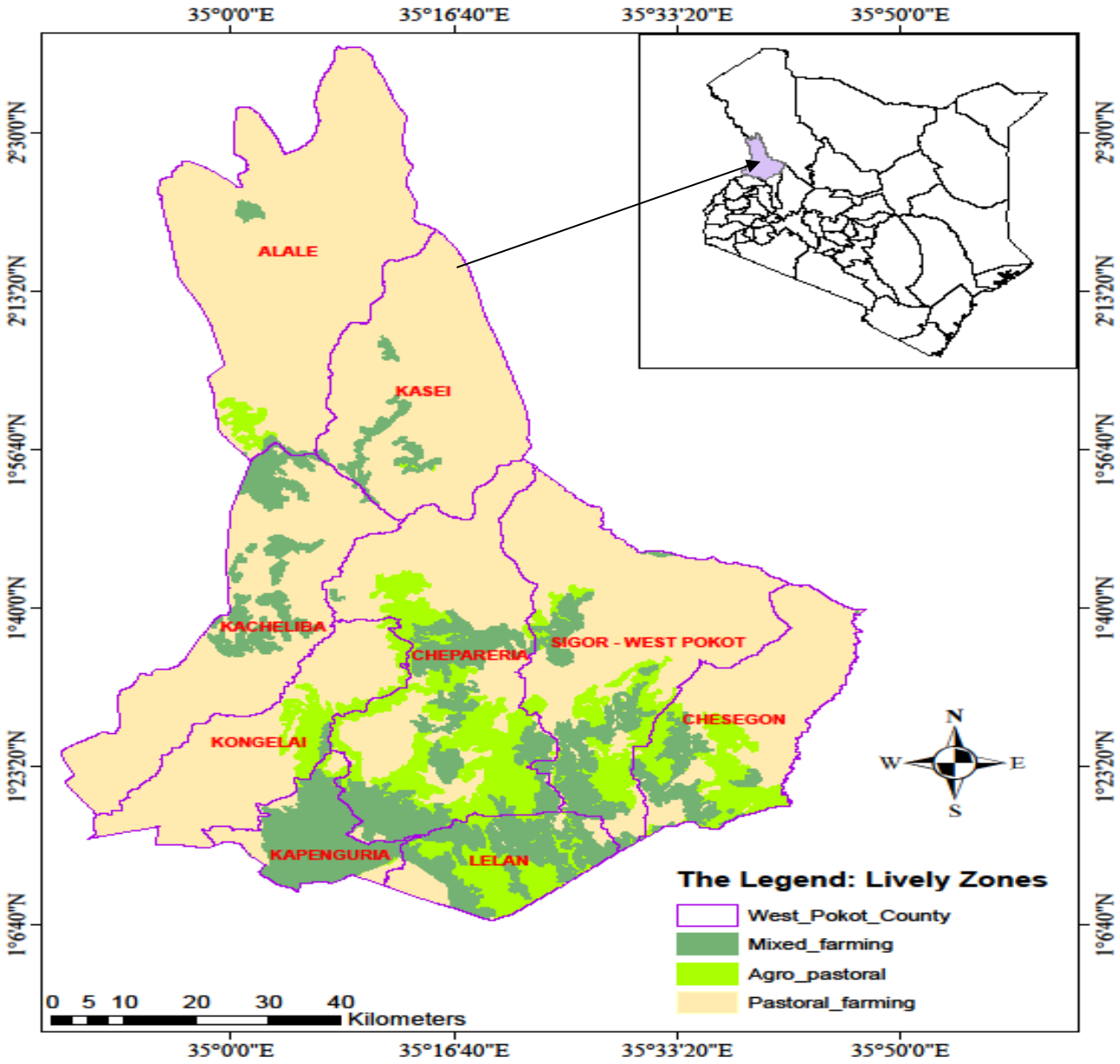

Figure 2.1: Map of West Pokot County
Source: Drought Early Warning Bulletin – West Pokot County

2.2 Research design and sampling strategy
The study adopted (Lambert, 2013) conceptual framework model that explores the food security learning framework which focuses on eight core and critical dimensions in realization of food security.

2.2.1Research design
The study employed descriptive survey and evaluation research designs. This study adopted stratified random sampling in determining the sample size for different wards, simple random sampling for departmental representatives and purposive sampling for key informants.

2.2.2 Sampling Strategy
The sample size of 398 respondents was obtained using a simplified formula (Yamane 1967).

$$n = N/1 + N(e^2)$$

Where:
n=Sample size
N= is the total population
e= is the error margin,
The sample size consisted of 118 respondents from each of the 3 wards, 4 from NDMA, 16 from the County line departments, 6 UN representatives, 6 NGOs representatives and 12 key informants giving a total of 398 respondents. Data collection methods included Primary sources including, focus group discussions (FGDs), observation checklists, interview schedules and questionnaires. Secondary sources included use of relevant documents and reports. Quantitative data was analyzed using SPSS and MS Excel software packages.

III. RESULTSAND DISCUSSIONS

3.1 Demographic characteristics of west Pokot County
Analyses of demographic characteristics (Table 3.1) indicate that majority (275) 69.1% of the respondents were male, while (123) 30.9% of the respondents were female. About 24.3% of the respondents were in the age bracket of (18-25) years, 59.6% in (25-35) years, (43) 10.8% in (35-45) years and (22) 5.4 % in (45 and above) years respectively (Table 3.1). The results indicate that in terms of occupation 15% of the respondents were farmers, 2% were businessmen, 40% pastoralists, 20% were unemployed, 6% were self-employed and 17% were employed. The results also show that during the survey, more men were willing to respond to questionnaires compared to women. Results on education reveal that the highest percentages of the respondents were not educated (37.5%), while primary 30%, secondary 20% and college and university constituted 12.5% respectively (Table 3.1). This was confirmed by the key informants who argued that most of the illiterate people believed that techno-science strategies are used by government to starve them since these strategies cannot help them directly. The respondents also lamented that since they come from a marginalized area the government does not think about them and the way they can increase production in their farms. The Drought Management Authority and NGOs also asserted that illiteracy levels have effects on adoption of convectional farming strategies since communities do not understand them well and they have also changed from relying on traditional crops for example millet and sorghum to high breed crops like maize especially those that take a longer duration to mature.

Table 3.1 Demographic characteristic of West Pokot County

Variable	Category	Percentage
Gender	Female	30.9
	Male	69.1
Occupation	Farmers	50
	Business	2
	Pastoralists	40
	Unemployed	20
	Self employed	6
	Employed	17
Education	None	37.5
	Primary	30
	Secondary	20
	College/University	12.5
Respondents age bracket	18-25	24.3
	25-35	59.5
	35-45	10.8
	45 and above	5.4

3.2 Household Livelihoods in West Pokot County
When asked about the main livelihood sources the respondents indicated that livestock keeping, farming and business were their sources of livelihood. The results show that 42% of the respondents strongly agreed that they rely on livestock keeping for livelihood, 35% on farming and 23% on business as their source of livelihood
From the focus group discussion held, it was revealed that there was a problem of dependency syndrome where people over rely on relief food. The community members complained to county and national government for responding with relief only when drought strikes. It was suggested that the government needs to initiate irrigation schemes and encourage restocking after drought in order to support them after losing their animals during drought. The study put emphasis on the need of educating the community on growing drought tolerant crops. The study found out that the respondents supported the government initiative to reclaim land under irrigation as it would lead to more engagement in farming activities and thus reduce reliance on livestock keeping as their main source of livelihood. Those who

relied on farming as their source of livelihoods aid that extension officers should be deployed in the area to enhance capacity building in modern ways of farming. The community members appealed to the government to increase employment opportunities since most of them were educated yet engaged in volunteer activities due to lack of employment opportunities. It was pointed out that the market for livestock and fish needs to be enhanced and corruption reduced.

3.3 Maize Yield production

The study indicated that whenever there is drought maize yield reduces drastically. In all the years that west Pokot has experienced drought it has had adverse impacts on food security. This is because drought impacts on agriculture include crop losses, lower yields in both cropland and livestock production, (Figure 3.1).

Impacts of drought to human health include increased risk of food and water shortages, increased risk of malnutrition and higher risk of water and food-borne diseases.

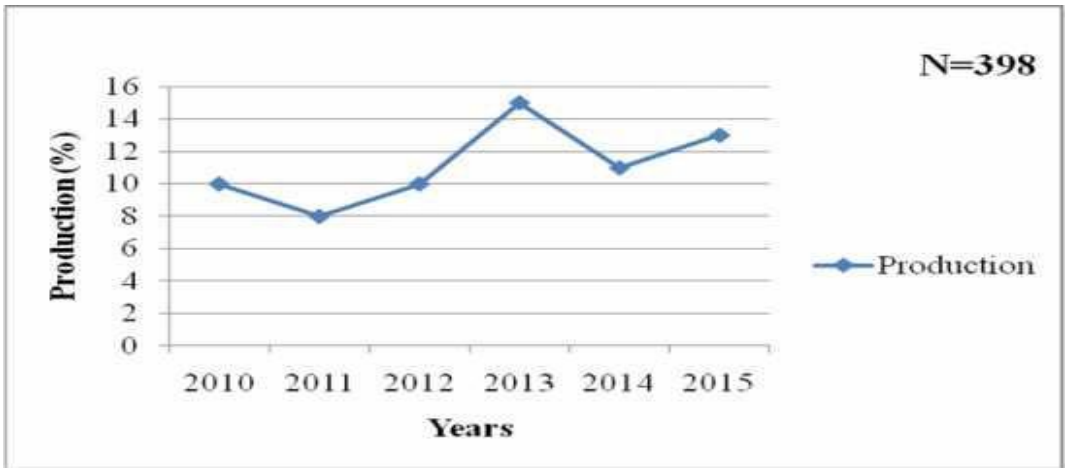

Figure 3.1: Maize yield productions 2010-2015

These results are in agreement with FAO (2013), which states that in the event of drought communities or farmers are expected to experience a decrease or even crop failure. Drought represents a constant threat to world food security. It causes income losses because several sectors can be affected. It also causes short falls in food production and leads to substantial increases in imports to meet local needs, which can result in increased fiscal pressure on county and national budgets. Drought normally results to poor harvests that threaten food security and livelihoods from household to national level, to varying degrees according to the extent that the family or nation depends on agriculture for its food and income, farmers who produce inadequate food to achieve production of self-sufficiency must resort to other sources of entitlement to feed their families (Ichara, 2012).

This study indicates that during 2011 and 2014 yield production went down because it was a year west Pokot experienced drought that impacted negatively on farm outputs, the study therefore agrees with (Nyandiko *et al*, 2012), who reported that drought and climate change has had disastrous consequences on maize production. The climate change induced droughts of 1982, 1992, 2000, 2003, 2007 and 2009 wreaked havoc on maize production and food security in Kenya. In Kenya's ASAL areas often crop yields such as maize, beans and sorghum vary according to seasonal and annual climate of the area. ASAL areas in Kenya are particularly vulnerable to climate variability and change due to the dependence on rain fed subsistence farming. These areas are affected by widespread poverty, diseases, rising human population and low adaptive capacity ACTED, (2013).

3.4 Analysis of maize yield production in west Pokot County

The mean maize yield in west Pokot County in 2014 was west Pokot 786.7 Kg/acre; in Pokot south 280 Kg/acre, Pokot central 229.0 Kg/acre while Pokot north 194.8 Kg/acre respectively giving the overall mean of 372.6 Kg/acre. The highest maize yield obtained was 890.75 Kg/acre in west Pokot (2010) while the lowest yield was 20.8 Kg/acre in 2011 observed in north Pokot sub-county (Table 3.2). From the analysis the highest observed maize yields are in west Pokot County (Mean =987 Kg/acre) while North Pokot realized the lowest average maize yield 20.8 Kg/acre. The findings revealed that there is wide variability in maize yields in the four Sub-counties over the period (2011-2014). Yield variability is strongly influenced by the impact of drought and climate change and change in ASALs particularly of north and central Pokot Sub-counties.

Table 3.2: Maize yield descriptive summary for West Pokot County (kg/acre)

Sub-County	Lowest yield	Highest yield	Deviation
Pokot North	20.8 (2011)	678 (2012)	657.2
Pokot Central	225 (2014)	747 (2010	522
Pokot South	240 (2011)	798 (2010)	558
West Pokot	550 (2011)	987 (2012)	437
Total	**1035.8**	**3210**	**2174.2**

Source: Field data, (2016)

The trend over the 2011-2014 period showed that maize yields have been declining sharply in all Sub-counties. Pokot north Sub-county had the highest variation in maize yields with 657.2 kg deviation difference, while West Pokot had the lowest deviation of 437 kg. The study further indicated that from 2010-2015 there were two drought years that 2011 and 2014 where the Sub-counties indicated low yield. The 2011drought was a national crisis that called for "Kenyans for Kenya "initiative that spearheaded contribution to those who were adversely affected by drought especially Turkana County.

3.5 Comparative analysis of Maize and Sorghum production in west Pokot County

The study revealed that communities in West Pokot normally plant maize and Sorghum. Comparing the two crops, key informants and community members reported that those who planted Sorghum received some harvest during drought periods as compared to those who planted maize. Although it was also noted that when thereis good rainfall thosewho plant maizereceive good harvest, this is because the size of the land allocated to maize is bigger than that of sorghum Figure 3.2 overleaf.

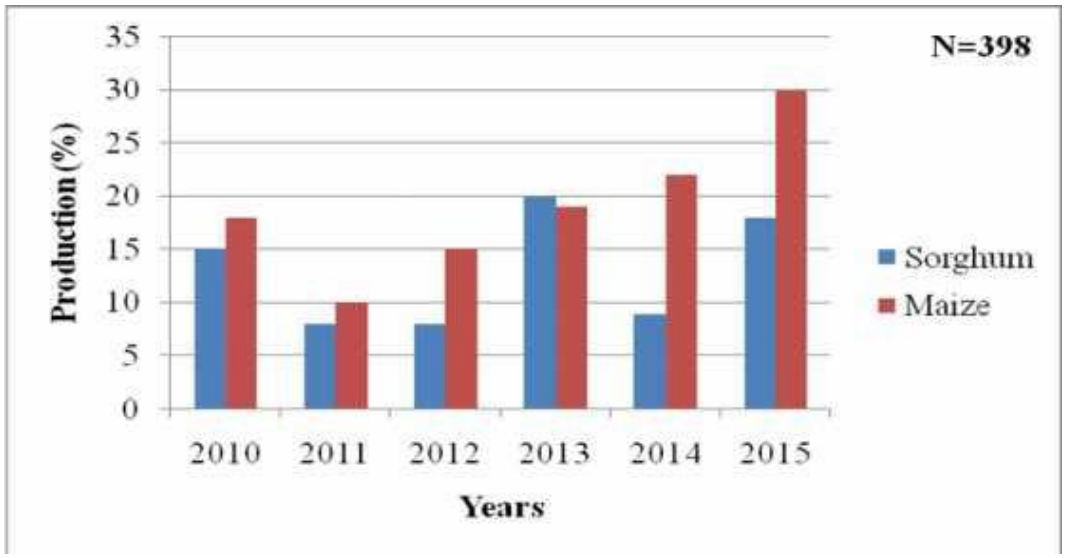

Figure 3.2: Comparison of yield production in West Pokot County

This study agrees with (FAO, 2013), which states that during drought it is only drought resistance crops that can withstand the harsh climatic condition, it also indicates that areas prone to drought need to plant crops like sorghum, cassava, millet, ground nuts and green grams (FAO, 2013). The Drought episodes in addition to occasional climate variability reduce crop yields, undermine livelihood strategies and enormously contribute to downward spiral of increasing poverty and food insecurity (ILRI, 2010)

Analysis of climate and crop yields can provide critical information to farmers and other stakeholders on adaptation mechanisms to forestall and mitigate climate change in Kenya's ASALs Counties. The study found that 96% of the respondents who planted maize had no harvest during the 2014 drought, 2.6% of the respondents who planted sorghum harvested very little from their farms and 1.4% of the respondents who planted green grams harvested at least more than one tin (2 kg). Table 3.3

Table3.3: Comparison of crops that were harvested during drought (2014)

Crops	Respondents	Percent (%)
Maize	382	96
Sorghum	10	2.6
Green grams/ground nuts	6	1.4
Total	**398**	**100**

Source: Field data, (2016)

These findings revealed that those farmers who planted maize were severely affected by drought because they recorded high percentage of the responses with no harvest compared to other crops that were planted by the respondents. While those who planted sorghum, green grams and ground nuts reported that they had poor harvests.

These findings are similar to NDMA (2013) that recommended that farmers need to embrace drought tolerant crops, that withstand the harsh climatic conditions in the area, according to NDMA, arid and semi-arid counties need to grow crops that withstand the climatic conditions of those counties for example cassava, sorghum, millet, green grams and ground nuts. The report also agrees with Ichara, (2012), who established that poor harvests threaten food security and livelihoods from households to national level in varying degrees based on the extent that the family or nation depends on agriculture for its food and income. Farmers who produce inadequate food to achieve self-sufficiency in production must resort to other, sources of entitlement to feed their families. The study found that among the four sub-counties, Pokot north record slow yield production compared to other Sub-counties, this is because north Pokot normally experiences low rainfall compared to other sub-counties, Figure 3.3.

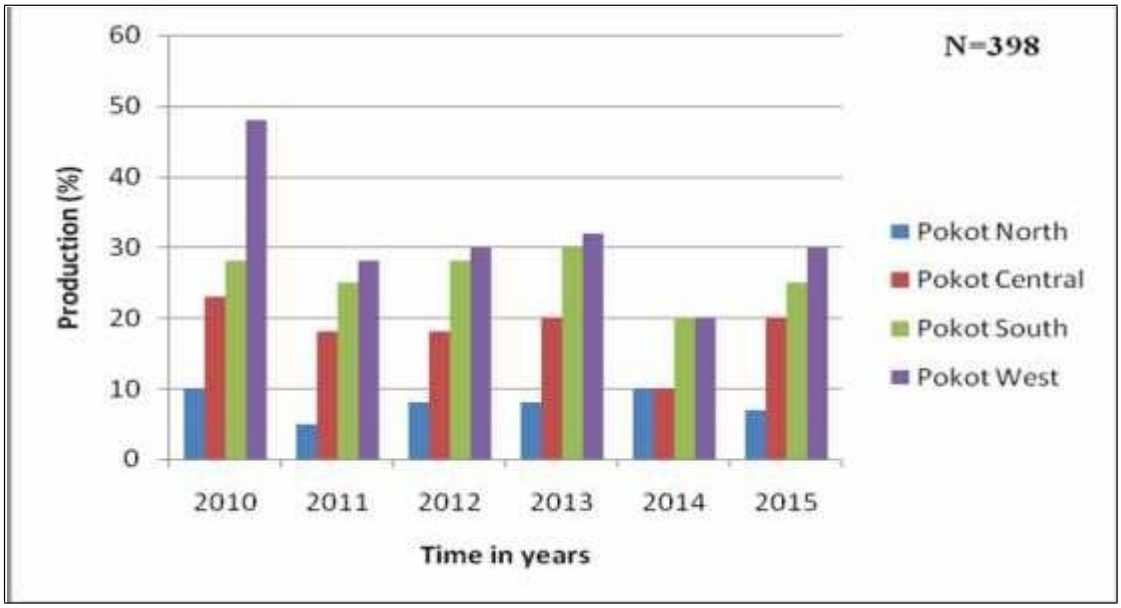

Figure 3.3: Yield production (2010-2015) in sub-counties

This study is in agreement with results from (NDMA 2013) that indicate that pastoralist areas in west Pokot experience low rainfall compared to areas that practice mixed farming and agro-pastoralism. Based on-ranking of vulnerability to drought and severity of impact of drought, north Pokot was ranked as the worst affected. This study revealed that increase in prices of food products could be attributed to scarcity of the commodity within the internal normal supply sources to the markets. This leads to much reliance on external (outside the Counties) markets to replenish the stocks in the major markets within the county. The study found that 80% of the respondents mentioned livestock production as their main source of food security, 73.30% indicated that selling of wild fruits, vegetables and termites was their main source of food security, 67.50% relied on selling of charcoal production. Of the studied respondents only 13.30% indicated crop production to be their main source of their food security Figure 3.4 over leaf.

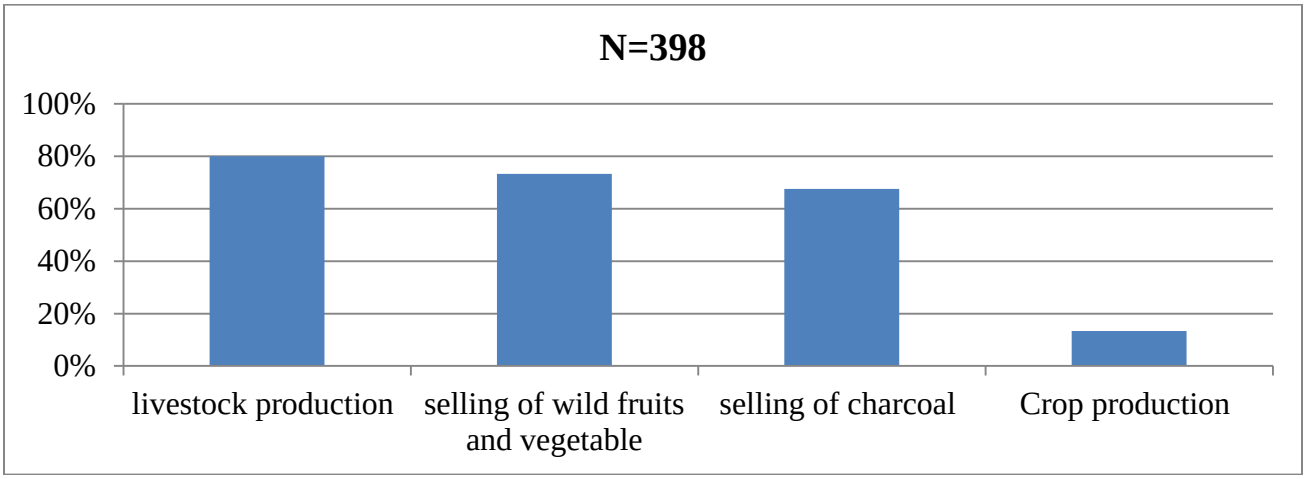

Figure 3.4: Source of food security in West Pokot County
Source: Filed data (2016)

These findings indicate that the main source of livelihoods for most of the respondents is animal production. The findings are consistent with Adan, (2015) who found out that Livestock is the main stay of the economy of the arid and semi-arid counties and contributes over 60% to food security in the County. The main livestock types found in the county are the indigenous cows, goats, sheep, camels, and donkeys. Crop failure was reported to be the worst immediate impact of drought on people's livelihoods by 68% of the respondents. The respondents further reiterated that crop failure (Figure 3.5) was their major drought related problem of which 68.8% of them referred to it as the main cause of food shortages while 64.2% of the respondents reported water scarcity and 72% of the respondents indicated that drought impacts heavily on their health particularly malnutrition.

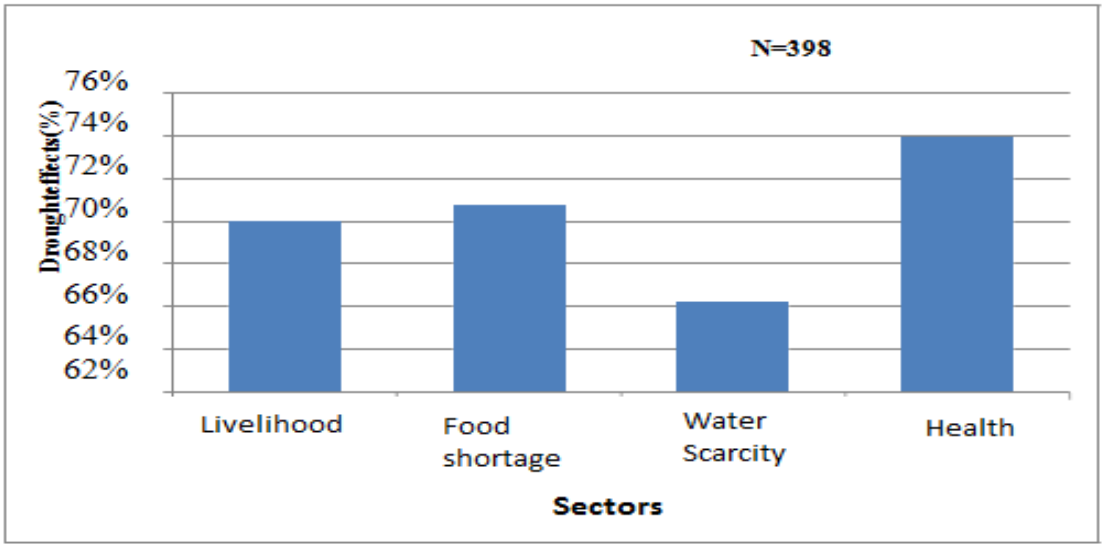

Figure 3.5: Effects of drought on different sectors in West Pokot County

Source Field data, (2016)

The findings indicate that malnutrition cases were adversely reported as the main impact of the drought. The results further show that during drought the area normally experiences malnutrition problems. The findings concur with Kenya demographic health survey, (KDHS, 2014) that revealed west Pokot County had the highest percentage of malnutrition cases that was at 45% nationally. The Kenya Red Cross Society, (2011), in its assessment reports indicated marked deterioration in grazing resources, coupled with severe water scarcity leading to exceptionally large migrations, heightened clustering of livestock, death of livestock, increased malnutrition rates among the young, changing diets (eating only once a day), and resurgence of conflicts as communities compete for fast dwindling resources.

According to Red Cross (2011) the North Rift, Northern Kenya and southern Ethiopia have witnessed increased frequency and intensity of droughts and this has resulted in heavy losses of livestock, increased the number of inter-ethnic conflicts and loss of lives (Habitat,2009).

Results from the study indicate that 74% of the respondents stated that the drought occurrence trend in West Pokot County is worsening. This is in tandem with a research by Ichara (2012), whose results indicate that since1960s each drought episode in Africa has been more severe than the previous one causing humanitarian crisis in the continent. Even though majority of the respondents revealed that drought is worsening, Sheffield *et al.* (2012), asserted that more realistic calculations, based on the underlying physical principles that take into account changes in available energy, humidity and wind speed, suggest that there has been little change in drought over the past 60 years.

The Sendai framework of action (2016), which focuses on development, strengthening and implementation of relevant policies, plans, practices and mechanisms need to aim at coherence**,** as appropriate**,** across sustainable development and growth, food security, health and safety, climate change and variability, environmental management and disaster risk reduction agendas. Disaster risk reduction is essential to achieve sustainable development, (SFDRR, 2016).

3.6 Milk Production

Every respondent indicated that during drought, animals produce less milk compared to the wet season. In Kapchok ward respondents indicated that production of milk reduced by 80%, in Riwo ward the respondents indicated that milk production reduced by 75% and in Lomut it reduced by 84%. This study was in agreement with NDMA (2016) findings, which indicted that during drought milk production decreased and this was attributed to the fact that there was constraint in access to pasture in terms of the distance covered and partly due to migration to a smaller extent that meant few animals from the milking herd remained behind within the households. The deterioration in animal body condition especially cattle was due to depletion of pasture in most it especially in Pokot north and central that meant animals trekking long distances in search of pasture. During this season, the body condition of goats and camels deteriorate slightly due to constraints in accessing browse of good quality.

IV. Conclusions and Recommendations

Drought is the major cause of food insecurity in West Pokot County. It is shown that maize farmers are most severely affected by drought because it leads to crop failure as compared to other crops such as sorghum, green grams and groundnuts that are drought tolerant. Drought also affects animal produce leading to production of less milk compared to the wet season. Prolonged drought negatively impacts on food security resulting to poverty increase, which affects community participation in social economic and political processes.

Drought increases household vulnerability in the event of future climatic shocks and food insecurity. It has the tendency of pushing pastoralists out of their production systems, forcing them to move to urban centers where food distribution, health, sanitation and water supply may be more reliably available.

The study recommends that there is need for the government to initiate irrigation schemes and encourage restocking after drought in order to support communities who lose their animals during drought. Capacity building through educating the community on growing recommended crop varieties that are drought tolerant is necessary. The national and county governments need to welcome the support accorded by communities towards the initiative of reclaiming land under irrigation as it would lead to more engagement in farming activities and thus reduce reliance on livestock keeping as the main source of livelihood in ASALs.

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