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Gender and Resilience to Climate Variability in Pastoralists Livelihoods System: Two Case Studies in Kenya

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Abstract

Recurrent droughts due to climate change has led to vulnerability of the pastoralist communities, leading to loss of assets and food insecurity. Climate change will have different impacts on women and men's livelihoods. Building resilience at individual, household and community level will largely depend on the suitability of interventions to the local context, particularly in relation to the social dynamics and power relations that create differences in vulnerability. Most of the research have focused on national and regional studies. The impact of climate change will not be uniformly distributed in countries within Africa or within the same country. This specific research focuses on two diverse ecological zones at the local level in the same County of Turkana in north western Kenya: agro-pastoral zone and primary pastoral zone. This paper aims to evaluate women and men's adaptive capacity to climate variability in Turkana, north-western Kenya. It is evident that increasing resilience can be realised by reducing vulnerabilities and increasing adaptive capacity. The results revealed that agro-pastoralists are more resilient to climate change than primary pastoralists. Male headed household are more resilient than female headed households. Access to basic services is contributing more in the resilience score than assets, gender of house hold head and age. Generally, few families in this region have very high resilience score.

Keywords: gender, pastoralism, vulnerability, adaptive capacity, resilience, climate change

1. Introduction

Climate change predictions for Africa indicate that there will be reduced water availability and expansion of the arid and semi-arid regions in sub-Saharan Africa due to climate change (Intergovernmental Panel on Climate Change [IPCC], 2007). The impact of climate change will not be uniformly distributed in countries within Africa or within the same country (Busby *et al.,* 2011). In Sub-Saharan Africa pastoralists inhabit the arid and semi-arid (ASAL) regions which have diverse climate and receive low rainfall. Galvin *et al.* (2004) state that while East African pastoralists have been able to track climate variability very well in the past, their strategies, based on centuries of exposure to intra- and inter-annual droughts, as well as floods, are not working now due, in part, to an inability to implement them. Moreover, drought affected areas have been estimated to double by the end of the century (from 25% to 50%) and drought periods will likely last longer (Birch and Grahn, 2007).

Most pastoral activities in Kenya are concentrated within the country's vast semi-arid and arid regions. Kenya is vulnerable to climate change, like many other countries in sub-Sahara Africa. Pastoralism which is one of Kenya key economic sector will be affected by the persistent droughts. In the year 2011, Kenya and the Horn of Africa experienced one of the worst droughts which led to starvation, malnutrition, human and livestock deaths mainly in the pastoralists inhabited areas in Northern Kenya (Haro, 2012 and Reuters, 2011). According to the National Climate Change Strategy (NCCRS, 2010) the increased reoccurrence of droughts in Kenya's have reduced famine cycles from twenty years between 1964 and1984, and then to twelve years between 1984-1996. Furthermore, the drought cycles have reduced to two years between 2004 and 2006 and then to yearly basis in the following years of 2007, 2008 and 2009 (GoK, 2010).

Adaptive capacity is influenced by many factors including: gender, ethnicity, religion, literacy levels, culture, disability and age (Denton, 2002 and Enarson, 2002). Other factors that influence adaptive capacity in the pastoral system include: mobility (i.e. access to natural resources); and access to resources (i.e. financial resources and technology). The adaptation strategies include capital in terms of knowledge and know-how pastoral communities use to respond to climate change and variability (Sonwa et al., 2016).

Adaptability form a core part of resilience. According to Folke et al., 2010, it is evident that increasing resilience can be realised by reducing vulnerabilities and increasing adaptive capacity. Resilience can be achieved for every specific risk by reducing sensitivity, exposure and increasing adaptive capacity. These measures can be achieved by intervening into all different dimensions namely: biophysical, economic and social. IPCC (2014) defines resilience as the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation. Miller et al. (2010) explains that there is a time dimension to the resilience concept: a system is resilient when it is less vulnerable to shocks across time, and can recover from them. Adger (2000) argues that these external stress and disturbances can be due to environmental, political and social change.

Three aspects are critical to resilience thinking: resilience, adaptability and transformability (Folke, 2010). Transformability can be defined as the capacity to create a completely new system when ecological, economic, or social structures make the existing system unsustainable (Walker et al., 2004). It is evident that processes of social learning and communication across multiple institutional scales, community reorganization, and adaptive capacity are critical when building general resilience of marginal societies to climate change (Osbahr et al., 2008). The policies developed at national levels can be insensitive to local needs. At times they do not provide the rural poor with access to the assets and services they need to allow them to innovate and adapt to the ways that can increase resilience to climate variability and change. To facilitate climate adaptation actions to deliver resilience, local perspectives and knowledge need to be acknowledged and given due priority in formal planning systems (Sharma et al., 2015). At present, resilience thinking does not give sufficient recognition to the already existing accounts of, for instance, institutional change trajectories, the dynamics of path dependence, the distributional character of institutions, or the fundamental political determinants and drivers of institutional design and diversity (Sjöstedt, 2015).

Most research undertaken on climate change and livelihoods have not focused on collecting and analysing gender disaggregated data, this has led to the assumption that climate change impacts on the livelihoods of women and men in the same way (Dankelman, 2002 and Food and Agricultural Organisation [FAO], 2003). Furthermore, there has been a slow progress in recognising the social dimension of climate risk despite years of research by social scientists (Fothergill, 1996, Moosa and Tuana, 2014).

Many women remain vulnerable not because of their sex, but because of the gender differentiation between women and men (Aguilar, 2010). Gender differentiation in adapting to climate change is affected by availability of natural resources, access to assets, international and national legal policy frameworks (Djoudi and Brockhaus, 2011). Women pastoralists are vulnerable due to a number of factors: cultural restrictions, poverty, conflicts, unfavourable government policies for the ASALs and national legal frameworks over the years has not promoted women participation in decision making (FAO, 2003 and GoK, 2004).

Understanding gender differentiation in adaptation to climate change is very important. This is because in sub-Saharan Africa women play a significant role in food security and adapting to climate change at the household level (UNDP, 2009) and (Nellemann *et al*., 2011). It is vital for policy makers to consider factors driving women choices of adaptation (Nduma *et al*., 2001). Prioritizing gender issues therefore involves focusing on the inequalities between women and men, in addition to other factors that cause them, in terms of their positions, needs and gender roles (Meer, 2007). Applying a gender lens contributes to a better understanding of the different experiences of disasters between women and men, and different groups in terms of ethnicity, race and age (Le Masson, 2015).

2. Methodology

2.1 Study Location

The two study sites are Katilu (agro-pastoralist zone) and Namoruputh (primary pastoral zone) in Turkana County in North Western Kenya. Katilu Location is in Katilu Division in the south of Turkana County. It is an irrigation scheme along the Turkwel River. Namoruputh location is in Loima Division in the Central of Turkana County. Namoruputh is not situated next to any river or lake.

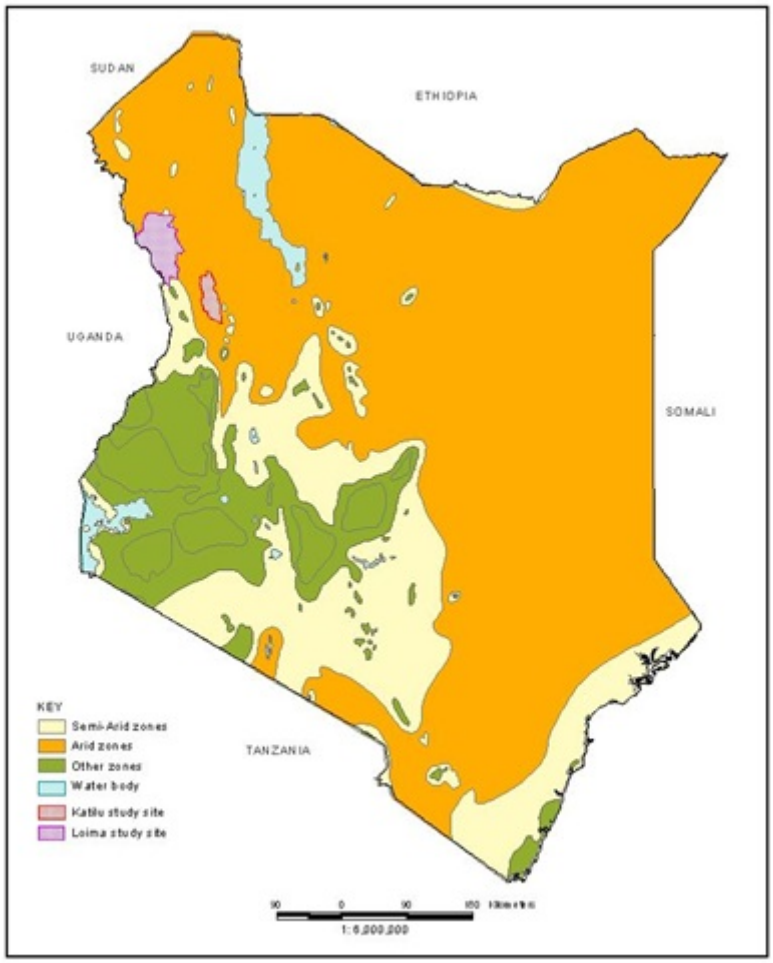

Figure 1. Map of Kenya showing Loima and Katilu Divisions in Turkana County

Source: Authors 2016

Turkana County was selected for the study on the basis that it has been subjected to historical and recurrent droughts that have left the regions vulnerable. Turkana County is in arid and semi-arid land (ASAL) area where managing short-term climatic fluctuations as well as adapting to long-term changes is critical to sustaining livelihoods. It experiences several structural challenges characterising low development and high poverty levels.

Turkana County experiences long rainfall which are usually erratic and unreliable between the months of April and July. While short rains are experienced between the months of October and November. The rainfall ranges 52mm and 480mm annually with mean of 200mm. The temperature ranges between 20^{o}C and 30.5^{o}C. Turkana County has a poverty index of 94%, and is one of the poorest regions in Kenya (Turkana County Integrated Development Plan – CIDP, 2013). The two study sites of Katilu and Namoruputh were selected to demonstrate the varied livelihood activities within the ASAL region.

2.2 Data Collection

This study used triangulation method which includes: the quantitative household survey data, focus group discussions (FGDs), literature review of secondary data sources and key informant interviews (KIIs).

2.3 Data Analysis

Structural equation models (SEM) under SPSS software was used. It represent a current statistical technique that is used to handle multivariate data with and additional component to account for measurement error (Byrne, 2010). Adjusting the survey variables for measurement errors is essential since most variables in social science are not directly measurable and the researcher only relies on proxies that are related to this variable of interest. Measurement error models are used to account for this discrepancy between the true measurement and the

observed measurement from the field (Blackwell et al, 2015).

Resilience is not observable but can be infered through several proxy variables. There are several frameworks for estimating relience from these proxy. Food and Agriculture organisation deleted (FAO) has developed a unified SEM approach called RIMA (resilience index measurement and analysis) based on eight pillars, namely income and access to food; assets such as land and livestock; social safety nets such as food assistance and social security; access to basic services such as water, health care, electricity, etc.; households' adaptive capacity which is linked to education and diversity of income sources; and the stability of all these factors over time. Availability of data capturing all these components in a survey is a big challenge especially in resource challenged countries, with particular reference to African countries. The resilience framework looks at the root causes of household vulnerability instead of trying to predict how well households will cope with future crises or disasters. In this study variables associated to adaptive capacity, household assets and access to basic services were available to be used in the analysis and estimation of resilience index.

The framework adopted for the current study is given in the figure 2 below

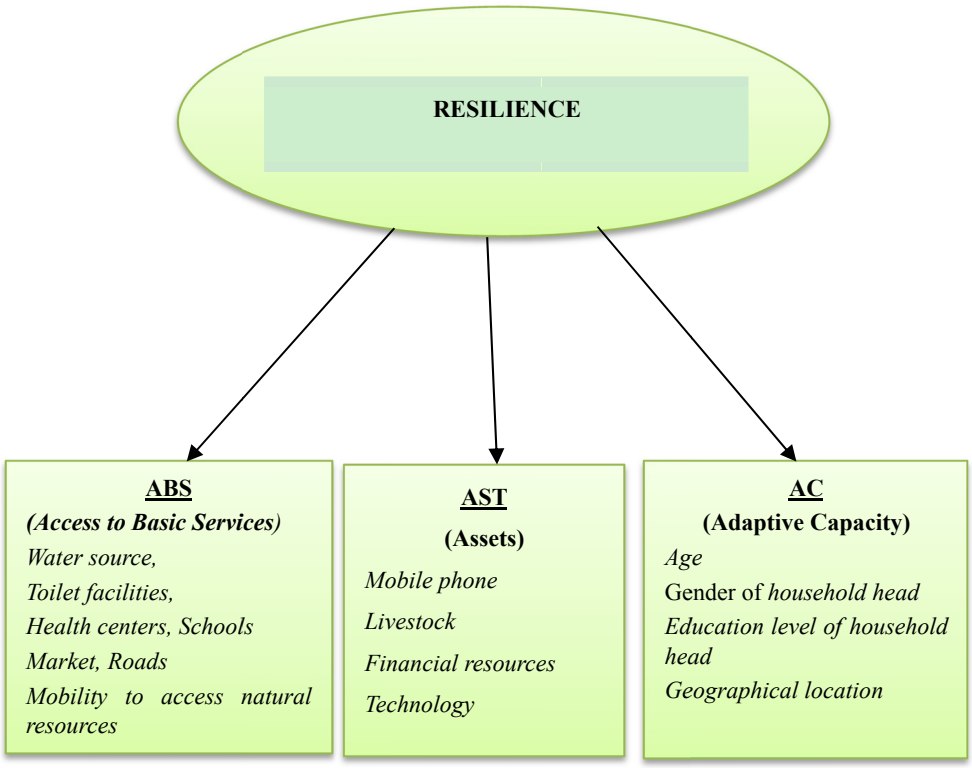

Figure 2. The framework adopted for the current study

Source. Authors

The statistical model (SEM) for this specified framework is as given below

$$ABS_i = \alpha_1 + \lambda_1 \eta_i + \delta_{i1}$$
$$AST_i = \alpha_2 + \lambda_2 \eta_i + \delta_{i2}$$
$$AC_i = \alpha_3 + \lambda_3 \eta_i + \delta_{i3}$$

η_i is a latent variable which represents the resilience score.

δ_i refers to the error term in the model.

α are the intercepts.

3. Results and Discussions

The structural model below depicts the relationship between resilence and its independent/predictor variables (ABS, AST and AC).

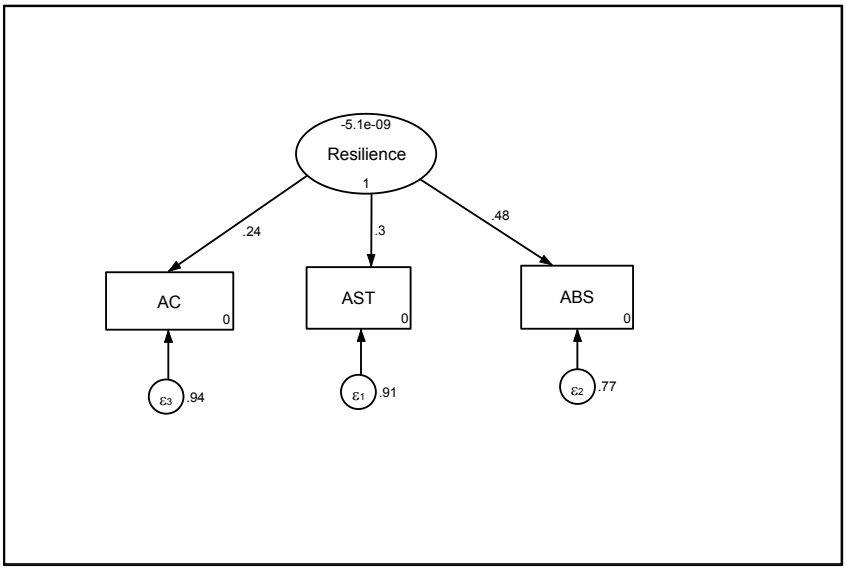

Figure 3. Structural equation model diagram depicting the pillars

From figure 3 above, it was found that ABS (Access to Basic Services like water source, health services, schools, market, mobility to access natural resources) has the highest loading factor on resilience (r = 0.48) followed by assets - AST (i.e. livestock, mobile phone, access to financial resources and technology) (r = 0.3) and finally adaptive capacity - AC (i.e. age, gender of household head, education level of household head, culture and ethnicity) (r = 0.24).

3.1 Access to Basic Services and Assets

The study finding reveals why Turkana pastoralist are less resilient and vulnerable to climate change. There are inequalities in accessing basic assets in Kenya, for instance, Nairobi's 814, 200 households enjoy the best roads and have numerous schools. A total of 88.3% of Nairobi residence own mobile telephone handsets and 22.3% access to internet connectivity. This is in contrast to Turkana County, where only 15.9 per cent of households own mobile phones. The poverty level in Nairobi is below 30% while the poverty level in Turkana is over 85% (Mwangi 2008).Inequality in Kenya has taken ethno-regional dimensions with some regions and the communities living in those regions being better off than others. This has at times created political tensions between ethnic groups (Wanyande, 2016).

Maddison (2007), argues that there is a positive relationship between the education level of the household head and adaptation to climate. Farmers/pastoralists with higher levels of education are more likely to adapt better to climate change. According to Benor et al. (1997) education contributes to creating positive mental attitude towards adoption of modern farming innovations

3.2 Adaptive Capacity

Watson and van Binsbergen (2006) states that pastoralists including Turkana pastoralists have traditionally used risk-spreading strategies over the years that include moving livestock to access the best quality pasture and water available, keeping species-specific herds to take advantage of the heterogeneous nature of their disequilibrium environment, and diversifying economic strategies to include farming, beekeeping and casual labour.

3.1.1 Correlation between Resilience and the Pillars

Table 1 below shows that asset and resilience are positively associated (r=0.539). In addition, the results revealed that that access to basic services and resilience are positively associated (r=0.8537). Lastly, the results showed that asset and resilience are positively associated (r=0.4302).

Table 1. Correlation between resilience and the pillars

Component	Resilience	Asset	Access to basic services	Adaptive capacity
Resilience	1.000			
Asset	0.5396	1.000		
Access to basic services	0.8537	0.1464	1.000	
Adaptive capacity	0.4302	0.0738	0.1168	1.000

3.1.2 Descriptive Statistics of Resilience Score

The average resilience among household in this sample was found to be 23.001(17.104). A box plot of resilience shows that a few families in this region have very high resilience resulting to outliers.

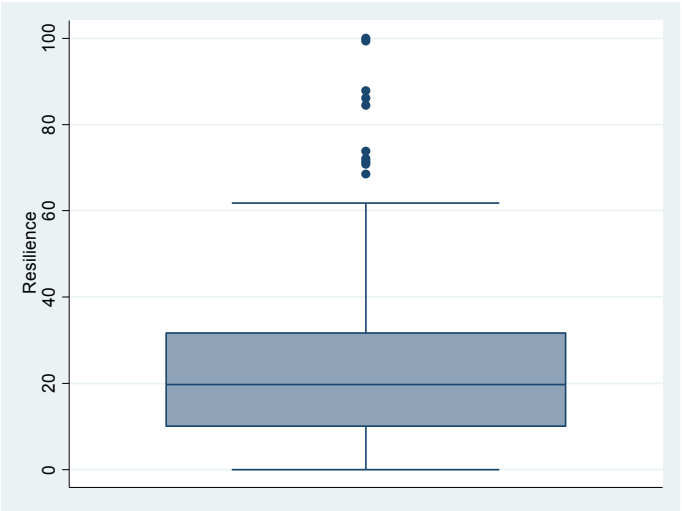

Figure 4. A box plot of resilience

3.1.3 Descriptive Statistics of Resilience Score

Table 2 below shows that the mean score for resilience was 23.001 with a standard deviation of 17.104. Its minimum and maximum was 0.00 and 100 respectively.

Table 2. Descriptive statistics of resilience score

Variable	n	Mean	Std. Dev.	Min	Max
Resilience	386	23.001	17.104	0	100

3.2 Resilence by Gender of Household Head

Figure 4 below shows resilience by gender of household head. The average resilience for male was 27.6 while that of female 21.2. Household headed by male are more resilient than households headed by female. To check whether this difference in resilience was statistically significant, a two sample independent t-test was carried out. The results are shown in table 3.

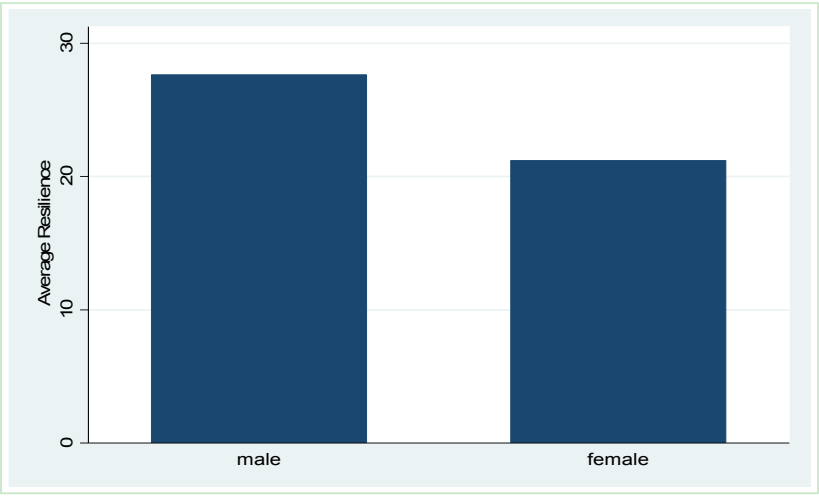

Figure 4. Resilence by gender of household head

The test statistics was found to be 3.374 (df = 384), with a p-value of 0.0008. This implies that resilience is statistically different between household headed by female and male.

Empirical research has shown that there is poverty differentiation between female headed households (FHHs) and male headed households (MHH). According to Buvinic (1993 cited in Appeleton, 1996:1819) not all FHH household are more vulnerable than the MHH. It is vital to disaggregate data according to different types of FHHs. This is because FHHs by widows are more likely to be vulnerable as compared to FHHs by married women which are likely to be more prosperous. In any of the observed variables, women have lower access to productive assets. This is in line with the current literature which states that women are vulnerable. For example, they have lower access to land, livestock, lower wealth index and participation score. Sonwa et al (2016) states that female-headed households in Turkana are more likely to lack labour for herding and accessing better pastures, which tend to be located in conflict-prone areas.

3.3 Resilience by Gender of Administrative Units (Division)

Figure 3 below shows resilience by gender of administrative units. The average resilience for Katilu was 23.6 while that of Loima 21.4. Households in Katilu division seem to have higher resilience as compared households in Loima division.

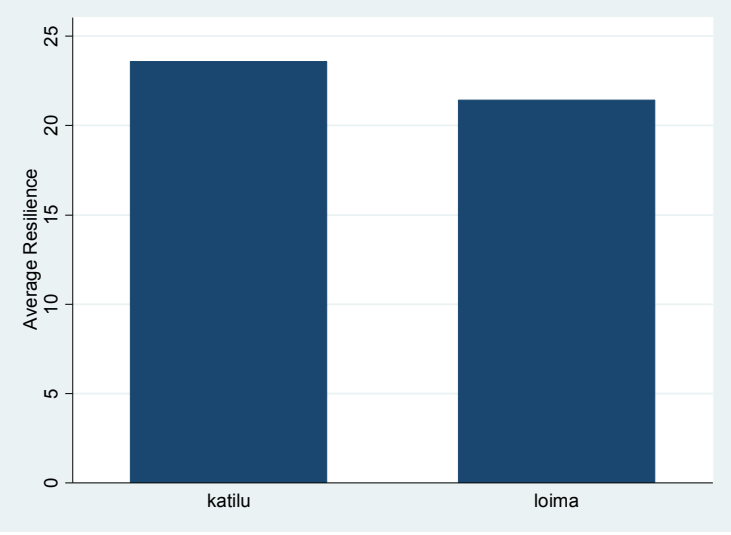

Figure 5. Resilience by gender of administrative units (division)

To check whether this difference in resilience is statistically significant, a two sample independent t-test was

carried out. The test statistics was found to be 1.094 (df=384), with a p-value of 0.2745. This implies that resilience is *not* statistically different between households in Katilu and Loima divisions of Turkana. The study results shows that women in agro-pastoral zone are more resilient than women in primary pastoral zone. Livelihood diversification varies according to agro-ecological zones.

Omolo (2010) states that livelihood diversification varies according to agro-ecological zones. Katilu is an agro-pastoralist area situated next to river Turkwell. The livelihoods sources in Katilu include selling agricultural produce. There is less farming activities in Namoruputh because the area is very dry.

4. Conclusion and Recommendations

From the results and findings above, the study concludes that access to basic services, assets and adaptive capacity are positively and significantly related to resillience. The study further concludes that access to basic services like water, health services, schools, market and mobility to access natural resources has the highest loading factor on resilience, followed by assets like livestock, financial resources and technology, and finally adaptive capacity like age, gender of household head, the education level of the household head, geographical location and culture. The study results shows that women in agro-pastoral zone are more resilient than women in primary pastoral zone. Household headed by male are more resilient than households headed by female.

This study findings helps the government of Kenya and development agencies understand how effective targeting can lead to livelihoods transformation. This study informs policy makers in prioritization of development programmes/projects to ensure inclusivity and address livelihood issues. The focus on analysis of gender and resilience helps policy makers to get a better understanding of the gender dynamics in social-ecological resilience. Further research, however, is needed to determine how gender, participation and decision making contributes to resilience.

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