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*Original Research Paper*

## Gendered decision making and adaptation to climate change in Mt. Elgon Region, Eastern Uganda

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### ABSTRACT

This study investigates intra household level decision-making in two rural districts in the Mt Elgon region. Data was collected from 442 respondents using a household survey. Pearson Chi-Square ( $\chi^2$ ), Multinomial and logistic regressions were used to understand the gender dimensions of decision making and barriers to climate change adaptation. The study demonstrates that coping and adaptation decisions within households are undertaken either as sole or joint decisions. Sole decisions are made either by the husband or by the wife while joint decisions are made by the husband and wife together or with other household members. However, most coping and adaptation decisions were often made either by the husband or by both the husband and wife. Seldom were decisions made individually by the wife or jointly with other household members. The study concludes that men or women may make decisions on certain coping and adaptation practices and not others implying that the kinds of coping and or adaptation practices will also determine who makes decisions.

**Key words:** Adaptation, Climate change, Decision making, Gender

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## I. INTRODUCTION

In the event of climate change, people will need to change their life styles and adapt either because the local impacts of climate change leave them no alternative or because specific adaptation will reduce losses associated with the impacts sustainably (Patt and Schroter, 2008). The components of this change in climate change may include technological innovation, institutional reforms, behavioral shifts and cultural changes (O'Brien and Sygna, 2013). However, to realize such change, greater emphasis needs to be placed on the factors that encourage or discourage the implementation of adaptation measures within households such as the decision making processes which remain fragmented and less explored.

Households do not function in a sterile economic environment. Social norms and customs influence household behavior and therefore the outcomes of transformation. Intra-household decision-making affects many choices with important consequences including the distribution of income, allocation time and resources decisions (Doss, 1996; Quisumbing and Maluccio, 2003; Doss, 2013). In the advent of climate change, if there is gender inequality in household decision making this affects the wellbeing of men, women and children in the household (Quisumbing and Maluccio, 2003). While substantial research attention has been paid to

the factors that influence adaptation to climate change within households (Maddison, 2007; Deressa et al. 2009; Nabikolo et al. 2012; Juana, Kahaka, and kurut, 2013), the ways in which adaptation decisions are made within households are a question that still puzzles many researchers. Most economic research treats the household as a single agent, many often times assuming that individuals within the household share the same preferences or that there is a household "head" who has the final say (Doss, 1996; Quisumbing and Maluccio, 2003). Few studies have considered how adaptation occurs within households (Berrang-Ford et al. 2011) and how decisions to adapt to climate change are made within households (Smithers and Smit, 1997). Understanding how decisions are made to adapt to climate change within households is important considering that barriers to adaptation to climate change are prevalent across multiple actors, including individuals, groups and institutions (Adger et al. 2009).

According to Mbogga (2012), the Mt. Elgon region has experienced extreme climate change and is most vulnerable to its effects (Knapen et al. 2006; Aaron et al. 2013). There is evidence for larger variations in temperature and rainfall predicted in the future. During the period 2001-2011, temperature increased by 1°C. Climate projections based on two emission scenarios (A1b and A2) from at least five

General Circulation Models indicate an increase in temperature for the next 30 years and more rainfall in the 2010-2039 periods (Mbogga, 2012; MWE, 2013; Eike et al. 2014). The region's high vulnerability to climate change is exacerbated by high population density, high poverty levels and the mountainous terrain which is further exaggerated by the current land use and unsustainable land management practices such as deforestation (MWE, 2013, Aaron et al. 2013; Obonyo et al. 2013; Eike et al. 2014; Bos et al. 2015).

Literature on climate change in the Mt Elgon has mainly focused on documenting the characteristics of the climate change events and their causes (e.g. Knapen et al. 2006; Claessens et al. 2007; Kitutu et al. 2009; Atuyambe et al. 2011; Kitutu et al. 2011; Mbogga, 2012). There have not been any substantive investigations on how climate adaptation decisions within households are made within the region. It is often assumed that the head of the household is the chief decision-maker in farming households, and this role is regularly attributed to the male spouse or husband (Meijera et al. 2015). However, the assumption that the household head is always the primary decision-maker is questionable (Rogan, 2013). There is therefore need to understand better how decisions within households are made (Deere, Alvarado and Twyman, 2012; Meijera et al. 2015). In this study, we hypothesize that within the

household, husbands do not dominate climate change adaptation decisions. The study specifically aims to; (i) unveil how decisions to climate change adaptation within the households are made and (ii) document the intra-household barriers to climate change adaptation.

## II. MATERIALS AND METHODS

### 2.1 Description of the study area

The research was carried out in Kapchorwa (latitude  $1^{\circ}7^{\circ}$  N,  $1^{\circ}36^{\circ}$  N and longitude  $34^{\circ}18^{\circ}$  E,  $34^{\circ}48^{\circ}$  E) and Manafwa districts (latitude  $1^{\circ}88^{\circ}$  N,  $33^{\circ}33^{\circ}$  N and longitude  $34^{\circ}33^{\circ}$  E,  $33^{\circ}33^{\circ}$  E) in the Mt Elgon region of eastern Uganda (Figure 1). The two districts are characterized by mountainous terrain and the climate in the two districts is affected by altitude (NEMA, 2008). The rainfall pattern is bimodal, with two rain seasons (Mbogga, 2012). Subsistence agriculture and livestock farming are the major occupations (MFEP 2014). The districts were selected purposively based on their acute vulnerability to climate change (MWE 2013). The mid to high elevation areas have had landslides, siltation of rivers as well as washing away of top soil, which depletes soil nutrients hence affecting agricultural yields (Kitutu, 2010; Mbogga, 2012). The districts are also characterized by poor infrastructure and basic services delivery and natural resource degradation (Mbogga, 2012; MWE 2013). Two sub-counties were purposively selected from each district due to



Morgan (1970). The household survey adopted semi-structured individual interviews which were conducted in the local languages used in the two districts. Data was collected on sources of climate adaptation information, coping and adaptation practices implemented, the process of decision making on a range of coping and adaptation practices undertaken by the households and the barriers that constrain adaptation to climate change within the households.

### 2.3 Data analysis

Cross-tabulations were used to generate Pearson Chi-Square ( $\chi^2$ ) values which were used to test any association between the husbands and wives' sources of adaptation information/advice adaptation as well as their cropping and adaptation practices.

Intra-household decision-making was analyzed using two household decision-making models: Sole and joint decision making. Under sole decision making, a single individual, usually the head of the family/household, dictated his preferences to the other members of the household in relation to climate change adaptation while under the joint decision making process, two or more parties having several possible options available to them deliberated on the final option to take or forego: each of the parties had an interest in reaching a settlement but their preferences were not identical. Sole decision making

within the household was further qualified by sex that is husband, wife/spouse while joint decision making was either with both husband and wife/spouse or with any other member within the household. Multinomial regression was used to test the association of gender with the decision-making modes for the various coping and adaptation practices. The model consisted of gender as the control variable. This relationship was expressed as  $D_i = f(G)$  where  $D_i$  is decision-making mode (sole male (husband), sole female (wife/spouse), joint (husband and wife or with other household member)).  $G$  represents the gender (male vs. female). Differences in the odds of decision making modes were estimated and their significance indicated by the Wald  $\chi^2$ .

A logit regression was used to determine the barriers influencing the household's decision to adapt to climate change. The specification of the empirical model that was estimated is as follows:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \dots$$

... (1). Where  $Y_i$  is a dichotomous dependent variable (Adaptation to climate change specified as yes=1, 0=otherwise).  $\beta_0$  is the Y-intercept whereas  $\beta_1$ - $\beta_6$  is a set of coefficients to be estimated.  $X_1$ - $X_6$  are explanatory variables (Inadequate financial resources, Non availability of farm labour, Land fragmentation, Non availability of agricultural inputs, Poor farming technologies, Limited access to climate adaptation information) hypothesized, based on theory and related



empirical work, to influence adaptation to climate change. The logit model was tested for

multicollinearity and heteroscedasticity and both were rejected.

### III. RESULTS

#### 3.1 Source of adaptation information

In order to understand the decision making process at household level, we first explore the source of climate adaptation information that may inform adaptation decisions and practices to adopt. The analysis reveals that access to climate information is gendered. Majority of the respondents received adaptation information from their own experimentation/indigenous knowledge. However, slightly more husbands used own experimentation than wives to inform adaptation decisions (Table 1). Analyses also revealed that husbands and wives received adaptation advice from government or non-governmental institutions extension agents. However, wives were more likely to receive advice from home visits by development or extension agents than their husbands because of their role in ensuring food security and their availability at home as husbands went either looking for informal employment or attended to livestock outside home. Husbands and their spouses also noted

to have attended community meetings to obtain information on production and adaptation to climate change; wives were however less able to attend community meetings where production and adaptation information was shared which they attributed to the multiple roles at home that kept them occupied and thus had less time to attend the community meetings as compared to their husbands. Access to radio media announcements for production and adaptation information was also reported; while husbands seemingly owned most of the radios, their wives were more likely to access climate information through the radios and attributed this to the fact that women are more at home than men, so they are more likely to get information from the radio than men (Table 1). There was significant difference between husbands and wives' access to climate information ( $X^2 = 85.47$ ,  $DF = 4$ ,  $P\text{-Value} = 0.003$ ).

**Table 1: Percentage of respondents identifying source of adaptation information by gender (Husband Vs Spouse)**

<i>Source of adaptation information</i>	<i>Percentage of respondents (%)</i>	
	<i>Male (Husband)</i>	<i>Female (Spouse)</i>
Own experimentation/indigenous knowledge	76	72
Visit by NGO/CBO extension agents	65	69
Visit by government extension agents	46	58
Attend community meetings	44	25
Radio media announcements	37	40

**3.2 Household decision making and adaptation to climate change**

Most adaptation options are not discrete measures likely to be undertaken specifically with respect to climate change but also within the political, economic and social environments. Both men and women reported similar or identical observations of temperature and precipitation trends over time and highlighted that droughts were frequent and severe droughts while the rains were erratic rains and extended. In bid to respond to the effects of climate change in the study area, households made adjustments in their agricultural livelihoods. We however observe that despite the climate adaptation information received by households, that most of the adjustments that household make were short-term

(coping practices) aiming to sustain life rather than engage in longer term adjustments (adaptation practices) (Table 2). This could signify that their choice of adaptation practices could be constrained. The adjustments identified were also found to be gendered. There were significant difference between men and women’s coping and adaptation practices ( $X^2 = 62.10$ ,  $DF = 9$ ,  $P\text{-Value} = 0.00021$ ). In comparison to men, women were less able to make adjustments in their livelihood. The most commonly made adjustments were diversification of crop and livestock to increase agronomic and economic benefits and spread risk, seek financial and non-financial assistance from friends, relatives and institutions (NGOs, community-based organizations - CBOs) while the least reported were not doing anything in response to changes in climate change.

**Table 2: Percentage of respondents identifying coping and adaptation practice by gender (Husband Vs Spouse)**

<i>Coping and adaptation practice</i>	<i>Male (Husband)</i>	<i>Female (Spouse)</i>	<i>N</i>
Diversify crop and livestock to increase agronomic and economic benefits and spread risk	80	90	338
Seek financial and non-financial assistance from friends, relatives and institutions (NGOs, CBOs)	84	55	277
Reduce household spending on non-essential activities to ensure sustainable food supply	58	72	260
Spend cash savings primarily to purchase food or invest in agriculture	68	50	236
Seek informal/formal employment as source of income to purchase food	42	58	200
Sell assets such as livestock to purchase food or invest in agriculture or other type of livelihood strategy	77	26	205
Rent agricultural land to increase crop production	48	34	164
Harvest more wild products as a supplementary food source or source of cash for immediate usage to reinvest in agriculture	17	26	85
Seek new source of livelihood such as trading	17	7	47
Did/do nothing in particular	14	6	41

For the various coping and adaptation practices identified by both men and women, coping and or adaptation decisions were being made as sole decisions (exploitation) by husband or wife and or joint decisions (bargaining) by the husband and wife or with any other household member (Table 3). The analysis reveals that men or women may make decisions on certain adaptation practices and not others implying that the kinds of coping and or adaptation practices will also determine who makes decisions.

Sole decision making was the most predominant mode of decision making within the households across all the adaptation

practices (Table 3). Adaptation decisions were generated either individually or jointly through deliberations; however the final adaptation decision was undertaken individually without the consultation of other household members. The distribution of sole decision making was inclined to the husbands on most of identified adaptation practices (e.g. Diversify crop and livestock to increase agronomic and economic benefits and spread risk, seeking financial and non-financial assistance from friends, relatives and institutions (NGOs, CBOs), sell off assets such as livestock to purchase food or invest in agriculture or other type of livelihood strategy and spend cash savings primarily to purchase



food or invest in agriculture and the decision to do nothing) indicating their dominant role in household decision making as compared to the wives (e.g. Reduced household spending, harvest more wild forest products). Husbands generally attributed a greater proportion (5/10) of the coping and adaptation decisions to them and of those decisions that they didn't regard as being theirs solely; the majority of the decisions (3/5) were indicated as being taken jointly with their spouses.

Wives concurred that men make a larger proportion (6/10) of the household coping and adaptation decisions on their own. They claimed 2/10 of coping and adaptation decisions as being their sole domain. We observe that the decisions undertaken by wives solely are decisions that do not require or involve financial resource for their implementation signifying a greater role that access to credit plays in coping and adaptation to climate change.

**Table 3: Percentage of respondents identifying the husband, the wife, or joint decision-making as the main decision-maker by gender (Husband Vs Spouse)**

<i>Coping and adaptation decision</i>	<i>Percentage of respondents (%)</i>							
	<i>Male</i>				<i>Female</i>			
	<i>Husband</i>	<i>wife</i>	<i>Joint (husband and wife)</i>	<i>Joint with other household members</i>	<i>Husband</i>	<i>wife</i>	<i>Joint (husband and wife)</i>	<i>Joint with other household members</i>
Diversify crop and livestock to increase agronomic and economic benefits and spread risk	<b>42</b>	18	34	6	<b>40</b>	21	31	8
Seek financial and non-financial assistance from friends, relatives and institutions (NGOs, CBOs)	<b>70</b>	8	15	7	<b>40</b>	19	35	6
Reduce household spending on non-essential activities to ensure sustainable food supply	9	<b>61</b>	24	6	15	<b>53</b>	20	12
Spend cash savings primarily to purchase food or invest in agriculture	<b>66</b>	14	16	4	<b>56</b>	28	10	6
Seek informal/formal employment as source income to purchase food	33	28	<b>36</b>	3	31	22	<b>40</b>	7
Sell assets such as livestock to purchase food or invest in agriculture or other type of livelihood strategy	<b>74</b>	10	12	4	<b>65</b>	12	22	1
Rent agricultural land to increase crop production	28	18	<b>44</b>	10	36	20	<b>41</b>	3
Harvest more wild products as a supplementary food source or source of cash for immediate usage to reinvest in agriculture	6	<b>58</b>	24	12	8	<b>61</b>	13	18
Seek new source of livelihood such as trading	35	18	<b>45</b>	2	<b>39</b>	22	34	5
Did/do nothing in particular	<b>43</b>	16	30	11	<b>60</b>	12	24	4

Under joint decision making, adaptation ideas were initiated either individually or jointly (husband, spouse or with any other member of the household) and brought to table where they were discussed and a final joint adaptation decision made as a homogeneous unit after reaching consensus. In cases where no consensus was achieved, the decisions were either shelved or taken individually. Where joint decision making was reported as the dominant decision making mode (e.g. Seek informal/formal employment as source income to purchase food, rent agricultural land to increase crop production and seek new source of livelihood such as trading), slightly more husbands reported a greater proportion (3/3) of the coping and adaptation decisions undertaken jointly in comparison to with their spouses who reported a lesser proportion (2/3) (Table 3). The fact that less women report joint decision making could signify the predominance of men in

decision making. The involvement of wives/spouses in such decisions was attributed to the fact that women play a pivotal role in securing household food security. Joint decision making with any other members of the households was reported the least mode of decision making. There was relatively similar distribution for joint decision making with other household members between the husband and their spouses (Table 3). The other members of the households involved in decision making included the elder children and the other resident relatives such as the spouse's in laws. Joint decisions with other household members especially the elder children occurred when these were actively involved in agricultural work and therefore had a say on what needed to be done as this could affect their agricultural productivity roles. They were also involved in decision making based on the fact that they had attained

higher levels of education and considered more knowledgeable on climate adaptation.

The multinomial regression analyses revealed that gender was significantly associated with the decisions to diversify crop and livestock to increase agronomic and economic benefits and spread risk, seek financial and non-financial assistance from friends, relatives and institutions, reducing household spending on non-essential activities to ensure sustainable food supply, selling off assets such as livestock to purchase food or invest in agriculture or other type of livelihood strategy and harvesting more wild products as a supplementary food source or source of cash for immediate usage to reinvest in agriculture (Table 4).

The regression analyses for the decisions related to seeking informal/formal employment as source income to purchase food, renting agricultural land to increase crop production

and seeking new sources of livelihood such as trading were not significantly associated with gender (Table 4).

**Table 4: Differences in coping and adaptation decisions between genders (husbands vs. wives)**

<i>coping and adaptation decisions</i>	<i>Odd ratio</i>	<i>Wald <math>\chi^2</math></i>	<i>p&gt; z </i>
Diversify crop and livestock to increase agronomic and economic benefits and spread risk	3.07	7.65	0.0047*
Seek financial and non-financial assistance from friends, relatives and institutions (NGOs, CBOs)	0.36	9.76	0.0023*
Seek informal/formal employment as source of income to purchase food	1.69	1.32	0.3632
Reduce household spending on non-essential activities to ensure sustainable food supply	0.28	11.56	0.0004*
Spend cash savings primarily to purchase food or invest in agriculture	3.79	12.54	0.0005*
Sell assets such as livestock to purchase food or invest in agriculture or other type of livelihood strategy	0.39	10.64	0.0042*
Rent agricultural land to increase crop production	0.63	1.95	0.1656
Harvest more wild products as a supplementary food source or source of cash for immediate usage to reinvest in agriculture	3.73	6.39	0.0094*
Seek new source of livelihood such as trading	0.85	0.35	0.5668

**\*P<0.05**

To further understand the decision making process with households, the relationship between resources ownership and the decision making authority over the use (sell) of such resources for adaptation was explored (Table 5). Some of the resources that were used (sold) for adaptation included land, livestock and other household property such as furniture. The analysis revealed that husbands see themselves as owing the outright majority of the major household assets sold for adaptation (60%). Of all the resources/assets owned solely by the husbands, 67% of the decisions to sell were made by husbands solely indicating greater control in decision making.

Forty one percent of the decisions made to sell household assets that were considered to be solely owned (25%) by the wives were made in consultation with their husbands. This percentage is relatively higher compared to that reported by husbands (33%) for solely owned assets. For assets that were considered to be owned jointly by both the husband and wife (43%), husbands still take precedence in making the decision to sell (57%) signifying that even for jointly owned assets, men were likely to undertake greater proportion of the decisions regarding their disposal. While type of asset may matter for decision making, the analyses presented dwelt on ownership of the

asset used (sold) for adaptation and reveal that ownership of asset is associated with the mode of decision making.

**Table 5: Relationship between asset ownership and decision making by gender (husbands vs. wives)**

Mode of asset ownership	Decision making			
	Husband (%)	Spouse (%)	Joint (husband and spouse (%))	Joint with other household member (%)
Sole male (60%)	67	0	33	0
Sole female (25%)	8	47	41	4
Jointly (Husband and spouse) (43%)	57	5	38	0
Jointly with other household member (18%)	7	0	0	15

### 3.3 Primary barriers to adaptation decisions

The most commonly identified barriers that shaped adaptation decisions to climate change were inadequate financial resources to purchase food or to invest in agriculture through acquisition of improved crop/animal varieties and new technologies (65% Male; 54% Female), non-availability of farm labour and poor health that negatively affected agricultural productivity (42% Male; 52% Female) and limited access to climate adaptation information (34% Male; 54% Female). We find that more women identify farm labour and poor health and this could be due to the multiple gender roles they play within households. Least reported were poor farming technologies that negatively affect agricultural productivity (24% Male; 31% Female). Also reported was non-availability of agricultural inputs such as improved quality of seed and fertilizer (35% Male; 45% Female)

and land fragmentation due to the mountainous terrain and high population that reduces agricultural productivity (25% Male; 13% Female). Simple means comparison test revealed that there was a gender disparity in the barriers reported. While more men reported inadequate financial resources and land fragmentation, more women reported non-availability of farm labour and limited access to climate adaptation, poor farming technology and lack of agricultural inputs. Analysis from the logit regression shows the adaptation decisions of men and women are constrained by a different set of barriers (Tables 6 and 7). Inadequate financial resources and land fragmentation significantly influenced the adaptation decisions of men (Table 6) while inadequate financial resources, non-availability of farm labour and limited access to climate adaptation information significantly influenced the adaptation decisions of the women (Table7)



**Table 6: Determinants of adaptation to climate change (dependent variable is adaptation to climate change) among the Male**

<i>Explanatory variable</i>	<i>Odd ratio</i>	<i>Estimated coefficient</i>	<i>Standard error of coefficient</i>	<i>p&gt; z </i>
Inadequate financial resources	0.257273	-1.371456	0.495347	0.004***
Non availability of farm labour	1.002416	-0.002412	0.057020	0.868
Land fragmentation	2.905187	-1.076455	0.617020	0.003***
Non availability of agricultural inputs	0.561771	-0.584610	0.375162	0.113
Poor farming technologies	1.086823	-0.084012	0.355622	0.881
Limited access to climate adaptation information	0.976248	-0.011214	0.220766	0.542
Constant		0.41573	0.942382	0.496
Log likelihood	-88.10345			
Number of observations	331			
LR Chi Square	34.76			
Prob> Chi Square				0.0047***
Pseudo R <sup>2</sup>	0.1775			

\*\*\* P<0.01

**Table 7: Determinants of adaptation to climate change (dependent variable is adaptation to climate change) among the female**

<i>Explanatory variable</i>	<i>Odd ratio</i>	<i>Estimated coefficient t</i>	<i>Standard error of coefficient t</i>	<i>Female headed p&gt; z </i>
Inadequate financial resources	22.8558	-3.27162	1.48516	0.021**
Non availability of farm labour	0.36098	-1.08591	0.43969	0.050**
Land fragmentation	1.12114	-0.02091	0.19075	0.808
Non availability of agricultural inputs	0.38010	-0.96729	1.09236	0.376
Poor farming technologies	0.75676	-0.46218	0.24143	0.082
Limited access to climate adaptation information	0.08647	-2.53737	1.34058	0.055**
Constant		0.95768	2.35689	0.685
Log likelihood	-43.1576			
Number of observations	89			
LR Chi Square	17.13			
Prob> Chi Square				0.0543**

\*\*P<0.05

#### IV. DISCUSSION

In the midst of climate change, farmers have to adapt in new and innovative ways in order to sustain agricultural livelihoods. However, this is only possible if they have access to sources of climate information/advice that informs their adaptation decisions. The results suggest that most of the households got adaptation information from their own experimentation. This finding is in agreement with the observation that farming households learn most about new innovations from their own experimentation/indigenous knowledge to make adaptation decisions (Conley and Udry, 2001). However, in the context of climate change, farmers own experimentation may not be 'appropriate'. Appropriate climate information is critical for long term adaptation to climate change. Successful adaptation to climate change involves the development of adaptation plans that are based on real-time climate information that aid decision making. Farmers own experimentation may not provide this, thus end up with inappropriate adaptation practices or no practices at all. While climate data is needed to provide 'appropriate' information needed for climate smart adaptation decisions, this doesn't necessarily reduce the value of indigenous knowledge (Mbilinyi et al. 2005). Existing indigenous knowledge could be used to supplement the designing and implementation of climate smart adaptation practices especially in developing

countries like Uganda, where there are few climate projections due to lack of appropriate climate data.

The results also revealed that there is variation between men and women's access to sources of climatic information. This is in line with recent findings by Ragasa et al. (2013), who examined the gender differences in access to extension services and agricultural productivity in Ethiopia. They found that there are systematic and statistical gender differences in terms of access to different channels and types of extension services. Women in this study were more likely to access climate adaptation advice from visiting development or extension agents and or listening to radio than men, while men had a greater probability of accessing information or advice from attending community meetings and own experimentation. These findings reinforce the assertion that the access to different sources of climatic information is not homogeneous and it's gendered (McOmber et al. 2013). We argue therefore that in designing climate adaptation information dissemination packages and channels, men and women's differential access to communication channels or sources should be put into consideration in order to enhance their adaptive capacities; enabling them to make informed decisions as

they respond to the everyday manifestations of a variable climate

The results of this study also demonstrated that farming households made adjustments in their agricultural livelihoods in response to climate changes. It was however observed that most of the adjustments that household implemented were coping practices rather than adaptation practices. This result suggests that choice of farming household's adaptation practices is constrained. This could be related to the fact that most of the farmers used own experimentation as the source of climate adaptation information to guide adaptation decisions which lead to implementation of inappropriate and unsustainable adaptation practices. We find that the currently implemented adjustments are unsustainable and in the event that changes in climate continue, households may be more exposed and vulnerable to climate change impacts. The study also demonstrates that household coping and adaptation practices are gendered suggesting that adaptation adjustments in farming households occur within existing gender roles. Women focused on fewer strategies as compared to men. This finding is not surprising as women tend to be more constrained than men in making adjustments due to limited financial resources and labour requirements for making adjustments.

The results revealed that there are variations on who makes coping and adaptation decisions

within households. Coping and adaptation decisions within households were mostly often made by husbands. In instances where husbands were not solely responsible for the adaptation decisions, decisions were commonly jointly made by both the husband and the wife. Women seldom made coping and adaptation decisions on their own. There seems to be a link between adaptation decisions and gender roles. While both men and women made adjustments in their agricultural livelihoods in response to climate changes, non-climatic forces could also have significant implications for agricultural decision-making (Smith and Skinner, 2002). Adger et al. (2013) argues that climate adaptation decisions are not undertaken in a "stand-alone fashion" but rather within the prevailing societal norms and cultural practices. The dominance of the men in decision making within the Mt Elgon could be attributed to the strong cultural and social systems that describe the roles of men and women (Otiso, 2006). These roles reinforced by the clan system at household unit that ascribe more power to the men when it comes to decision making process (Khamalwa, 2004; Shero, 2014). In the face of adversity, men as heads of households are commonly expected to offer guidance and direction through making decisions for household adaptation. It is in this regard that women perform certain labor and household obligations as directed by the husband. This is in line with recent findings by Meijera et al. (2015) who found that in most

patriarchal societies, husbands more often control the allocation of their wives' labor and decision making with regard to household substance.

However, while decision making in the rural farming households of Mt Elgon could be attributed to the strong cultural and social systems existent in the region, it is important to note that other factors may influence agricultural decision making in the study area (Smith and Skinner, 2002). This study demonstrates that decision making is also dependent on the type of coping and adaptation practices to be implemented. There is a gendered variation in decision making with husbands and wives exercising decision making authority for different practices (Meijera et al. 2015). This study indicates that gender affects the decision-making roles within households when it comes to coping and adaptation practices. Husbands commonly made decisions on coping and adaptation practices that were associated with financial resources such as selling off assets for adaptation or seeking financial and non-financial assistance and spend cash savings primarily to purchase food or invest in agriculture. Surprisingly, husbands also took precedence in making decisions for crop and livestock diversification as it needed financial resources for its implementation. Wives made decision on reducing household spending on non-essential activities to ensure sustainable

food supply and harvesting more wild products as a supplementary food source. Such decisions did not require financial resources for their implementation; we observe that decision making occurs with the gendered roles of men and women.

Similarly most of the household assets used in the coping and adaptation processes were owned by the husbands. Husbands also took precedence in making decision to sell off the asset for adaptation even where wives solely owned the assets or where they were jointly owned by both the husband and wives. Empirical findings on the relationship between asset ownership and decision making in Malawi, Mali and Tanzania (Doss et al. 2014) indicate that women who do not own assets are less likely to have input into most household decisions. This signifies that if women own assets, then their involvement in decision making at household level improves. Interestingly, the opposite was observed in this study, we observe a lesser proportion of women involved in the decision making process on their own even when they owned the asset sold either as solely or jointly with spouse. This suggests that for women in male headed household, absolute or relative ownership status of an asset may not play a significant role in delineating household relations. Women were less likely to make decisions alone; their decision making processes were largely consultative in nature,

presumably reflecting the presence of a dominant spouse. We argue therefore that inclusion of women in coping and adaptation decisions may not be as a result of just owning an asset but could be influenced by other factors beyond just ownership.

The results of this study also revealed that household adaptation to climate change is constrained. The primary barriers faced by the households in the study area in response to climate change are more or less similar to those reported from other studies across Africa (Bryan et al. 2009; Washington 2004; Maddison, 2007; Dressa, 2009; Onyeneke and Madukwe, 2010; Juana et al. 2013, McOmber et al. 2013). Results suggest that there are differences between husbands and their wives in terms of barriers to climate adaptation. Husbands were more likely to lack adequate financial resources while their wives in addition to the inadequate financial resources were constrained by non-availability of labour and limited access to climate adaptation information. These findings suggest barriers to climate adaptation are gendered and may be related to the differential roles played by both men and women in ensuring household

sustenance. The study therefore argues that in promotion of climate smart adaptation practices, a better understanding of the constraints of women and men in different environments should be taken into consideration if the adaptive capacity of both men and women is to be enhanced.

The findings of this study contribute to the existing literature aimed at understanding the processes of climate change adaptation within rural farming households in Uganda (Hisali, Birungi and Buyinza 2011; Kansiime, 2012; Nabikolo et al. 2012, Ampaire et al. 2015; Jost et al. 2015). It further presents the linkages between coping and adaptation practices with gender roles in decision making that have not been clearly understood. As policy makers and development agencies in Uganda embarks on designing and implementation climate smart adaptation practices in bid to address the effects of climate change, the dynamics of gender dimensions in intra-household decision-making need to be recognized and taken into consideration if the adaptive capacity of both men and women is to be enhanced.



## V. CONCLUSION

This study unveils the gender differences in climate change adaptation decisions in rural farming households of the Mt. Elgon region, Eastern Uganda. It demonstrates that coping and adaptation decisions within households are undertaken either as sole or joint decisions. Sole decisions are made either by the husband or by the wife while joint decisions are made by the husband and wife together or with other household members. However, most coping and adaptation decisions were often made either by the husband or by both the husband and wife. Seldom were decisions made individually by the wife or jointly with other household members. These results suggest that men or women with a household may make decisions on certain adaptation practices and not others implying that the kinds of coping

and or adaptation practices will also determine who makes decisions. The study has also shown that husbands and wives are constrained by a different set of barriers to climate change adaptation with the same household. Women are more sensitive to barriers to climate adaptation than men. The results have important practical implications; in promotion of climate smart adaptation practices by government and development agencies, there is need to appreciate that decision making on coping and adaptation is gendered and may vary between communities if adaptation efforts are to be effective. Similarly households should not be treated as homogeneous units as members within are constrained differentially in attempt to adapt to climate change.

## CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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