Transformative Engagement Network (TEN)

Building resilience against hunger and climate change in smallholder farming communities through transformative engagement

Masters in Transformative Community Development

Title of Research Paper: Climate Variability: How it Affects Women's Adaptive Capacity on Food, Water and Energy needs

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I, Esther Stone Chirwa, certify that the research paper is my own work and I have not obtained a Degree in this University or elsewhere on the basis of this Research.

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ABSTRACT

Food, water and energy are critical necessities which drive the daily livelihoods of a household. These are basic needs that keep every household running to sustain life. Availability of food, water and energy is linked to the environment. Climate variability is affecting sustenance of these vital resources. Women are responsible for sourcing and utilization of food, water and energy in the home due to defined gender roles, yet they have no control over decision making due to power imbalances between males and females.

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Effects of climate variability are diminishing required amounts of food, water and energy, thereby inflicting pressure on women as additional gender roles emerge. There is linkage between food, water and energy since households depend on cooked food. Water and energy are vital resources that support food preparation.

This study was conducted in Bolero, Rumphi district, focusing on assessing the stretching adaptive capacity of women to effects of climate variability on food, water and energy needs. Mixed data collection methods were used to collect data from 111 respondents. Data was analyzed using content analysis, to identify themes and discourses on food, water and energy needs. The survey has established that women have continuously ensured provision and governance of these resources in their households. It has also established that households rely on maize for food, which may affect their coping capabilities. Furthermore, increasing water and energy needs with no alternatives to firewood will affect food consumption at household level. The results emphasize the need to change people's attitudes about food and advocating environmental friendly technologies that would reduce women's workload to meet food,

water and energy needs. Improving women's access to resources and promoting equality will enhance their adaptive capacity to effects of climate variability.

Key words: Climate variability, adaptive capacity, women, food, water, energy, technologies, attitudes.

1.0 INTRODUCTION

1.1 Background

Livelihoods of communities in low income countries are being affected by climate viability related adversities (Twomlow et al., 2008; Lalthapersad-Pillay, 2010). The most vulnerable is the population dependent on natural resources for livelihood (Cooper et al., 2008). In Malawi, approximately 90% of the population is dependent on natural resources and rain-fed agriculture for subsistence livelihoods (Stringer et al., 2009; Chinsinga et al., 2012). Women who constitute 52% of the population suffer from impacts of climate variability most. The social position of women in families and communities often exposes them to climate variability impacts on food, water and energy needs (Alexander & Nabalamba 2011).

A woman's daily life in the household revolves around food sourcing and preparation, collecting water, and firewood (Chikaire et al., 2011). Women have become more vulnerable to impacts of climate variability than men because at times they have failed to cope effectively due to their social position perpetrated by cultural norms (Singh et al., 2010).

Women's vulnerability is exacerbated by multiple responsibilities of growing food crops and household chores (Jerneck & Olsson, 2013). Culture has gendered some crops and livestock causing more strain on food availability (Carr & Thompson, 2014).

Drought, resulting from adverse weather patterns is affecting water availability in most African countries, including Malawi (Lalthapersad-Pillay, 2010). Lack of water brings multiple constraints in the home.

Energy sources are getting scarce because of increased deforestation and technological challenges to provide alternative sources of energy. Firewood and charcoal contributes 90% of Malawi's total energy demand, mainly for cooking and warming, (Gamula et al., 2012; Malakini et al., 2013). Malawian society

depends on cooked food and fuel wood is a major resource for cooking. This means that water, energy and flour result into food on the table. Therefore, if one of the three is missing, it translates into a crisis for the woman who is deemed to have failed her duties.

Studies have shown a strong relationship between climate variability, gender, food, water and energy. Climate variability affects factors most essential to food, water and energy acquisition at household level (Alexander & Nabalamba, 2011). Hence exploring women's experiences on climate variability will assist to understand their adaptive capacity to fulfill food, water and energy needs in the home.

1.2 Problem Statement

In Malawi, women and girls do most of the household and farm work. This has been socially constructed by tradition and culture. Surprisingly, women exhibit resilience to climate variability. There is limited knowledge and understanding on how women keep households running all the time, even when they are struggling with other stressors to livelihood. Contemporary research on women and climate change, (Okayo et al., 2013) in Kenya, has often centered on workload assessment in terms of volume of work and distances to water and firewood sources. Hence, not much attention has been paid to understanding women's experiences amidst numerous domestic chores.

This study will contribute to understanding gender dimensions of climate variability, especially, how women cope to food, water and energy scarcity beyond issues of distance and time.

1.3 Significance

The outcome of this work will help to identify critical areas in gender groups that require support for further programming.

Findings from this study will contribute to transforming decision-makers in conceptualizing policies relating to adaptive capacity of women to effects of climate variability on food, water and energy needs. Consequently, the outcome of this research will support development of gender responsive interventions in climate variability adaptation.

1.4 Aim

To investigate the stretching adaptive capacity of women to effects of climate variability on food, water and energy availability in Bolero

1.5 Specific objectives

- To examine effects of climate variability on household food, water and energy needs.
- To assess how women cope with household needs for food, water and energy.
- To examine how shortage of food, water and energy complicates coping ability of women

1.5 Research questions

2 What intra-household challenges do women face because of food, water and energy scarcity in Bolero?

3 How do women cope with household needs for food, water and energy?

2.0 LITERATURE REVIEW

2.1 Introduction

Climate variability is affecting livelihoods of most communities in Malawi, since the country depends on natural resources for food, water and energy (Kaczan et al., 2013). More than 90% people in Malawi are predominantly engaged in subsistence rain-fed agriculture, which is highly vulnerable to climate variability impacts (Asfaw, et al., 2013; Maganga et al., 2013). Erratic rainfall and temperature changes are a common occurrence, contributing to low crop yields, especially food crops. Communities can no longer predict rains, at the same time the rainy season brings in multiple problems such as flooding or drought which affect food production and water availability (Chinsinga et al., 2012).

Climate variability adversities affect women farmers more than men because of their social roles in society (Carr & Thompson, 2014). Women bear the primary responsibility for growing and processing food, fetching water and firewood everyday (Ongoro & Ogara, 2011).

Social factors influence adaptation, such that power differentials restrain relationships in households and communities (Matunhu, 2011). Although women are mostly involved in ensuring food, water and energy needs, they are reliant on men, who mostly own and control resources in the home. Feminist theories focus on existing power relations between men and women, where social institutions have supported

male dominance over women (Gardiner, 2004; Bee, 2013; Watkins, 2015). Gender equality will support transformative community development. Overcoming gender inequalities will enhance women's access to resources and decision-making in the context of climate variability amidst prevailing disparities. Gardiner (2004) explains that women's conditions can be improved once causes and results of gendered inequality are explored.

There is inequality in decision making, e.g. crops to be grown and when to plant. Carr and Thompson, (2014) argue that in the context of adaptation to climate variability, decisions about crops to be grown and time of planting are critical factors that shape agricultural outcomes. This may imply that the difference in priority needs for men and women facilitate adaptation.

Social, political, economical, technological and institutional factors enhance adaptive capacity to climate variability, (Vincent, 2006). This confirms that power relations, enabling policies, household income levels, skills and knowledge facilitate good adaptation. This is complemented by existing opportunities and support from development agencies working in communities. Therefore, assessment of existing norms on food, energy efficient technologies and food management skills is essential to sustain food, water and energy needs at household level.

In assessing effects of climate variability on food, water and energy needs, it is important to understand underlying factors (Burke & Lobell, 2010; Carr & Thompson, 2014), such as, availability, access and utilization of food and daily household water and energy requirements. Such assessments at household level are still inadequate.

Phiri et al. (2012) conducted a study in Chikhwawa district on how farmers adapt to drought and floods. The study found out that gender of a household head significantly and positively influences farmers' choice over the type of seed to grow. Households practiced various adaptation strategies to reduce effects

of drought. Findings indicated that men could decide to use improved hybrid varieties since they could afford to buy the seed, while women could not. This study also revealed that land holding size and income increase the prospect of coping. There is need to find out how farmers can improve food production amidst such extreme climatic factors. Examining women's contributions to effective decision making will facilitate proper coping.

According to the Malawi Vulnerability Assessment Committee report, (MVAC), Malawi Government declared Rumphi district as one of the districts affected by hunger for two consecutive seasons, 2013/14 and 2014/2015. This was attributed to low production due to climate related hazards, (MVAC report, 2014/2015). This calls for farmers to identify feasible coping mechanisms besides crop production.

In their separate studies, Mwase et al. (2006) and Phiri, et al.(2012) have attested to the understanding that crop diversification, focusing on early maturing varieties, is used as an insurance against drought and floods. However, there is need to find out why there are still challenges to effective coping.

Water is a critical resource in the home. Climate variability has affected water sources, rendering water a scarce resource. In rural communities, water is not placed in the house, but communal water sources. This requires someone to fetch it, in most cases, women and girls. Asaba et al., (2013) conducted a study on assessing other conditions that affect water fetching in Uganda. This research divulged that women make more trips to fetch water and spend more time queuing and waiting for water, observing that this process affects physical/ emotional health well being of women, including risks of assault. It further highlighted how community has socially constructed roles for males and females in Uganda, as, "it is deemed shameful, demeaning, 'unmanly' and unusual for a man to collect water, especially on a daily basis" (Asaba, et al., 2013). The research highlighted the need for exploring social aspects of meeting household water needs.

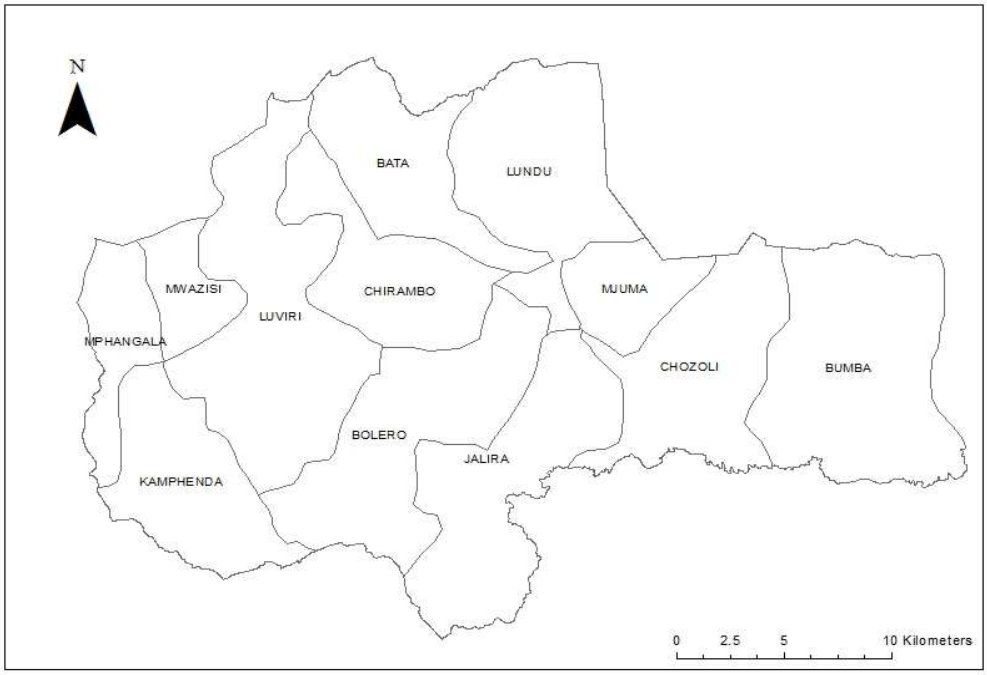
Energy is a critical resource to food preparation. Firewood is the common form of energy used in rural communities, with cooking mostly done on a three-stone open fire. Malakini and Maganga, (2011) conducted a study comparing performance, cooking time and firewood usage of three-stone fireplace, Rocket and *Chitetezo* cooking stove technologies in Lilongwe. This survey focused on analyzing amount of wood used to cook one kilogram of food. Rocket stoves proved to be more efficient on cooking time than open-fire and C*hitetezo*. A major constraint for exploration is technology transfer and uptake since Rocket stoves are not common in most communities.

3.0 METHODOLOGY

3.1 Study area

Study areas were Bolero and Jandang'ombe Village Development Committees (VDC) in Bolero Extension Planning Area (EPA), Rumphi district. Bolero has a population of 58,550 with an average of 5 persons per household. Rainfall ranges from an average of 500mm to 760mm per annum. Average land holding size is 2.7ha. Bolero VDC has 678 households (213 Female Headed (FHH) and 465 Male Headed Households (MHH)) whilst Jandang'ombe has 396 households (134 FHH, 262 MHH). Bolero is a predominantly Tumbuka society, with patriarchal values where men have greater control and authority over resources than women. The area was chosen because it covers both rural and peri-urban areas which provided a picture of how the two types of communities cope.

Figure 1: Bolero EPA Map



Source: Quantitative household survey report. 2014

3.2 **Sampling**

Purposive sampling was used in conducting group interviews in order to have a greater number of women than men. A total of 5 groups of about 5-22 people were targeted. About 94.8% respondents were women and 5.2 % men. More women were targeted than men because they are mostly engaged in food preparation and household chores in the home. Also that including more men than women would have led to an overload of male perceptions on the issue under study.

Key informants were randomly selected, targeting people who have lived in Bolero longer and extension workers from various organizations.

3.3 Data collection

Qualitative data was collected using different data collection tools. Group interviews, key informant interviews, desk reviews,community consultation workshops and direct observation.

3.3.1 Desk Review

Review of EPA reports, latest journal articles and internet resource generated an overview picture of food, water and energy situation.

3.3.2 Community consultation workshops

A community dialogue workshop to find out how food shortage affects families was conducted. A total of 45 people (30 men & 15 women) attended. Participants included Lead Farmers, VDC and ADC members, government extension workers, chiefs and members of the Area Stakeholder Panel. Information obtained contributed to development of interview guides for group discussions and Key Informant Interviews (KII).

3.3.4 Key informant interviews

Key informant interviews were conducted with traditional leaders, lead farmers, elderly people, and Government and Non-Governmental Organizations (NGO) extension staff using a structured interview guide. These are people who have lived in Bolero for some time and have observed and experienced climate variability in the area. Responses were made to 15 out of 20 questionnaires.

3.3.5 Group interviews

Group discussions were conducted with 5 groups, 4 women only groups from existing groups, e.g. Village Savings and Loans group (VS&L) and one mixed group from the same village. About 96 people, (92 Female, 4 male) participated. Groups comprised of married women and female headed households with varying age ranges, marital status and educational backgrounds.

Participants were informed about interview consent forms and demographic information questionnaires, which they completed prior to discussions. The facilitator administered a pre-tested interview guide. Data was recorded in a notebook as well as transcripts using an Android gadget.

3.6 Ethical Consideration

An informed consent form outlining purpose and procedure of the survey was prepared and translated into Tumbuka. This was explained and presented to participants prior to discussions, clarifying confidentiality, the right to participate, anonymity and how the information will be used. Participants who could read were given to read. Participants signed the consent form, which was co-signed by a representative from Bolero EPA Office.

Picture 1. A woman reading the consent form to others

3.7 Data analysis

The survey mainly captured qualitative data which was analyzed through content analysis using inductive approach (Burnard, et al. 2008). Transcribed text from group discussions was coded and put into a matrix (MS Excel) to identify emerging common themes and discourses in relation to research objectives. Responses were triangulated to identify dominant features and sequence in order to understand context and interpret meaning in relation to research objectives. (Teddlie & Tashakkori, 2009; Silverman, 2011). Demographic data was analyzed using SPSS package to generate descriptive statistics.

Quotes from participants were captured and presented to understand context. However, actual names were not used. Results were validated by government staff and key informants.

3.8 LIMITATIONS OF THE STUDY

More women were targeted than men, which limited more male perceptions on the issue.

4.0 RESULTS

4.1. Effects of climate variability on household food

4.1.1 Production and environmental changes

About 95.8% of group discussion respondents rely on farming, signifying that rain-fed farm produce is the major source of food. Crops grown include; maize, groundnuts, soya beans, sweet potatoes, cassava and millet. Maize is regarded as staple food and grown by every household. This is because of preference over *nsima*[1] made from maize flour. *"Maize is our main food, when we have no maize it means we have no food. We don't feel that we have eaten if we have not eaten nsima from maize. Although we have other foods, to us nsima is food. We depend on rain to grow maize." Woman, 45 yrs, Community Savings Investment Program (COMSIP) group.*

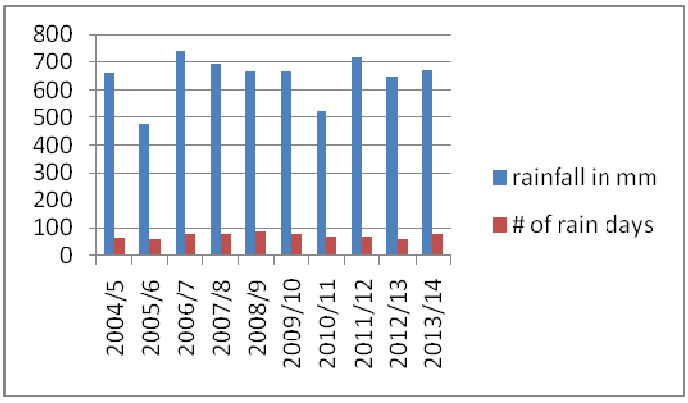


Fig 2. Bolero rainfall data for 10 years – Source Bolero EPA

[1] A thick porridge (pap) made from maize, sorghum, cassava and millet flour. Consumed with any type of relish

Picture 2. Drought affected maize crop

Farm produce does not meet annual household food needs. Food crop production has been affected by climate variability, through delayed and early cessation of rains, dry spells, drought and floods. Soils are degraded and crops require sufficient nutrients to yield better results, yet farmers, especially women cannot meet fertilizer requirements due to high costs.

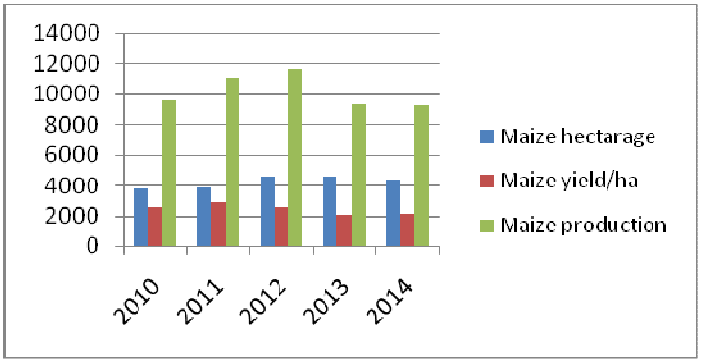


Fig 3. Average maize yields in Bolero over five years - source- Bolero EPA

High temperatures have affected growth of some crops and fruits. Crops that grew well in particular temperatures fail to do well when conditions for growth have changed. Changing temperatures have

negatively affected fruit production, especially mangoes, which previously were flowering in June and ripening around November till January. Bolero used to have a lot of mangoes, which were used for coping when food was not available. This has changed as some mango trees are bearing less fruits.

Changes in weather pattern have brought a strain on food preservation. Persistent rains are making it difficult to preserve vegetables due to lack of sunshine. "*We never lacked relish, we kept adequate stocks of vegetables and beans, but nowadays we rely on buying*". *Lead farmer, 40yrs, Community Facilitators (COFA) group.*

Early cessation of rains has affected planting of the second bean crop. This has seen a reduction in bean production, thereby affecting household food needs and income.

" In the old times we were not much affected by hunger because when we planted in October, beans and pumpkins would be ready by February. This supported our food needs during critical periods." woman, KII, 55 years.

4.1.2 Availability and Access

Although adequate food at household level might be a challenge, food is available through various outlets. These include; Agricultural Development and Marketing corporation (ADMARC) markets produce markets and neighboring communities, such as Hewe which is 43kms away. Cassava, sweet potatoes, beans, groundnuts, fruits and vegetables are accessed from the produce market.

4.1.3 Variety

Food security is not only about yields but variety. Bolero has a diverse and rich definition for food. Besides maize, people grow other food crops, fruits and keeping livestock. Apart from farm grown food, people have been dependent on forests for mushrooms and wild fruits (*matwatwa* and *mbula)*. Forests were also a source of animal protein such as caterpillars (*vilungulungu* and *mapala*), hares and antelopes. Deforestation has depleted natural forests which produced wild fruits and habitat for mushroom growth and shelter for game. These delicacies are no longer found anywhere closer in Bolero.

"There were a lot of mushrooms around this place which supported relish needs. Wild fruits were plenty and children did not bother their mothers about food. Since natural forests have been cleared, we no longer get mushrooms or any wild fruit and some caterpillars and locust delicacies which we used to enjoy, have become extinct". KII with Chief.

Small tomatoes (*mapuno*), often grown on anthills and could withstand dry season, are scarce. This variety of tomatoes was much preferred when preparing traditional vegetables like *mnkhwani* (pumpkin leaves) and *bwenkha (*okra) because the vegetables tasted good. Nowadays although these tomatoes are grown, they cannot withstand the extremely hot dry season.

4.1.4 Nutrition and utilization

Food security is not only about availability of food, but nutrition inclusive. Nutrition for people of Bolero was already defined as starches, fruits, pulses, meat products and vegetables. All this is essential for healthy living. Therefore, both quantity and quality are important to fulfill food needs for a household in

terms of nutritive values. This is why women endeavor to source different types of foods which they prepare in different ways, e.g. vegetables are seasoned with groundnuts flour, *nkhowe* (samp[2]) is mixed with beans, pigeon peas or groundnuts flour. These are local recipes which are not only prepared to fulfill daily food needs but also to provide nutrition requirements.

4.1.5 Taste and preference

Food is appreciated for its aroma and taste, which makes it appetizing. This is complemented by the effort and skill invested during preparation. Elderly respondents explained that the type of food being eaten has changed. Local foods are hard to find and have been replaced by exotic varieties, mostly hybrids, which do not have the desired taste. Local maize was appreciated for its flavor and taste as well as its *poundability* and ability to withstand weevils. Women indicated that flour made from local maize lasts longer than flour from hybrid maize which uses more for a single meal. However, local maize no longer yields much because it takes long to mature, yet rains stop early.

Households prefer *nsima* from polished maize flour than *mgaiwa* (whole meal) flour. Processing maize into polished flour is an additional task for women and a must learn skill for every woman since husbands prefer *nsima* made from polished maize flour than *mgaiwa*. Women who use *mgaiwa* for *nsima* are deemed to be lazy and that nsima from *mgaiwa* demands good relish like meat and fish.

Indigenous vegetables such as *luni, bwenkha* and *molozi* were appreciated for taste and convenience since they were readily available in gardens or forests. Indigenous vegetables cannot easily be found nowadays and some are becoming extinct. As a result, households depend on exotic vegetables which are not palatable.

[2] Pounded maize grains with husks removed, cooked like rice

4.2. Effects of climate variability on water needs

4.2.1 Source

Taps are main sources of household water, provided under the Nkhamanga rural piped water project. Tap water is available in almost every village around Bolero. The project has brought potable water closer to people, unlike in the past when people were drawing water from rivers. Lunyina River, which is perennial, is the source of water for the project.

Boreholes are complimenting taps, especially when taps run dry. There are six boreholes around Bolero peri-urban centre, three of which are for institutions. Jandang'ombe has two boreholes. Luviri and Lunyina rivers are also used to fetch water for domestic chores and irrigation farming. Lunyina River is the main activity area for irrigation farming and laundry.

4.2.2 Availability

Luviri River runs during rainy season and dries up by August. Availability of vegetation (reeds and trees) along the upper part of the river conserves water even during dry season. However, the lower part, which is closer to Bolero and Jandang'ombe VDCs has been clogged up with sand through siltation; hence dries up quickly.

Taps and boreholes are unreliable. Taps run dry most of the time due to low pressure at the source. In such cases households rely on boreholes, however, queuing for water is the older of the day. This results in women and girls spending more time or walking long distances to fetch water.

Intermittent water supply affects women and girls more than males due to critical sanitary needs for females. Households with babies or under five children are also affected since they need water for nappies and maintaining sanitation and hygiene needs**.** "*Queuing up for water makes us to draw water for cooking only; as we cannot draw enough water for washing or bathing. We take our laundry to Lunyina river, 3Kms away", woman 35 years Jandang'ombe.*

4.3 Effects of climate change on energy

Firewood is the major source of energy for cooking and warming, using the three-stone open fire. Almost 100% of the people use firewood. Climate variability has led to prolonged cold seasons with temperatures getting lower. This has resulted in increased demand for firewood and charcoal for warming, thereby increasing deforestation.

4.4 How women cope with household needs for food, water and energy

4.4.0 Coping with food needs

4.4.1 Purchasing

Households that have run out of food rely on buying. Food is sourced from ADMARC markets, produce markets and neighboring communities. Maize, beans, rice and groundnuts are bought from ADMARC, while cassava and sweet potatoes are available at produce markets. *"When we have no food we buy from*

others within the village and other places like Hewe, where in most cases the harvest is good because there are forests still standing", *woman, 44 years COFA.*

4.4.2 Use of alternative foods

When there is no maize, households eat other foods, especially during lean periods, January to March. During this time, households eat *nsima* from cassava flour (*kondowole*) or millet flour (*gajuwelu*), cooked cassava, sweet potatoes and green bananas. Occasionally, they eat pumpkins, samp. These food crops are available in Bolero. *"During lean months, we take nsima from mgaiwa instead of the most preferred polished maize flour. When we cannot find maize we eat kondowole)," woman, 36 years, VS&L group.*

4.4.3 Reducing number of meals per day

The normal meal pattern is three meals a day (breakfast, lunch and supper). This is mainly observed during times of plenty and snacks such as groundnuts and fruits are consumed in between. There is dietary variation of meals from three meals to two during severe food scarcity. Women assume the task of ensuring that the little food available should last more days, hence rationing. In such situations, some households take porridge for lunch and save *nsima* for supper. Some households just afford a single meal in a day, especially supper.

4.4.4 Reducing meal sizes

Women become very economical in food preparation to avoid wasting. The common practice of *chimbala (*left overs) is no longer done since meals just serve to accomplish the need to at least have something to eat than satisfying an individual's hunger at that time.

4.4.5 Producing extra food

Where water is available, women have established gardens in homesteads or along rivers, growing vegetables to meet daily household needs for relish. Households closer to perennial Lunyina River do much irrigation farming, growing maize to complement the harvest from rain-fed crop.

4.4.6 Generating income to purchase food

People engage in casual labor *(Ganyu*), which involves working in other people's gardens for money, or food. Women are the ones who mostly engage in *ganyu* since they have to make sure they provide food for children in the home. However, the amount of work done through *Ganyu* is bigger than the remuneration. This demonstrates that *Ganyu* workers get tired and cannot be effective in their own gardens.

4.4.7 Planting quick maturing varieties and growing drought resistant crops

Farmers plant early maturing crops, especially hybrid seed and groundnuts. Local varieties are not preferred because they take long to mature. Farmers grow sweet potatoes and cassava since these crops

Picture 3. A lead farmer showing *mbeya* manure to group members

can withstand drought conditions. However, it was observed that a smaller number of households grow cassava and sweet potatoes.

Farmers, mostly women use manure to improve soil fertility to improve maize yields. Manure supports soil moisture retention. Women appreciate the importance of manure and are able to make nutrient rich manure since they were trained

4.5 Constraints on coping with food needs

4.5.1 Perceptions and preference

Perceptions about food are rendering households vulnerable to food needs. Households over rely on maize for food, regardless of other foods available in the area. The mindset of depending on maize only is affecting households in fulfilling their food needs. Households prefer polished maize flour to *mgaiwa*. This contributes to food wastage since husks (*gaga*) are separated and thrown away or used as livestock feed. Even though *mgaiwa* is highly nutritious, households use it mainly for porridge. *Mgaiwa* nsima is used when households have limited maize supplies. Use of polished maize flour compromises nutrition intake.

4.5.2 Scarcity of productive land

Land is a limiting factor for farmers to grow more food crops. The average land holding size is 2.7 hectares. The patrilineal society has defined men as land owners, who inherit land from their fathers and pass it on to sons. This deprives women land ownership and control rights. Although women have lobbied for land, what they get is not enough to meet their food needs. Women are given marginal areas which are prone to flooding. In such situations, renting land becomes an alternative. However, high costs for land rentals are prohibitive to women.

4.5.3 Non utilization of livestock for food needs

Households diversify crops and livestock to meet their food needs. Food availability becomes a challenge when women look at the various enterprises with an economic view. Women rear small livestock such as goats, pigs, poultry or rabbits. Instead of using livestock for food in the home, the economic benefit surpasses food and nutrition needs. Families would not allow slaughtering pigs or goats for home use, but income generation.

4.5.6 Rationing maize sales

Considering that Bolero is one of the areas that have continuously been affected by food shortage, there have been times when maize in ADMARC markets was being rationed to meet demand. This was evident especially during 2013/2014 growing season. An individual was allowed to buy only 10kgs yet the amount could not suffice an average household of 5 people in a week. This meant households making repeated visits to ADMARC markets, thereby spending more time instead of working in their gardens.

When demand for maize surpasses supply, prices go up. Purchasing food becomes a problem when households do not have sufficient disposable income.

4.5.7 Instability in the homes

Some men desert their homes when there is no food, leaving the wife and children. This leaves the responsibility of fetching food to women. "*Men desert us for women, with smaller families. They buy food and eat in such homes leaving us starving with children", woman 40years, Jandang'ombe.* Here, women highlighted the issue of smaller families being better than large families which are difficult to sustain in times of food scarcity.

4.6 Coping with water needs

4.6.1 Using water sparingly

Scarcity of water increases time spent on fetching water. Tap or borehole water is sparingly used for cooking, drinking and washing dishes. Laundry and bathing is done at Lunyina River. Due to water constraints, laundry and baths are done occasionally, although the need might be high. This compromises hygiene and sanitation requirements.

Water is reused to support other needs in the home, for example, water used to wash hands or plates is re-used to water vegetables grown at the homestead.

4.7 Constraints on coping with water needs

4.7.1 Lack of income to pay for piped water

Households pay for piped water. Disconnection of water due to high water bills is affecting constant supply of potable water. Households resort to boreholes or rivers in such situations. They pay a modest user fee at boreholes.

4.7.2. Congestion at boreholes

A borehole serves more people and boreholes do not yield much water, resulting into congestion. Women wait in long queues to draw water, which is rationed, allowing an individual to draw only one bucket a time. Women wake up as early as 2.00 a.m. to queue for water. In trying to meet household water needs women make several trips each day and fetch considerable amounts.

4.7.3 Gender based violence in households

Drawing water during odd hours has resulted into conflicts in the home. Husbands complain and become suspicious of their wives drawing water during odd hours. This has resulted into fights in some homes. *"Waking up early in the morning, leaving our husbands in bed brings conflicts in the home since they get suspicious. Some men have married second wives because they complain that we leave them in bed, hence not fulfilling the conjugal rights", Woman 42 years, Jandang'ombe.*

4.8 Coping with energy needs

4.8.1 Using firewood

Firewood is the major form of energy for cooking and warming for almost all households. Forests around Bolero have been depleted, resulting in walking long distances of 5 to 10 Kilometers to source firewood. Those that cannot manage the long distance buy bundles of 10 x 1 meter long or oxcart loads which are sold around the villages and trading centers.

Women also use *Faldebia albida* (*msangu)* trees that grow in their gardens and regenerating shrubs to source firewood. Households have planted agro-forestry trees in gardens and along farm boundaries to generate strategic firewood needs. As trees grow, pruned branches are used for firewood. Total Land Care (TLC) is promoting regeneration of natural trees and use of efficient energy saving stoves.

Women complement cooking fuel energy needs through use of crop residues such as tobacco and maize stalks.

4.8.2 Using charcoal

Charcoal is also used for cooking and warming and is produced at *Kapyolambavi* forest, 5-10 kilometers away, which makes it cost more. It is packed in various containers, the common one being a 20kg bag which costs K1500.00[3]. Households buy to complement firewood.

4.8.3 Use of mud stoves

[3] K450.00 equivalent to US$1

Total Land Care has introduced efficient energy saving mud stoves and a few women have adopted the technology. These stoves use less firewood as compared to open fire cooking, hence sequestrate less carbon. Rocket stoves, which use much less firewood, have been introduced to replace ordinary mud stoves. Women appreciate use of stoves indicating that stoves are used for warming during winter, cook faster and conserve heat which keeps the food warm. Stove making is being integrated with tree planting to support firewood needs for the households.

Picture 4. A group member making *chitetezo* stoves

Picture 5. Briquettes and energy saving stoves made by a women's group in Bolero

4.8.4 Use of Briquettes

Briquettes have just been introduced in Bolero. Life Concern (LICO) organization trained a group of women, who are making briquettes and sell in Rumphi, 30 Km away. Briquette making uses biomass and used paper or card boxes. Sensitization is continuing since the technology is still new. The group is also making *chitetezo* mbaula (energy saving mud stoves), compatible with briquettes.

4.9 Constraints on coping with energy needs

4.9.1 Firewood scarcity

Increasing demand for firewood, opening gardens, brick curing and general population increase have accelerated deforestation. Wanton tree cutting leaves bare grounds, making it very cold during winter, thus, need for more firewood for warming. Women walk long distances to fetch firewood and head load it. This increases the workload as more time is spent fetching firewood instead of other productive work. *"Firewood is a big problem. We walk about 5- 10KM to fetch firewood, spending close to 6 hours. Dry wood is not readily found and we cut growing trees to dry at home. Unfortunately most of us cannot manage the distance; therefore we have to buy firewood, which demands one to have money every time". Woman, 39 years Coalition of Women Living with AIDS (COWLA).*

4.9.2 Lack of income

Those who cannot manage to go to the forest have to buy firewood or charcoal. A bundle of about 10, one meter long pieces of wood costs K100.00, an oxcart load costs K4, 000.00 while a bag of charcoal costs K1500.00. It is difficult for women to have income always to meet the daily energy needs.

Women are adapting to cooking styles in line with available fuel wood, e.g. twigs, maize or tobacco stalks, wood shavings, husks and other biomass. In order to save firewood young mothers resort to giving children junk food (*kamba*), instead of nutritious porridge. Malnourishment in children may result into malnutrition disorders.

4.9.3 Inadequate energy saving alternatives

There are limited alternatives to fuel wood energy sources. Knowledge and use of energy saving technologies such as *chitetezo* cooking stove and briquettes is still low, while biogases are nonexistent.

5.0 DISCUSSION AND CONCLUSION

5.1 Discussion

5.1.1 Knowledge and coping with climate variability

Climate variability is evident, with rainfall season characterized by early onset and cessation of rains. The rainfall season runs from December to March, with a lot of fluctuations, ranging from erratic, persistent and uneven distribution complemented by disasters such as floods, dry spells and drought, (Chinsinga, et al., 2012). Such rainfall variations affect food production since extreme weather patterns destroy crops (Maganga et al., 2013).

Farmers have knowledge of climate variability and its devastating effects on food and water needs regardless of age, marital status and literacy level. Respondents, 74% of which had completed primary school level were able to articulate climate variability experiences which they related to climate change. Farmers have adopted climate smart technologies as a way of overcoming climate variability challenges. Women have managed to cope against climate variability and kept their households running through food crop diversification and planting drought tolerant or early maturing varieties (Cooper et al., 2008;

Gebreselassie et al., 2013; Mwase et al., 2014). However, dependency on maize crop for food is constraining their efforts.

Manure is used in recognition of depleted soil fertility to improve soil texture and boost maize production. Women are able to make manure fertilizer known as *mbeya* manure, using livestock droppings, biomass and some fertilizer. This is beneficial, considering the escalating fertilizer costs.

Communities have demonstrated coping with climate variability constraints on their daily food, water and energy needs. Coping with food needs encompasses managing food production, financial capacity to access food and effective utilization of available food. Women have shown capability to manage all this and are championing processes to sustain food, water and energy needs. Village Savings and Loans (VS&L) approach is an economic empowerment tool which is supporting women to meet daily food, water and energy needs. Women dominate VS&L groups, saving and borrowing money to support their household needs. Such economic empowerment enhances coping and reduces dependency on men, thereby overcoming power imbalances.

Ganyu is the main means of coping for households to generate money to buy food, (Mwase et al., 2014). In Bolero, it is women who spend more time on *Ganyu* and often use the money on food and other household needs. Although men do *Ganyu*, money generated is not mostly used on household needs, but personal desires. Reliance on *Ganyu* creates a vicious circle for households, who become perpetually hungry and poor.

5.1.2 Sustenance of the staple food

Maize is grown on a bigger hectarge than other food crops since it is a staple food (Katengeza, et al., 2012; Kaczan et al., 2013). Climate related hazards mean low food production and maize becomes scarce. This scarcity is manifested at household level exerting pressure on families to cope. Therefore,

climate variability is directly linked to household food shortage, particularly maize. Although people have other foods, they feel vulnerable to hunger without maize. Preference for local maize increases food shortage (Katengeza, et al., 2012), since local maize produces low yields, which are worsening amidst climate variability challenges.

Processing food is an additional job for women. Processing maize into flour is rigorous, while processing white flour is more complicated, demanding more time and vigor.

Overreliance on maize complicates effective copping to impacts of climate variability. Prices of maize fluctuate due to critical challenges of demand and supply, making the commodity inaccessible to the average farmer. People should change their perception about food in the event of climate variability than relying on maize alone.

5.1.3 Competing elements

There is competition between rearing livestock and growing food crops. Households fail to grow crops such as cassava and sweet potatoes for fear of destruction by livestock. This challenge also affects home gardening. However, demand for manure is increasing. Pig and poultry manure are best for making *mbeya* manure. In such situations, households prefer keeping livestock over growing food crops.

5.1.4 Food and Energy requirements

Most foods that constitute a meal cannot be consumed without cooking and firewood is a key element to accomplish cooking. Type and size of firewood used has a bearing on the quality and quantity of food

cooked; including time spent cooking (Makungwa et al., 2013). This has an impact on consumption of some foods in households, e.g. dry beans or pumpkins take long to cook and demand more heat, hence require good sized firewood. This denies families' access to good nutrition. Therefore, the type of firewood available determines the type of food to cook in the home; a case in point is that twigs cannot be used to cook dry beans or pumpkins. Good quality cooked food gives credit to a woman, while poor cooked food has a negative bearing on the woman and may warrant grounds for divorce.

The dwindling forest cover is a cause for concern for future cooking energy sources. The problem of deforestation is escalating and might bring greater consequences in future, hence need to identify effective energy saving alternatives.

Fetching water has become a challenging and risky job to women and girls as they spend more time, sourcing the commodity, including odd hours. Queuing for water from improved water sources as a constraint confirms previous research findings in Uganda by Asaba, et al., 2013.

5.1.5 Gender and power dynamics

While males and females play complementary roles in agriculture production, there are challenges regarding power relations and decision making between them. The patrilineal society in Bolero has defined men as home owners; hence control most of the resources. Notable examples are about land rights for women, where men are land owners upon inheritance from their fathers. The average land holding size is 2.7 hectares. Fathers pass on the land to male children. Since women are married into the homes, they have no control over resources and cannot make decisions about property on their own. Lack of access to land for women is a common issue in most areas in Malawi (Phiri, et al., 2012). However,

when women have greater entitlements to land, they will be able to grow more food crops and have access to other opportunities such as farm input loans to improve production. Thus, land is a limitation to effective production of food crops.

Although women are involved in farming, they do not contribute much in decision making and control over harvest and income. Males control marketing of farm produce and income, making women dependent on them. This exacerbates women's adaptive capacity to food, water and energy needs.

Frequent drought and erratic rainfall has brought more constraints on women as they take up multiple roles, such as reproductive roles, household chores and health care for families, besides farming (Ongoro & Ogara, 2011). Water and firewood fetching are considered to be tasks for women and girls only as men are involved where they will get income out of it. Such feminization of roles and responsibilities during disasters brings further stressors and additional workload on females. When males support females with these chores, the time women spend on the chores would be gained and used for other productive activities to benefit the household and community.

5.2 Conclusion

Scarcity of food, water and energy has complicated and stretched adaptive capacity for women because the three go together. There is a direct link between food, water and energy to support daily food intake. Although food might be available, it cannot be processed into a meal without water and energy. Energy supports cooking food, boiling water and warming households. It becomes incomplete and complicated when households have food and miss water and energy. Likewise when energy is missing, yet food and

water are available, food cannot be cooked. Therefore, to meet daily food needs of a household, quality water and adequate energy are critical.

Constraints that women face due to skewed power relations and social inequalities have implications on their fulfillment of meeting food, water and energy needs. Effective transformation will take place when underlying issues of inequality are identified and addressed. Gender responsive interventions in climate variability adaptation would improve the status quo.

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Annex 1

Gender Analysis Matrix

	Culture	**Labor**	**Time**	**Resources & control**
Women	Responsible for household chores Have defined roles for women in the home, such as fetching water, firewood and cooking Confined them to keeping small livestock (goats, Pigs and poultry). Traditionally identified as caregivers, mothers and wives. Considered as visitors, since they marry into the man's village. Responsible for	Domestic chores Agricultural production activities (farming, keeping livestock) Managing daily household needs (food, water and firewood) Group that does *Ganyu* in times of food insecurity	Spent in cultivating in gardens, fetching firewood and water. Participating in social economic activities such as Village Savings and Loans, Coalition of Women Living with AIDS	Access training from extension workers and able to practice, e.g. manure making. However, limitations to practice some activities such as conservation agriculture, unless the husband is also interested and allocates land Able to engage in economic activities such as joining VS& L groups where they save and borrow money. Through lobby groups, they lobbied for land rights from the men

	ensuring food availability in the home on daily basis			and have been allocated at least an acre each to decide as to how to use it.
Men	Regards them as head of the house Home owners, breadwinners and income earners. Land owners through inheritance from the father Cattle owners, which is mainly used for *lobola* (bride price) Have defined roles such as building houses, thatching houses Allows them to have more than one wife	Agriculture production, especially commercial crops such as tobacco Marketing crops Responsible for constructing houses for the family	Farming, especially growing tobacco Socializing e.g. in beer parties	Property owners and key decision makers on property Decide which crops to grow Decide on how to use proceeds from crops Responsible for family security

Girls	Defined roles, especially household chores and child care Expects them to be married off	Helps mother with household chores and farming	Household chores Farming Going to school	Not consulted in decision making
Boys	Respected as owners of the home/village Destined to inherit property, especially land	Farming and herding livestock (for those who have livestock)	Farming Going to school	Consulted in most decisions regarding property

Annex II

Checklist for group discussion

INTRODUCTION

Thank you for accepting to participate in this interview. My name is__..... and my colleague's name is……., who will assist to take notes of our discussion. I am a student at Mzuzu University studying Transformative Community Development. We are conducting a study on assessing how climate variability is affecting women's capacity on food production, water and energy. The overall objective of the study is to investigate the stretching adaptive capacity of women to effects of climate variability on food, water and energy availability in Bolero.

The discussion will revolve on climate variability, food production, water and energy. The information from this survey will be shared with academicians, government policy makers, leaders and decision makers in the communities and the general community members. The findings from this study will contribute to transforming decision- makers in conceptualizing policies relating to adaptive capacity of women to effects of climate variability on food, water and energy availability. Consequently, the outcome of this research will support development of gender responsive systems in climate change mitigation and adaptation.

Your responses will be treated as confidential. We will not include your names or any other information that could identify you in any reports that we will produce. We will ensure that we destroy all notes and audiotapes after we complete this study and publish the results. Do you have any questions on this activity?

During the discussions, only one person at a time will be allowed to speak and mini discussions should be avoided to allow people to concentrate on the key discussion.

General Information

- Name of the group members
- Type of group

Discussion guiding questions

A. To assess how women are coping with household needs for food, water and energy

1. What kind of livelihood activities are women engaged in?
2. How accessible are food resources to women?
3. Distance to access water sources? And time spent
4. Distance to access firewood sources? And time spent
5. What alternatives do women use in order to cope with energy needs during different times of the year?
6. Who fetches these household livelihoods needs? Food, water and firewood

B. To examine the effects of climate variability on food security, water and energy

1. Climate variability, what are people saying?
2. What has changed in this area? How are women affected?
3. What are the impacts of Climate variability on food production, water and firewood?
4. How are women getting through in terms of food security, water and firewood?

5. Describe the climatic trends observed in this area over the past 10-20 years? /Provide a seasonal calendar of food crop production
6. Why the social groups are mentioned above more affected by impacts of climate variability?
7. What interventions are deliberately targeting women?
8. What agricultural and income related community based structures/organizations are facilitating these interventions?

Annex III

DEMOGRAPHIC QUESTIONNAIRE FOR GROUP DISCUSSION PARTICIPANTS

Name of participant----------

Village---------- VDC---------- GVH----------

T/A----------District----------

1. **Gender**

1 = Male 2 = Female

2. **Marital status?**

1 = Single 2 = Married 3 = Separated 4 = Divorced 5 = Widowed

6= Deserted

3. **Age?**

1 = < 25yrs 2 = 25 to 34 yrs 3 = 35 to 44yrs 4 = 45 to 54 yrs 5 = 55 to 64yrs

6 = > 65

4. Occupation?

1 = Farming 2 = Employed 3 = Business person (entrepreneur)

4 = Extension worker 5 = other (specify) ----------

5. Highest level of education?

1 = No education 2 = Primary school 3 = Secondary School 4 = Tertiary

5 = Functional literacy

6. A*nnual income?*

1 = MK0 -5,000 2 = MK5, 001-10,000 3 = MK10, 001-15,000

4 = MK15, 001-20,000 5 = MK20, 001-25,000 6 = >MK25, 000

Annex IV

QUESTIONNAIRE FOR EPA AND DISTRICT LEVEL LEADERS

District level checklist (DADO, District Environmental Officer, AEDC, Meteorological Officer, AEDOs, Forestry, NGOs Officials and Local leaders)

Name _____

Gender Male |___| Female |___|

Position _____

Organisation/Department_____

Years lived in Bolero |___| Years

Highest Qualification Certificate |___| Diploma |___| BSc |___| MSc |___| PhD |___|

Field of Qualification e.g. Agriculture, Environment _____

Climate change context in Bolero

1. What was the normal climate change and weather pattern in the Bolero?

   _____

2. What has been observed in the recent past (10-20 years)?

   _____

3. What climate change related risks or hazards occur in the district?

   _____

4. How is the rainfall pattern in Bolero EPA?

   _____

5. What changes have taken place in the agricultural season in terms of amount of rainfall and distribution?

_____

6. What are the risks that occurred in the previous growing season (dry spells, floods, etc)

_____

7. What impacts of climate change have been observed on agriculture?

_____

8. What are the impacts on natural resources? (water, land, forest etc)

_____

9. How are women affected by climate variability impacts?

_____

10. How are communities copping to climate variability related risks and hazards?

_____

11. What activities does your organization implement in response to any of the climate change related problems faced by the community?

_____

12. What resources are important to people's livelihood in the district?

_____

13. What other non-climate specific project activities are being implemented in the district?

_____

14. How sustainable are these projects in the face of climate change?

_____

15. What other activities would you propose for adaptation to climate change?

_____

16. How are communities participating in project activities?

_____

THANK YOU FOR YOUR TIME

Annex V

Kuzomera kuchita nawo kafukufuku

Ine ……..nkhuzomera mwakujipereka kufumbika mafumbo na …….ghakukhwaskana na kafukufuku wa umo wamama wakukhwaskikira na kusintha sintha kwa nyengo ku Bolero, mu boma la Rumphi, Malawi. Chilato chikulu cha kafukufuku uyu nkhuwona umo womama watondera maunonono agho ghakuwakhwaska malinga na kusintha sintha kwa nyengo mdera lawo. Nkhuzomera kuzgora mafumbo ghakukhwaskana na kafukufuku uyu umo nkhukhwaskikira mnyumba yane. Nkhupanikizga kuti vyakusangika vya kafukufuku uyu vizamkuperekeka ku walala wamasambiro na awo wakupanga malango. Ivyo visangikenge mu kafukufuku uyu vyamkuvwirapo kuchiska boma pakupanga malango gha ulimi mwakuyana na midauko ya mdera lane. Vyose ivi vyapataulika kwa ine muchitumbuka ndipo napulikiska.

Napulikiska nkhanira chilato, ndondomeko na nyengo ya kafukufuku uyu, na kukhumbikwira kwa gawo ilo nitolengepo, ndipo nangupika mwawi wakufumbapo mafumbo. Nkhupanikizga kuti nipokelengepo kalikose chara pa ntchito iyi. Nkhumanya kuti nasankhika mwachisani-sani kuti nitolepo lwande pa

kafukufuku uyu. Nkhumanyaso kuti vyose ivyo niyowoyenge vyamkusazgika na fundo za wanyane pakulemba lipoti yaumaliro ya ntchito iyi. Wanisimikizgira kuti vyose ivyo niyowoyenge visungikenge mwachisisi pa nyengo zose nakuti zina lane lamkugwiriskika ntchito yayi kweneso ivyo nayowoya vizamkuniwerera yayi. Naphalilikaso kuti visisi vya ine vizamkuwikika mu lipoti iyi yayi. Nili mwanangwa kuleka kutolapo lwande pa kafukufuku uyu pa nyengo yiri yose na kuti nkhwenera kupereka chifukwa icho nalekera yayi. Sono pakulemba zina lane pa pepala ili, nkhuzomera kuti nifumbike mafumbo pa kafukufuku uyu.

Sayini: ……Kaboni:……

Zuwa: …….

Mzuzu University

Annex VI

Voluntary Informed Consent Form

1, _____, consent to being interviewed by …….. (Name of interviewer) for a study on assessing how climate variability is affecting women's capacity on food production, water and energy in Bolero**,** Malawi. The overall objective of the study is to assess the stretching adaptive capacity of women in Bolero to climate variability. I agree to answer questions on this research. I understand that this information will be shared with academicians, decision makers and policy makers. The results of the study will be used to influence national policy as well as in designing of Agriculture programs that take into consideration cultural requirements for my community. All this has been fully explained to me in Tumbuka language.

I fully understand the purpose, procedure and time period for the study, what my involvement means and have had the opportunity to ask questions. I understand that I will not directly benefit from participating in this study. I understand that I was chosen to participate in the study through random selection. I understand that the information from my interview will be used anonymously for collation into general themes for a report. The answers I give will not be used for any other purpose, and will be kept strictly confidential at all times. I have been assured that my name will never be used and anything I say will not

be traced back to me. I have been assured that no private or confidential information relating to me will be included in the report. I have the right to withdraw my participation at any point and do not need to give any reasons for my withdrawal. Now by signing this form, I give my informed consent to the interviewer to proceed with the interview.

Signed: ……**Witnessed**:……

Date: …….

Mzuzu University

P/Bag 201

Luwinga, Mzuzu 2. Malawi.

Annex VII

Direct observation form

Name of researcher----------

Date of observation----------

Location of observation----------

1. What food is being prepared in the homestead as the main meal

   _____

2. What other foods are being consumed at the house hold?

   _____

3. How do households cope with food scarcity?

   _____

4. What type of energy is used for cooking?

_____

5. Is energy for cooking locally available? observe distance from source

_____

6. What alternatives sources of energy are being used?

_____

7. What actions have been done to improve the situation?

_____

8. How far is the source of water?

_____

9. Who fetches water for the home?

_____

10. What other uses of water are employed beside household use?

_____