



# **Impact of Climate Change on food security among Vulnerable Groups (Women, Children and the Elderly): A case study of TA Kilupula, Group Village Headman Mwantende**

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## **ABSTRACT**

Poor and vulnerable groups are more negatively affected by changing climate and its related uncertainties in many developing countries. Agriculture, forestry and fisheries are the major sectors extremely sensitive to climate change even as a majority of the population in developing countries is highly dependent on these sectors for its survival. Climate change has been the prime reason for issues like low access to drinking water, food insecurity and associated health problems. Dietz and Stern (2009) observed that the climate-related events have a high impact on the marginalized population compared to the high income groups in the developing countries. Bridges (2016) found that the Scheduled Caste and indigenous communities are adversely affected due to climate change in India. However, a low number of studies have documented climate change impacts on marginalized groups, for example, in Africa (Boko et al., 2007). In addition, there are other aspects about climate change and inequality in terms of an uneven power structure and distribution of relief material in society. In the above context, at local, national and international levels, it is the vulnerable groups that are the most adversely affected due to climate change. In India, there are no significant studies on vulnerable communities and climate change. The IPCC Fifth Assessment Report has stated that climate change has directly affected the poor and marginalized groups through its impacts on their livelihoods such as losses in crop yields, destroyed homes, food insecurity and indirectly through increased food prices. Therefore, there is a need to assess the impacts of climate change on the livelihoods of vulnerable communities and thus why the researcher will carry this assessment in Traditional Authority Kilupula, Group Village Headman Mwantende in Karonga district. Climate change impacts on vulnerable communities and people in Karonga has affected a large number of people, especially socially excluded groups or vulnerable groups. Olsson et al (2014) comprehensively

discussed the impacts of climate change on the marginalized population in developing countries. Most of the developing countries have inadequate adaptation strategies, especially for vulnerable communities. Vulnerable groups are facing two hurdles in this society. First, major environmental problems like pollution, water contamination, improper solid waste disposal, land degradation, forest degradation, and lack of access to natural resources on the one hand are factors that lead to loss of their livelihood because most of them depend on climate sensitive sectors as a major source of their income and employment. On the other hand, they are also hit by low literacy, unemployment, low income and lack of access to energy. In many developing countries, they have no decision-making power in society. Fankhauser and Stern (2016) has noted that climate change exerts uneven impacts across countries and populations at the global level. Moreover, developing countries show less adaptation to climate change and other coping mechanisms for preventing the adverse impacts of climate change. Climate change and its related hazards are having a great impact on the lives and livelihoods of vulnerable communities. Vulnerable communities have already suffered economic as well as social discrimination. Climate change is also another burden in their lives. The World Bank (2016) expressed the view that the rising temperate, unpredictability over the beginning of the monsoon season has resulted in impacts on some people and communities associated with low



## CHAPTER ONE

### INTRODUCTION

#### 1.0. Introduction

Food security in the sub-Saharan region faces the risk of a changing climate. With potentially devastating effects on food production capacity, agriculture is extremely vulnerable to climate change. Higher temperatures and more erratic rainfall patterns have reduced yields, encouraged weed and pest proliferation and increased the likelihood of short run crop failures and long run production declines (Nelson et al., 2009) cited in (World Bank, 2010). With a rapidly growing population, demand for food has increased, calling for efforts to step up food security globally. According to the World Bank (2008), “In Africa, demand for food is expected to reach \$100 billion by 2015, double its level of 2000” (World Bank, 2008:1). Further to that, Sub-Saharan Africa is the only region where yields of food crops have declined, and farmers get only one-third of the yields achieved by Asian farmers (World Bank, 2008:1). The capacity to produce food has come under severe challenge due to changing climatic conditions therefore calling for responses to curb the effects of climate change. Developing countries are more susceptible to climate change due to their low adaptive capacity and growing dependence on resources sensitive to changes in climate.

Climate change will weaken development efforts in Africa and the rest of the developing world; will hit the poorest and most vulnerable sections of society hard (Madzwamuse, 2010). Madzwamuse argues that climate change will further deepen the development crisis faced by developing countries. According to Madzwamuse, (2010) climate changes “threaten to reverse the gains of sustainable development and put additional pressure on already overstretched human and financial resources in developing countries” (Madzwamuse, 2010:1). The perennial challenges faced by the Sub-Saharan countries being, poverty, burden of diseases, conflict, environmental degradation, malnutrition among others, risk getting aggravated by climate change (O’Brien, 2010). In short, the implications of climate change are serious. According to O’Brien (2010:1), “Climate change can be considered as the biggest environmental threat in human history, and as the defining human development challenge for the 21st century” (O’Brien, 2010: IPCC, 2007b; UNDP, 2007; Stern, 2007). Thus, the magnitude of the effects of climate change is far reaching and this has seen a number of climate change related disasters taking place. The majority of Sub-Saharan Africa’s population (96%) is dependent on rain-fed agriculture and in some countries; predictions forecast a 50% yield deficit by 2050 while arable land will decline by 6% (Madzwamuse, 2011). Climate change has already compromised food security and access to food in poor rural communities. This has condemned poor countries with the least financial, institutional and technological capacity to adapt to climate change to being the worst affected and most vulnerable. The implication is that, with agriculture facing harsh climate vulnerability, food production in countries and even at the household level has to keep up with internal demand (World Bank, 2007). Therefore, either small-scale farmers face the task of adapting or falling casualty to the effects of climate change, taking into account that small-scale subsistence agriculture is essential to growth and to reducing mass poverty and food insecurity (World Bank, 2007).

The capacity of small-scale farmers to adapt to climate change is enabled by some form of state intervention. Government has an increasing role to build capacity of small-scale farmers so that they manage to adapt to climate change. This is based on the understanding that in South Africa an estimated 2.2 million households are food insecure, 14 million people are vulnerable to food insecurity and cannot adapt with some form of state assistance (HSRC, 2004; DAFF, 2006).

Global climate conditions and patterns have recently been changing. This has seen countries mostly in the Sub-Saharan region and beyond suffering perpetual droughts. Increasing temperatures have taken their toll on crops, water bodies and in some instances led to perpetual rains that have resulted in floods. This has compounded the fate of a continent suffering from a myriad of development challenges where for example, malnutrition is responsible for several deaths every year. Therefore, against this background an in-depth qualitative study was conducted to establish adaptation mechanisms employed by small-scale farmers to achieve household food security.

## **1.2. Problem statement**

Malawi is continuously facing the problem of food insecurity due to climate change that is causing more damages; Malawi has experienced a number of adverse climatic hazards over the last several decades. The most serious have been dry spells, intense rainfall and seasonal droughts, which have adversely affected food security. This is greatly affecting the development of this country due to the series effects (Maxwell & Smith, 1992). Over 90% of the population in Malawi is engaged in subsistence rain fed agriculture, which takes place during a single rainy season starting from December and ending in April and 60% of the population are food insecure on year round basis. Since rainfall during this period tends to be highly erratic due to the problem of climate change so this affects food security due to wide, spread of crop failure because of dry spells (DFID, 2006).

Due to climate, change affects the prices of agricultural inputs such as fertilizers, pesticides, farm tools and machines and others have been fluctuating recent. This has caused farmers to abandon farming and opt for other small-scale businesses. High prices of these inputs have made farming very challenging. According to FAO (2007c) the price of a 50kg bag of maize which was purchased at a price tag of K3500.00 rose within a short period of time to K8000.00 of which many small scale farmers in rural areas cannot afford to buy at that high price hence eventually results in shortage and scarcity of food at household, community, regional and national level (World Bank, 1999). While increasing attention has been placed on floods in Mwantende Karonga less attention has been given to other effects of climate change on local communities in terms of changes in food security (Pandit, 2009). Though much research at government and non-governmental level has been done and our knowledge in climate change has increased significantly, research in climate change impact in food security is still very limited. Because of inadequate research, understanding climate change impacts in food security in Karonga has been very limited. This is due to lack of knowledge and information about climate change first and how it affects food security by our society. Therefore,



studies to assess the degree to which climate change has been effecting food security in the area of Mwantende village that will provide more insight into the problem of which will lead to finding more lasting solutions to the problem.

### 1.3. Objectives of the study

The following include the main and specific objectives of the study

#### 1.3.1. Main objective

The general objective is to assess the effects of climate change on food security in Karonga District

#### 1.3.2. Specific Objective

1. To find out the activities that are taking place in the area of Mwantende village that are contributing to climate change effects
2. To evaluate the effects of climate change on food security in the area under study
3. To find out how community members cop with this problem of climate change effects on food security
4. To establish possible solutions of climate change on food security

### 1.4. Research questions

The study is geared to answer the following research questions and provoke a deeper understanding into the matters raised by the researcher:

1. What are the activities that are taking place in the area of Mwantende that are contributing to climate change effects?
2. How does community members cop with this problem of climate change effects on food security?
3. What are the effects of climate change on food security?
4. What are some of the possible solutions of climate change on food security?

### 1.5. Significance of the study

Jukes & Neuberger (1998) found out that, there is not much that tries to find out and compare the relationship between climate change effects on food security. In view of this, the study intended to contribute to the existing body of knowledge regarding the nature of climate change effects on food insecurity among communities and also contribute to the scarce literature regarding the prevalence rates in rural areas like that of karonga district and also provide a reference point for future studies on similar subject for instance the increase in the rate of mortality and morbidity rate. There is a lack of accurate database neither on climate not on longer-term production data base of the climate sensitive sectors that are required to formulate or reformulate national policies and strategies. This study will contribute to create database of local climate knowledge base on these critical and globally valued issues of climate change upon agriculture at village level for the policy makers in addressing climate change impacts and for policy

making in adaptation and mitigation in agriculture. This policy can be valuable for food security testimonial combating against climate change.

In light of the above, this study sought to contribute towards the practice of climate change adaptation in Malawi and sub-Saharan Africa in a bid to improve on the different mechanisms and coming up with best practices. This is considering that climate change as a discourse is relatively new in terms of research, and thus much more dynamics still need to be researched on. Government departments working on agriculture, environment, climate change and food security, civil society organizations as well as academics are likely to benefit from the findings of this study, which will open up to more informed research and debate on the climate change adaptation best practices.

### 1.6. Definition of terms

- Climate change refers to any change in climate overtime whether due to natural variability or as a result of human activity (Huse, 2008).
- Food insecurity refers to the in availability of adequate world supplies of basic food stuffs to sustain a steady expansion of food consumption and to offset fluctuations in production” (world Food Summit, 1990).
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### 1.7. Organizational of the paper

This research consists of five chapters each having with respective contents. This chapter one not only introduces the study, but also covers the background to the study and problem statement of the research. The problem statement is in part what prompts the research to be carried out to address the problems raised. Both the objectives of the research and the research hypothesis, which will be the central in guiding the research to achieve its intended aims, are also covered in this chapter. A review of literature for other similar studies to the research is presented in Chapter Two. In addition, the theoretical and conceptual frameworks for this study are also discussed in this chapter. A discussion on the methodology of the research is presented in Chapter Three. This includes sampling method, data collection, and data analysis tools. The chapter also outlines the challenges that are likely to be faced in the course of the research and research ethics. Lastly, before conclusions are made in Chapter Five, results and discussions of the findings and study recommendations will be presented in Chapter Four.

**LITERATURE REVIEW****2.0. Introduction**

The following chapter is a critical review of literature on climate change adaptation and food security. For purposes of conceptual clarity, it is important to define the key concepts used in this study. Considering that, there are many interpretations and definitions relating to adaptation, climate change, food security, this section presents a discussion of these concepts and their relevance to this study. Important concepts in this study included, climate change adaptation, food security, food insecurity, climate change, household food security. A discussion on the different theoretical frameworks informing the study is also presented in this chapter.

**2.1. Definition of the terms****2.1.1. Climate Change**

Climate change will lead to more deep and longer droughts than have been observed over wider areas in view of the fact that the 1970s, predominantly in the tropics and subtropics (Trenberth *et al.*, 2007). Climate change refers to (i) long-term changes in average weather conditions (WMO usage); (ii) all changes in the climate system, counting drivers of change, changes themselves and their sound effects. Climate refers to the characteristic conditions of the earth's lower surface atmosphere at a specific location; while weather refers to day-to-day fluctuations in these environments at the same locality (IPCC, 2007).

**2.2. Empirical literature****2.2.1 Impact of Climate change on Food Security**

The climate change and food security (CCFS) framework shows how climate change affects food security outcomes for the four components of food security, food availability, food accessibility, food utilization and food system stability in various direct and indirect ways.

**2.2.1.1. Food system vulnerability**

**Overview:** A food system is vulnerable when one or more of the four components of food security – food availability, food accessibility, food utilization and food system stability are uncertain and insecure. Food availability is determined by the physical quantities of food that are produced, stored, processed, distributed and exchanged. FAO calculates national food balance sheets that include all these elements. Food availability is the net amount remaining after production, stocks and imports have been summed and exports deducted for each item included in the food balance sheet. Adequacy is assessed through comparison of availability with the estimated consumption requirement for each food item (FAO/NRCB, 2008).

High market prices for food are usually a reflection of inadequate availability; persistently high prices force poor people to reduce consumption below the minimum required for a healthy and active life. Where these scarcities are compounded by the results of climate change, the introduction of mitigation practices that create land-use competition and the attribution of market value to environmental services to mitigate climate change, they have the potential to cause significant changes in relative prices for different food items, and an overall increase in the cost of an average food basket for the consumer, with accompanying increases in price volatility (FAO, 2007c). Food accessibility is a measure of the ability to secure entitlements, which are defined as the set of resources that an individual requires obtaining access to food (FAO, 2003a). The mere presence of an adequate supply does not ensure that a person can obtain and consume food that person must first have access to the food through his/her entitlements. The enjoyment of entitlements that determine people's access to food depends on allocation mechanisms, affordability, and cultural and personal preferences for particular food products (Pretty et al., 2005).

Increased risk exposure resulting from climate change will reduce people's access to entitlements and undermine their food security. Food utilization refers to the use of food and how a person is able to secure essential nutrients from the food consumed. It encompasses the nutritional value of the diet, including its composition and methods of preparation; the social values of foods, which dictate what kinds of food should be served and eaten at different times of the year and on different occasions; and the quality and safety of the food supply, which can cause loss of nutrients in the food and the spread of food-borne diseases if not of a sufficient standard. Climatic conditions are likely to bring both negative and positive changes in dietary patterns and new challenges for food safety, which may affect nutritional status in various ways (Devereux and Maxwell, 2001).

#### **2.2.1.2. Potential effects of Climate Change on Food Access:**

**Allocation:** Non-market mechanisms include production for own consumption, food preparation and allocation practices within the household and public or charitable food distribution schemes. For rural people who produce a substantial part of their own food, climate change impacts on food production may reduce availability to the point that allocation choices have to be made within the household. A family might reduce the daily amount of food consumed equally among all household members, or allocate food preferentially to certain members, often the able-bodied male adults, who are assumed to need it the most to stay fit and continue working to maintain the family (Mano, Isaacson, & Dardel, P 2003).

**Affordability:** Climate impacts on income-earning opportunities can affect the ability to buy food, and a change in climate or climate extremes may affect the availability of certain food products, which may influence their price. High prices may make certain foods unaffordable and can have an impact on individuals' nutrition and health. Changes in the demand for seasonal agricultural labor, caused by changes in production practices in response to climate change, can affect income-generating capacity positively or negatively. Mechanization may decrease the need for seasonal labor in many places, and labor demands are often reduced when crops fail, mostly owing to such factors as drought, flood, frost or pest outbreaks, which can be influenced by climate (UNFCCC, 1992).



An increase in food prices has a real income effect, with low-income households often suffering most, as they tend to devote larger shares of their incomes to food than higher-income households do (Thomsen and Metz, 1998). When they cannot afford food, households adjust by eating less of their preferred foods or reducing total quantities consumed as food prices increase. Given the growing number of people who depend on the market for their food supply, food prices are critical to consumers' food security and must be watched (Du Toit and Ziervogel, 2004).

### **2.2.1.3. Potential effects of Climate Change on Food Utilization**

**Nutritional value:** Food insecurity is usually associated with malnutrition, because the diets of people who are unable to satisfy all of their food needs usually contain a high proportion of staple foods and lack the variety needed to satisfy nutritional requirements. Declines in the availability of wild foods, and limits on small-scale horticultural production due to scarcity of water or labor resulting from climate change could affect nutritional status adversely. In general, however, the main impact of climate change on nutrition is likely to be felt indirectly, through its effects on income and capacity to purchase a diversity of foods (UNFCCC, 2006).

The physiological utilization of foods consumed also affects nutritional status, and this in turn is affected by illness. Climate change will cause new patterns of pests and diseases to emerge, affecting plants, animals and humans, and posing new risks for food security, food safety and human health. Increased incidence of water-borne diseases in flood-prone areas, changes in vectors for climate-responsive pests and diseases, and emergence of new diseases could affect both the food chain and people's physiological capacity to obtain necessary nutrients from the foods consumed (Levin & Pershing, 2005).

### **2.2.1.4. Potential Effects of Climate Change on Food System Stability**

**Stability of supply:** Many crops have annual cycles, and yields fluctuate with climate variability, particularly rainfall and temperature. Maintaining the continuity of food supply when production is seasonal is therefore challenging. Droughts and floods are a particular threat to food stability and could bring about both chronic and transitory food insecurity. Both are expected to become more frequent, more intense and less predictable because of climate change. In rural areas that depend on rain fed agriculture for an important part of their local food supply, changes in the amount and timing of rainfall within the season and an increase in weather variability are likely to aggravate the precariousness of local food systems (FAO, 2007c).

**Food emergencies:** Increasing instability of supply, attributable to the consequences of climate change, will most likely lead to increases in the frequency and magnitude of food emergencies with which the global food system is ill equipped to cope. An increase in human conflict, caused in part by migration and resource competition attributable to changing climatic conditions, would also be destabilizing for food systems at all levels. Climate change might exacerbate conflict in numerous ways, although links between climate change and conflict should be presented with

care. Increasing incidence of drought may force people to migrate from one area to another, giving rise to conflict over access to resources in the receiving area. Resource scarcity can also trigger conflict and could be driven by global environmental change (FAO, 2007f).

Rosenzweig et al., (1994) investigated the potential impact of global climate change on world food supply. The study used data drawn from other individual studies so as to obtain the world picture of the simulated change in crop yield associated with different climate change scenarios. To simulate the economic consequences associated with the different changes in yield associated with different climate scenarios, the study used a world food trade model. The study found out that developing countries were more vulnerable to climate change than the developed countries. The study also found out that adaptation options taken up at the farm level in developing countries didn't reduce this gap in vulnerability. The findings by Rosenzweig et al., (1994) were supported by findings of another study by Parry et al., (1999). Parry et al., (1999) investigated the potential impact of climate change on world food security using crop growth models for wheat, rice, maize and soybeans and simulated the changes of crop yields as a result of climate change. They found out that climate change will affect agricultural production more in developing countries than in developed countries particularly those located in Africa. It further noted that, agricultural production in mid and high latitudes will benefit from climate change while agricultural production in low latitudes will suffer.

Chang (2002) used the production function approach to analyze the impact of climate change on Taiwan agricultural sector. He used yield regression models and factored in farmer's adaptation responses. The study focused on 60 crops including rice, corn, wheat, sorghum, soybeans, carrots, tea and sesame among others. Chang (2002) noted that temperature and precipitation have significant impact of crop yields in Taiwan. He also found that climate change will have an overall positive impact on Taiwan society welfare.

Basak et al., (2009) analyzed the impact of climate change on Boro rice production in Bangladesh. Their study used a DSSAT model to analyze the impact for the years 2008, 2030, 2050 and 2070 for 12 locations in Bangladesh. Their study also used weather data from the regional climate model PRECIS, soil and hydrologic characteristics. The study found out that Boro rice production will reduce by over 20% and 50 % for the years 2050 and 2070 respectively as a result of climate change. The study also found out that temperature increase is primary responsible for the decrease in production.

Saseendran et al., (2000) investigated the impact of climate change on rice production in Kerala state in India. The study used a CERES-RICE model to investigate the impact of climate change on rice production. The study used climate change scenarios from ECHAM3 climate model. The study found out that an increase in CO<sub>2</sub> concentration will lead to an increase in rice production in the Kerala state due to the fertilization effect. In addition, the study found out that an increase in temperature will have an adverse effect of reducing yields by 6% for every one-degree increase in temperature.

A number of studies on the impact of climate change on agriculture have been conducted using the production function approach. One such study was by Makadho (1996) who investigated the potential effects of climate change on corn production in Zimbabwe using two global climate models namely the GFDL and CCC models. In addition, the author used CERES- maize model to simulate the changes in crop yield associated with the different climate change scenarios. The study found that corn production is expected to decrease as a result of the increase in temperature. This is because increase in temperature will result in a shortening of crop growth period.

Onyeji and Fischer (1994) investigated the potential impact of climate change on Egyptian agriculture and its economy wide implications. They focused on maize and wheat in their study. The authors used IBSNAT crop model to simulate the changes in crop yields associated with the different climate change scenarios. The study found out that climate changes will result in a reduction in agricultural production and that the decrease in agricultural production will have other negative economic wide implications.

The current study differs from the above studies in terms of approach used to analyze the impact of climate change. The above studies used the production function approach while the current study used both the production and Ricardian approach. In addition, the current study differs those studies in that they ignored farmer's adaptation measures hence their results may overestimate the impact of climate change on agricultural production. The Ricardian approach used by the current study automatically incorporates farmer's adaptation measures in the face of climate change in its analysis. Thus, it is able to give a much more accurate picture of the impact of climate change on food security

### **2.2.2. The Effects of Climate Change on Food Security in Malawi**

Malawi is one the most vulnerable countries to climate change. Oxfam (2009) noted that in Malawi mean annual temperature has increased by 0.9°C between 1960 and 2006, an average rate of 0.21°C per decade. The combination of higher temperatures and less rain will affect the 90% of Malawi's food security. The impacts of climate change are being manifested in various ways in the country. The country has experienced increased frequency of extreme climatic hazards such as intense and unreliable rainfall, sudden and severe floods, droughts, prolonged dry spells, heavy thunderstorms and hailstorms. The increase in number of extreme climate related events is a source of mounting concern.

Across the country a growing number of communities are now experiencing the effects of climate change especially food security has been affected which seem to be out of the ordinary (Kamperewera, 2010).

Floods and droughts have alternated along the lakeshore and in the Shire Valley. Floods are often caused by heavy rainfall over a short period of time. In most instances, villages not directly affected by the heavy rainfall may also be

flooded because they are downstream from the rain catchment. These floods are exacerbated because of heavy deforestation that has taken place in most parts of the country. Droughts and dry spells have resulted in poor yields or total crop failure, leading to serious food shortages, hunger and malnutrition. Unreliable rainfall patterns have rendered upland field cultivation rarely viable and cultivation has shifted in the low lying dambos. For instance, hunger cases have been on the increase in the country (Maxwell, 1996). Standrews (2011) presented a report on the impact of climate change in Malawi in relation to agriculture since the country depends on agriculture for food. This report outlined that there are extreme cases of hunger in Malawi due to climate change because of the change in rainfall patterns which are affecting agriculture production. Flooding, on the other hand has severely disrupted food production, led to internal displacement of communities, loss of life and assets, and overall reduction of community level resilience (FAO, 2000).

In October 2001, Malawi Vulnerable Assessment Committee (MVAC) was updating its Household Economy Assessment (HEA) in three livelihood zones in the Central and Southern Malawi. Populations were facing significant defeat in the annual in the annual food requirements after experiencing a dry spell in the early 2002 during a critical stage of maize development the GoM declared a Food Crisis that was accelerated by climate change (Oxfam 2009). According to the FEWS Net Malawi Food Security Report (2002), the final crop production figures (1.32 million metric tons) were 13% lower than the previous year's production. The final winter maize production estimates for 2001- 2002 were projected to be more than 70% of the average winter maize production for the past three years (about 83, 000 million metric tons).

In 2005, President Bingu WA Muntharika, in his address to the nation when he declared a national disaster over food shortages said, 'the food crisis has been escalated and we need more assistance. We are facing a national disaster affecting the lives of people that has been increased by climate change (IPCC, 2007). A recent UN Report found that climate change was responsible for growing food shortages across the country. It revealed that the climate change has left many families unable to earn a living as breadwinners are struck down by the effects (FUM, 2010).

One study published by UN suggests that about 70% of households have seen their income fall because of illness due to food insecurity. The study report shows that half of the country's farming families could earn vital cash elsewhere. This practice has seen in some farms losing part or all their crops. In other areas families have left land fallow because there is no one to look after the crops. The report says about a quarter of poor households have been switching their crop mixes abandoning certain crops leaving the land fallow if some household members are seriously ill. The report further highlights an over reliance on maize, high inflation and poor management of farming resources as factors. Climate change has created problems across the current food crisis is extricable linked to its longstanding and severe climate change. The report further estimates 3 million people as being at risk from the growing food crisis (IPCC, 2007b).



### 2.3. Review of Food Insecurity Coping Strategies Globally

This sub-section reviews the recent studies of food insecurity coping strategy related work globally. The available literature on food insecurity coping strategies shows that food insecurity exists among households in South Africa (Majake, 2005; Hendriks, 2005; HSRC, 2004; Monde, 2003). In QwaQwa, food insecure households commonly employed food consumption coping strategies (Majake, 2005). The objective of the study conducted by Majake (2005) was to evaluate the impact of food security packages on households in QwaQwa. A survey of 60 households, half of whom received food security packages conducted between April and June 2004 came up with a number of coping strategies employed by households. The study showed that the strategies employed by households to survive included most severe coping strategies, eating from dustbins and sending households out to beg. Relying on less preferred foods such as eating porridge with tea, jam or animal fat were identified as the least severe strategies employed by households in QwaQwa (Majake 2005).

Oldewage-Theron et al,(2006) observed similar strategies for coping with food security in the study conducted in the Vaal Triangle (Oldewage-Theron et al, 2006).The objective of this study was to determine household food security and coping strategies of an informal settlement in the Vaal Triangle. The households employed food consumption coping strategies to cope with food insecurity. The coping strategies used were limiting the variety of foods served (practiced by 75 per cent of households); limiting portion sizes (80 per cent of households); skipping meals (60 per cent of households) and maternal buffering (76 per cent of households). The study concluded that the area is a poverty-stricken community with household food insecurity where the caregivers changed their food consumption patterns to cope, resulting in compromised nutrition (Oldewage-Theron et al, 2006). A study conducted by Maliwichi, Bourne, and Mokoena (2003) in Khayelitsha also showed that households employed consumption coping strategies to alleviate food insecurity. The aim of this study was to investigate the coping strategies of households in Khayelitsha, Cape Town to ensure household food security (Maliwichi et al, 2003).

The findings showed that 70 per cent of the households in the informal settlement used short-term coping strategies. These included borrowing money (from friends or relatives) to buy food; borrowing food from neighbors or friends; purchasing food on credit; relying on help from friends/neighbors and maternal buffering (i.e. mothers limiting their food intake to ensure children get enough food to eat (Maliwichi et al,2003). Ziervogele et al, (2006) conducted a study in Sekhukhune on household coping ad adaptation mechanisms where 597 individuals were interviewed across five municipalities. In Sekhukhune, many households have developed a wide range of coping and adaptation strategies in response to changing conditions that affect their livelihoods and well-being (Ziervogel et al, 2006).

The objective of Ziervogel et al,(2006) study was to identify and assess integrated and cross-sectoral adaptive management opportunities. The study showed that household employed short-term coping strategies that included the following: relying on piecework; eating less preferred food; reducing number of meals a day; limiting portion size of meals; borrowing food; eating elsewhere and purchasing food on credit (Ziervogel et al, 2006). Therefore, a host

of adaptation and coping mechanisms are available. Some which are directly in response to the climate change, whilst some are indirect thus responding to the effects and impacts of climate change. There is need for integration of mechanisms so that climate change can be dealt with at an early stage. The direct effects of climate change are critical and adaptation strategies that effectively and efficiently respond to climate change are of essence.

#### **2.4. Theoretical Framework**

This study critically assessed some key theories and approaches. Amartya Sen's entitlement theory of famine forms the conceptual basis of all agencies' approaches to assessing food security. The entitlement approach posits that most famine mortality results from the inability of people to acquire food through either purchase or exchange, or transfers (Sen, 1981; Young, Jaspars, Brown, Frize and Khogali, 2001). Of course, the availability of food near to the household is a prerequisite of food security. However, despite the assertion, this study interpreted climate change being an inevitable factor that reduces the ability of people to acquire food in any way. In justifying the relevance and importance of the entitlement approach to this study it is critical to note that increasing aggregate food availability is not enough to reduce hunger (Delgado, Townsend, Ceccacci, Hoberg, Bora, Martin, Mitchell, Larson, Anderson and Zaman, 2010).

Sen's studies showed that the key to reducing hunger is to increase the "food entitlement" or command over food of individuals, which may or may not be linked to aggregate food availability in markets. Changes in food entitlements could occur through changes in a variety of factors, such as policies (domestic and foreign), environment, technologies, and individual characteristics that affect how individuals secure access to food (Sen 1981). It is through these various factors that climate change becomes an inevitable aspect in influencing command over food for individuals. Failure to scheme and implement agricultural enabling conditions in the form of adaptation policies and strategies in this case severely affects the capacity of individuals to have command over food (Delgado et al, 2010). In a way, the entitlement theory stands on the argument that food security is a complex phenomenon that is influenced by a number of factors. Young et al, (2001) further argue that availability is influenced by factors such as a community's proximity to centers of production and supply, or by market forces, restrictions on trade and international policies that affect food supplies (Young et al, 2001). All of these are fundamental to food-security analysis. Sen's work was nonetheless a radical breakthrough; before him, the availability of food was thought to be the overriding determinant of famine. According to Sen (1981) people's 'exchange entitlements' (or their livelihood sources) reflect their ability to acquire food (Sen, 1981) cited in (Young et al, 2001). Importantly the significance of the entitlement approach to this study lay in that, it draws analytical attention to other sources of food apart from production, and highlights the need for more empirical research and modelling on the likely effects of climate change on other components of local and national food systems (Bohle., Downing., and Watts, 1994). The distribution and reproduction of entitlements to food is determined by the livelihood system in the local economy, as well as structural factors in the local political economy that construct 'social vulnerability' [e.g. gender] (Bohle et al, 1994).

Taking a production based entitlement approach; entitlement analysis is more suitable at a community level. According to Vincent and Cull (2009) “The entitlement approach operates best at the micro-level of households or livelihood groups [e.g. farmers, landless labourers], often in combination with a livelihoods framework” (Vincent and Cull, 2009:15). Of interest is that an entitlements-based analysis of climate change takes into account differences in dependence on food production by different groups of households. 38 For instance, farmers are most directly vulnerable to ‘failure of production-based entitlement’ due to climate change, because they depend most heavily on crop production for both their food and their income. Poor farmers with undiversified livelihoods and few asset buffers are most vulnerable of all, because they lack alternative sources of food when their harvests fail (Vincent and Cull, 2009). Therefore, such an analysis takes into consideration the dynamics associated with climate change and food security. Taking a look at another critical perspective of entitlement, when crop production is inadequate, subsistence farmers look for alternative work to supplement their food and income, and the rural non-farm economy becomes an important determinant of household food security, through its capacity to generate ‘labour-based entitlement’ to food (Vincent and Cull, 2009).

Apart from farmers, other groups that depend indirectly on agriculture for their living are also vulnerable to a collapse of demand for their services such as landless labourers. One plausible consequence of climate change is that pressure on rural labour markets will increase, and if the supply of labor rises while demand for labor is constant or falling, real wages will fall, exacerbating food insecurity in poor rural communities (Vincent and Cull, 2009). Another ‘second round’ consequence of climate change could be an increase in labor migration out of areas where food production is more variable and employment opportunities are falling, with unpredictable implications for household food security that require detailed context specific analysis and modelling (Vincent and Cull, 2009).

However, Sen’s entitlement theory has its own restrictions. Of concern, it implies a straightforward sequence of entitlement failure leading to hunger and then to malnutrition, starvation and death (de Waal, 1990). But research into people’s responses to famine, often referred to as ‘coping strategies’, has shown that their priorities in times of food stress are to preserve productive assets to protect livelihoods, rather than to meet immediate food needs (Corbett, 1988). On the other hand, an analysis of food security requires a systems approach. The Global Environmental Change and Food Systems (GECAFS) Project have advocated this approach: a joint project of the International Geosphere-Biosphere (IGBP), the International Human Dimensions Programme on Global Environmental Change (IHDP) and the World Climate Research Programme (WCRP). According to Ingram (2010) a food systems approach “...systematically connects the activities of food producers, processors, distributors, retailers and consumers involved in food systems to food security and environmental outcomes.” (Ingram, 2010:3).

#### **2.4.1. The Production Function Approach**

The production function approach will be the pioneering approach to analyze the impact of climate change on food security. The approach is based upon experimental or empirical production functions where environmental variables

such as precipitation or temperature are inputs. These environmental variables in the production function are varied so as to estimate the impacts of climate change on yields. These changes in yields are then incorporated in economic models so as to predicate the changes in welfare as a result of climate change (Mendelsohn et al., 1994).

Production function approach has the advantage of providing estimates of impact of climate that are free of bias as a result of the determinants of agricultural production that are beyond a farmer's control such as soil quality (Deschenes and Greenstone, 2006). In addition, the approach provides better predictions of the impact of climate change on agricultural yields because of its use of controlled experiments (Mendelsohn et al., 1994; Deschenes and Greenstone, 2006).

Despite this, the approach suffers from some limitations. First, the approach does not incorporate adaptation measures adopted by farmers in the face of climate change. This is unlikely since farmers will respond to the changing climate conditions. They may introduce new crops or replace crops with livestock. The lack of incorporation of adaptation measures results in an overestimation of damages because of climate change (Mendelsohn et al., 1994). Secondly, the approach is very expensive because of the controlled experimentation required (Deressa, 2007). This may explain why the approach has been used in few sites around the world and for a few crops mainly grains. Hence, the approach may be of little value for generalizing results.

#### **2.4.2. The Ricardian Approach**

Mendelsohn, Nordhaus and Shaw developed this technique in a study done in 1994 that examined the impact of climate change on USA's agriculture. Mendelsohn et al., (1994) developed this technique to correct the bias that the production function approach had of over-estimating damages to agriculture because of climate change. This bias was a result of its failure to incorporate adaptation measures taken up in response to the changing climatic conditions. According to Mendelsohn et al., (1994), the Ricardian approach estimates the impact of climate change by looking at how climate in different places affects farm revenue or the value of the farmland. They note that by looking at the effect of climate variables such as temperature or precipitation on farm revenues or value of the farmland, the approach is able to incorporate farmer's adaptations to climate change.

This approach has gained popularity over the production function approach in the recent past because of the various advantages it has over production function approach. First, the ability to automatically take into accounts the farmer's adaptation responses and secondly, it is cost effectiveness. This is because the Ricardian approach can rely on secondary data whereas the production function approach would require extensive experimentation, which is expensive (Deressa, 2007)



## 2.5. Conceptual Framework

A conceptual framework is a visual presentation that explains the variables studied and the relationship among them, (Miles and Huberman, 1994). The conceptual framework as shown in below will depict the relationship between the independent variables, the moderating variable the intervening variable.

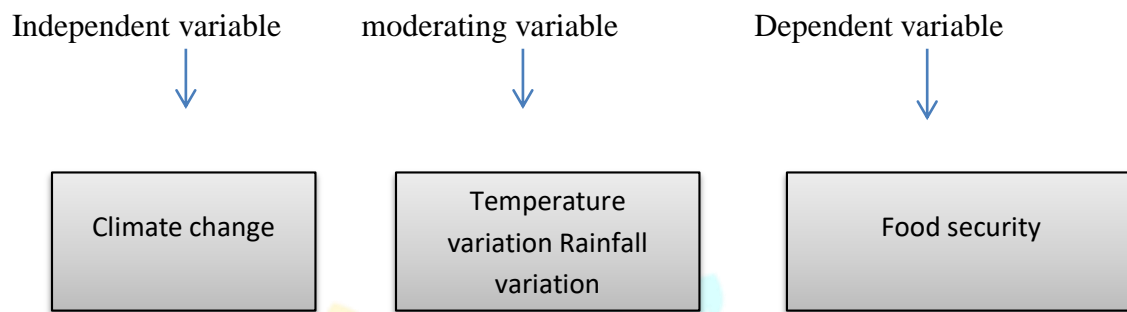


Figure 2. 1: Conceptual Framework

Source: Jere (2022)



## **RESEARCH METHODOLOGY**

### **3.0. Introduction**

This section provides a detailed analysis on the sample, data collection and analysis tools used in carrying out the research. Study limitations and ethical standards that the researcher faced during the research respectively, are also presented in this section.

### **3.1 Research Approach**

The study employs both qualitative and quantitative approaches for the researcher to learn and establish the effects of climate change on food security in a detailed way and offset the weaknesses of using one research paradigm. As argued by McMillan and Schumacher (2001), qualitative research provides very valuable data as it is a means to describe the characteristics of an existing phenomenon systematically, factually, and accurately. With respect to this, the researcher thought it necessary to use Qualitative design because it is an appropriate way the study can explore detailed information about effects of climate change on food security. For this particular research, qualitative approach is also deemed suitable because the study aiming at understanding and exploring an area where the previous knowledge is very limited.

However, it is impossible to conduct a research free of statistical description hence quantitative approaches will be adopted as well. This is where data is treated in quantitative form such as numbers and percentages or any attributes that can be ordered in terms of magnitude (Schutt 2004). As such, this approach allows the researcher to make some statistical inferences and present data in some statistical format such as tables, graphs, charts rather than text only.

### **3.2 Research Design**

There are a number of research strategies that a research may be able to employ, namely, experiment, case study, grounded theory, ethnography, survey and action research (Bryman 2004, p.84). Research design provides the glue that holds the research project together. For the purpose of this research, a case study was used because it provides more realistic responses than a purely statistical survey.

### **3.3 Population of the Study**

The target population of this study was 150 participants from area T/A Kilupula. This number covers all community members and Environmental Officers

Table 3. 1: Showing population of the study

Respondents	Target population	Sample size	Percentage
-------------	-------------------	-------------	------------

Environmental officers	100	30	30
Community development officers	50	15	30
	150	45	60

**Source: Jere (2022)**

### 3.4 Sample Size

A sample size of 150 was comprising of 5 development officers from the administration level and the rest from other personnel of the organization. This represents 30% of the entire population of the area of study. This agrees with Kerlinger (1986) who noted that a sample size of at least 30% is a good representation of the entire population. For development officers a sample size of 15 staff will use the purposive sampling technique. Though the study should cover more community members, the sample size has been chosen because of time and constraints of resources. 45 community members was used for the study.

### 3.5 Sampling technique

Sampling deals with the process of selecting elements from the population to simply represent the population (Schutt, 2003). It mainly deals with the question of generalization. For the purpose of the study, simple random sampling and purposive sampling were used.

#### 3.5.1 Random Sampling Technique

According to Dodge (2003) random sampling technique is a technique where the researcher select subjects for study from a large population of people then draw conclusion basing on the response of randomly selected group of people 60 household of men and women were selected by counting from 1-5 houses the researcher gave a questionnaire to every fifth household so that they can give out information on the effects of climate on food security among vulnerable groups in the area of TA Kilupula, karonga If in the previous fifth house a questionnaire is given to a female person then in the other fifth house a questionnaire is given to a male person.

#### 3.5.2 Purposive Sampling

Purposive sampling on the other hand which is a non-probability sampling was used because the researcher wished to study a small subset of larger population. Purposive sampling was used on key informants who give out the required information because of their knowledge, experience and position in the society (Russell, 1996). However, results for purposive sampling may be misleading due to bias of the researcher in selecting respondents. The researcher used purposive sampling in the research to exercise personal choices in selecting appropriate sample units. This enabled

the researcher to purposely acquire information from the Chiefs, Agriculture, Development and Environment Officers and from those people who work in NGOs concerning the effects of climate change on food security among vulnerable groups.

### **3.6 Data Collection Tools**

In order to explore in-depth data, the study used a mixed research approach, that is, both primary and secondary research instruments

#### **3.6.1 Primary Data**

The Primary Data in this research mainly come from interviews that were conducted. A number of relevant questions were asked in connection with the research problem. The primary data collection methods included the following: Questionnaires, Focus Group Discussion, Observation and Key informant interviews.

##### **3.6.1.1 Questionnaires**

Questionnaire is one of the data collection instruments, which the researcher used. The questionnaires were administered to 60 household men and women in order to get their views and opinions on the effects of climate change on food security in the area of T/A Kilupula. In Karonga. The questionnaire was used because it targets a wider group of respondents, it eliminates bias, and most importantly, the researcher was able to get that information that cannot be readily given face to face, especially that information that deals with community perceptions and attitudes

##### **3.6.1.2 Focus group Discussion**

The other data collection instrument, which the researcher used, is the focus group discussion. Mc Laughlin and Jordan (2003) add that the key to focus groups is participant chemistry, the combination of similar individuals, a moderator encourages them to share their views and non-threatening, non-judgmental environment produces a group dynamic that eliminates participants' inhibition and embodies them to air their true feelings on the subject at hand (Ibid, 341)

##### **3.6.1.3 Key informant interviews**

With the interviews, the researcher clarifies any question that is difficult and the researcher had a chance to ask the respondents to expand on answers that are particularly important. The researcher looking for explanations from the Environmental Officers, Agriculture development Officers, NGOs during the interview on the effects of climate change on food security among vulnerable groups in the area of Traditional of Kilupula in Karonga District



### **3.7 Data Analysis and interpretation**

Both quantitative and qualitative data were collected. Quantitative data analysis employed Microsoft Office Excel 2010 and SPSS. Frequency distribution and percentages were used for the quantitative data analysis. Tables, charts and graphs were used to ensure easy understanding of the analyses.

### **3.8 Limitations and Delimitations of the study**

#### **3.8.1 Limitations**

Any scientific research has its own limitation and this study is no exception. The major weakness of this research is the lack of literature on climate change and food security as major focus has been written on effects of climate change on floods. The study may face financial constraints. Being self-sponsored activity, the exercise proved to be expensive for a student considering travel, printing of materials, photocopying and telephone cost that will incur during the data collection period. Limitations also arise with the use of interviews as it involves qualitative evaluation and therefore the results must be judged subjectively. It is possible that the influence of the interviewer may become more important than that of the interviewee; the interviewer is in control and their agenda is what matters.

#### **3.8.2 Delimitations**

The worth and significance of this research cannot be underestimated for a number of reasons. By abiding to scientific norms of research, the researcher met the required standards within the field of Community development. The use of the combination of data sources such as interviews, questionnaires and focus group discussions increased the likelihood that the phenomenon under study understands from various points of view. And the use of both probability and non-probability helped the researcher to overcome these weaknesses for the validity and reliability of this research.

### **3.9 Ethical consideration**

Because this study dealt with human beings, it was necessary to understand the ethical and legal responsibilities of conducting research (McMillan, 2010). Primarily, ethics clearance was sought from the University of Fort Hare. Having obtained ethics clearance from the DMI University, the next step entailed seeking clearance from the District Commissioners and District Agriculture Development office in Karonga district. Considering that the study was conducted in a rural setting, clearance was also obtained from the chieftainship of the area. The study observed informed consent where, assurances of confidentiality and anonymity were given to all participants. Respondents were thoroughly briefed on the purpose of the study, the intended use of the data obtained from them as well as the potential result of the study.

### **3.10 Summary**

This chapter has covered issues to do with the whole research methodology. The chapter has also explained that the study approach is Qualitative. Other relevant things covered in this chapter includes study area and why that area, sampling procedures and sample size. Data collection methods, data preparation, and analysis have been explained in this chapter.

**CHAPTER FOUR****RESEARCH FINDINGS AND DISCUSSION****4.0 Introduction**

Emphasis should be made from the onset that the presentation of the findings is done in relation with the objective of the study as presented in chapter one. In order to investigate the effects of climate change on food security in T/A Kilupula, GVH Mwantende, Karonga district, questionnaire was submitted interviewed by the researcher and the data were collected in two weeks. During the interviews, respondents were asked to outline their responses on the effects change climate. The data acquired in this chapter has been derived from primary sources which involved a questionnaire and key informant interview.

**4.1. Age of respondents**

The researcher used SPSS and Microsoft excels software's to analyze quantitative data. The researcher found that the majority respondents are in the age range of 40-49 and 50- 65 with 33.9% and 32.2% respectively. This category comprises of people with experience in climate change effects on food security. Frequency table and a pie chart in fig 2 below shows.

Table 4. 1: Showing age of respondents

Age		
	Frequency	Percent
15-29	10	15.31%
30-39	20	20.41%
40-49	15	33.90%
50-65	25	32.20%
Total	<b>60</b>	<b>100%</b>

Source: Jere, 2022

**4.1.1 Age group respondents**

The percentage of the age group of the sampled population ranged from 11.86 percent aged between the age group of 15-29 years,22.03 percent of between 30-39 years, 33.90 percent of those between 40 -65 and above. The variation in percentage were done due to the fact that many of the age group between 15-29 were mostly young people below marriage age while that of the age group between 50-65 and above is the high because people of this age have much experience in climate change effects on food security.

#### 4.1.2 Occupation of respondents

The researcher also found what the respondents do for a living during the time of the research study. The findings show that out of the sample population of 30 respondents they do small scale farming which help them to earn a living which is representing 60. And 20 respondents do business especially selling charcoal and timber a development which shows that most of them cut down trees unnecessary. And 9 percent are working in different work environment as shown in the table 3 below:

Table 4. 2: showing occupation of respondents

Occupation of participants		
Description	Frequency	Percent
Farming	30	60 %
Business	20	30 %
Work	9	9%
<b>TOTAL</b>	<b>59</b>	<b>100</b>

Source: Jere 2022

#### 4.2 Discussions of the findings

The main objective of the study was to analyze the effects of climate change on food security.

**4.2.1. Objective one:** To establish activities that are taking place in the area T/A Mwantende, Karonga district that are contributing to climate change. According to the findings of the research Community members are also responsible for climate change effects on food insecurity. At Mwantende community, deforestation and land degradation is rampant. This is evident in that when community members want to make money, they cut down trees for charcoal burning for selling. 50. % of the community members said; ‘our means of earning a living is burning charcoal. *We have nothing to do for a living apart from burning charcoal of which we sell in town and that clearing a new plot of land for cultivation is money making work. However currently we are unable to make more money because of scarcity of trees for charcoal burning and this is making as to travel long distance to get trees for charcoal burning.*’

According to the findings of the research the 10% in the area of T/A Kilupula, GVH Mwantende -Karonga district revealed out that the villagers do have the tendency of cutting down trees which they use for constructing houses and opening up of new farmland little is done to replace trees. Environmental officer, Agriculture development officers added that the villagers cannot stop cutting down trees because they make ends meet through these trees for their survival; for example, firewood, charcoal for sale, molding bricks for sale and building their houses

The research also found out that population growth is another contributing factor that has led to the change of the environment. According to the results from the research 40% of the household men and women stated that; there is early marriages in the area due to school dropout among girls hence there has been an increase in birth rate which leads to a rapid growth in the population and this growth in the population has affected the state of the land because although the population is rapidly increasing the land has remained constant over time thereby creating a fight over the limited resource (land). With this population growth in the area land cannot cater for everybody so this results into survival of the fittest on the available resources that land can offer such as agriculture and construction, so this uncontrollable growth leads to the depletion of the land itself and its resources which results in climate change. Details of the findings are illustrated in the graph below:

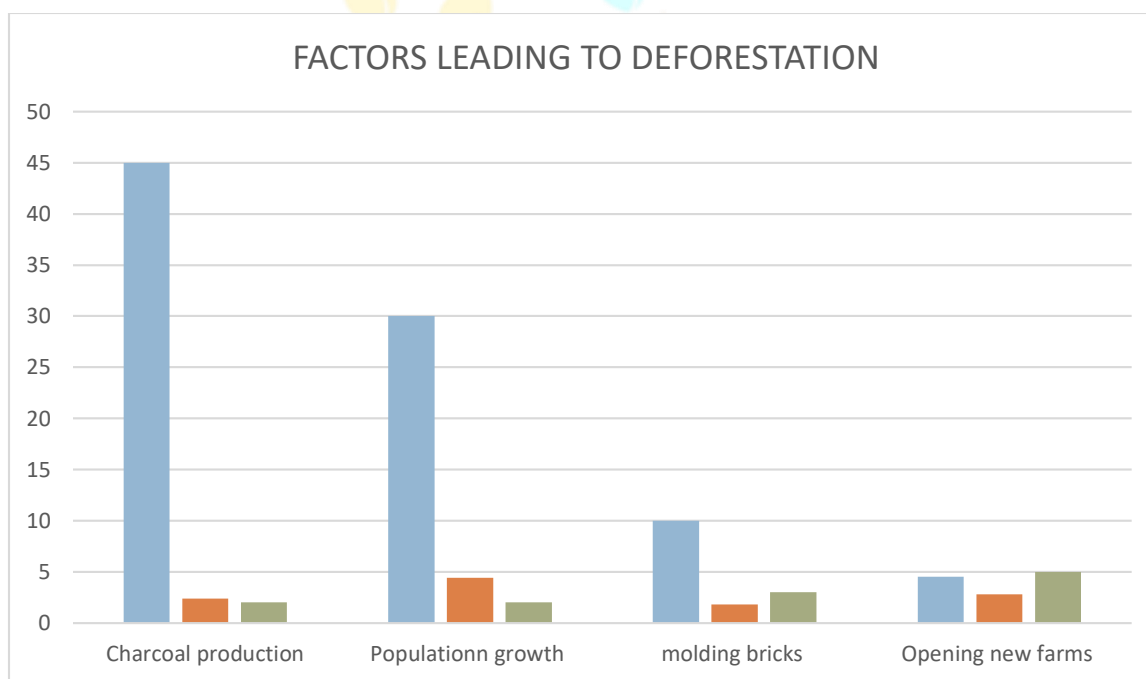


Figure 4. 1: Showing factors leading to deforestation

Source: Jere (2022)

**4.2.2. Objective two:** Investigate the effects of Climate change on food insecurity to the wellbeing of people. According to the results of the research findings 30% stated that in recent years they are no longer experiencing enough rains; there are so many indicators of climate change that are evident and can be observed in our everyday lives, rainfall patterns have drastically changed therefore affecting farmers a lot for they rely on these patterns so as to plant their crops. Climate change reduces farm productivity and enhances food insecurity, which increases the chance of malnutrition among women and children.

*25% of the Community members who also tend to be farmers expressed their concern that; at first we used to harvest bumper yields but nowadays the harvest has drastically gone down due to the change of weather patterns. "Dry spells*



*have resulted in poor yields or total crop failure, leading to serious food shortages, hunger among female headed households, and the elderly*

People in the area of Mwantende are now uncertain of when to plant. 10 % of the household men and women stated that said that Farmers now opt for short-season hybrid maize and rice varieties because the growing season is shorter. Rainfall patterns have hindered the growing of long-season local indigenous maize varieties hence most families have little food to eat. For example, maize used to be grown in November, but it is now being grown in December/January.

According to the research findings, several interviews from key informants indicate 10 % of the community members are unable to participate in development activities due to hunger. This happens most of the time when community members sleep without eating and are psychologically affected. It was in rear instances that community members do take part in development activities when they have not eaten anything and being psychologically affected. Low participation in development activities also happens when they travel around looking for food in other communities. One community member from T/A Kilupula, Mwantende, Karonga district said; *“I lost concentration every time when I work up with an empty stomach because I am powerless to work in the field. This made me to stay idle at home because I always think of how I am to work in the field without strength”*

When a community member experience physical or psychological trauma in rural area, they tend to be unable to participate in development activities and even manage to assist themselves. This kind of effect was evident when one community member from GVH Mwantende a said. *“I started to stay away from working in the field which I used to do starting from the time my food stocks were out of stock”*. He attributed this to the change in rainfall distribution on food security of which he suffered and experienced because he did not have anything to eat and have strength to work in the field.

Respondents who were interviewed from Mwantende community, 13% confessed to have experienced psychological hurt said that; *“I experienced psychological hurt because had nothing to do with life especially when it came to what to eat and how to acquire basic needs for my family. My family members had to ask me to provide something for them to eat and that they expected me to do so in as far as my responsibility is but I could not do anything”*.

Here is an observation of the 5 % of the FGD participants at Mwantende, community members revealed that most households revealed that they do not have enough food to cater for all members in their families. This in turn makes family members to suffer from climate change related effects on food insecurity, such as malnutrition, and its related diseases due to unavailability of food. Parents and care takers are also unable to provide the necessary care and support to their children and other family members. At T/A Kilupula, Mwantende -Karonga district, due to inadequate of rains it leads to low food production as a result malnutrition is common among most people, especially children of which in turn make students to drop out from school.

A health officer also commented that food being a basic need it is important for survival, growth and good health. If food is not taken in the right proportions, the individual develops deficiency disease and fails to participate in

productive activities. A hungry child will not be able to learn well at school, as a result, he or she will be failure hence unproductive citizens. Other teachers that were also interviewed commented the same thing. 6% of the respondents admitted that due to shorten of rainfall there is high food prices due to low production that increases food insecurity. This is evidenced by the graph 2 below

### Effects of climate change on food security at T/A Mwantende, Karonga district

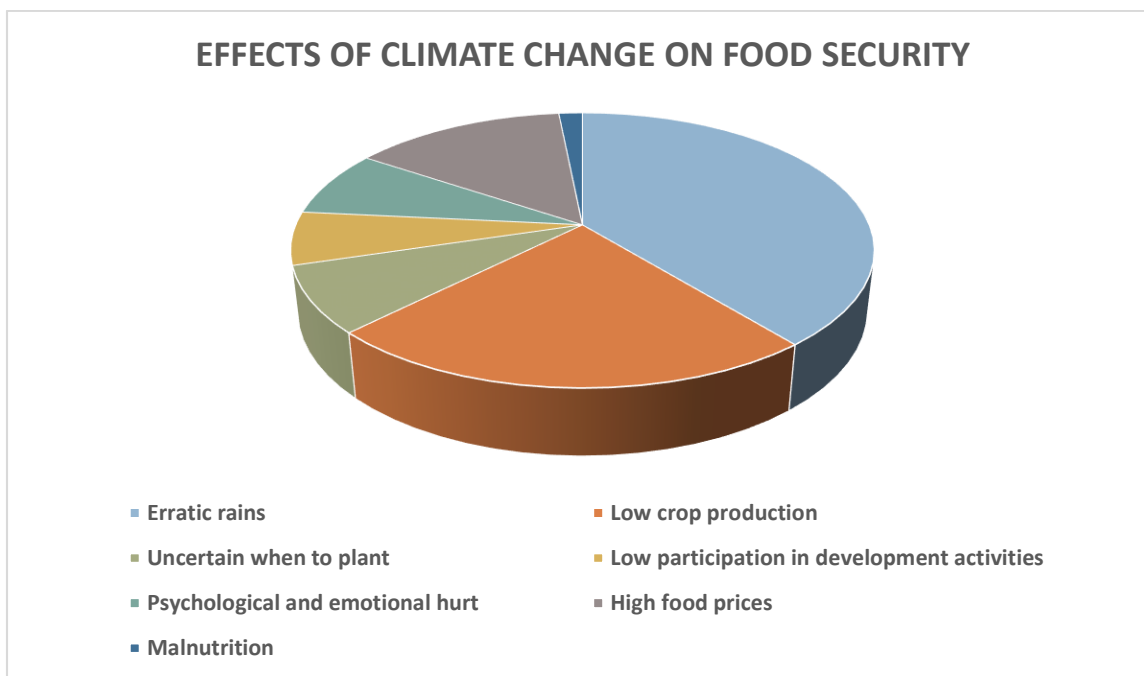


Figure 4. 2: Effects of climate change of food security

Source: Jere 2022

**4.2.3. Objective three:** To find out how community members coping with climate change effects on food security. The research went further to out how community members coping with climate change effects on food security. At T/A Kilupula, Mwantende, 30% of the community members commented said that “community members are trying their best in coping up with climate change by growing different crops that are more resilient to weather changes and less water”. The finding also shows that 5% of the respondents commented that more people are practicing small scale livestock production; more people are rearing goats and chicken. These animals are sold during disasters i.e. drought., 5% indicated that they rely on remittances, doing piece works in exchange for food or money to purchase food, doing small businesses, exchange of household items with food, sales of fish, sales of household assets and selling of locally brewed beer

Malawi Red Cross Society Field Officer, revealed that “people are coping up with climate change by working hard in planting more trees. For instance, they managed to plant 2600 tree seedling of which 500 were planted along Songwe and Mtakisi rivers”. 20% of the respondents said that to cope up with climate change we are practicing crop rotation so that we have food all the time if other crops fail. According to the results of the findings of the research the 25 % of the community members agreed with the FDG for environment, agriculture and development officers

commented that *community members are planting more trees to avoid land degradation which left the land bare*. Respondents who were interviewed from T/A Kilupula, Mwantende community, 10 % commented that” climate change effects on food security result into Food rationing – affected communities reduce meal frequency to once a day as they struggle to cope with food shortage brought by droughts or floods. This may have diverse negative impacts on nutritional health”. Men leave their families also in search of piecework in neighboring Tanzania to make earn meat putting their families at risk as well of family insecurity.

According to the results of the findings of the research 30 % of the participant also contributed that the Use of manure is gradually being adopted to supplement use of inorganic fertilizers use of manure are being encouraged as the modest way of conservation farming. According to the results of the findings of the research the 25 % of the participant said *that communities are coping up with climate change by adding Legumes in farming to generate nitrogen in the soil*”.

Figure 5 illustrate the findings from respondents.

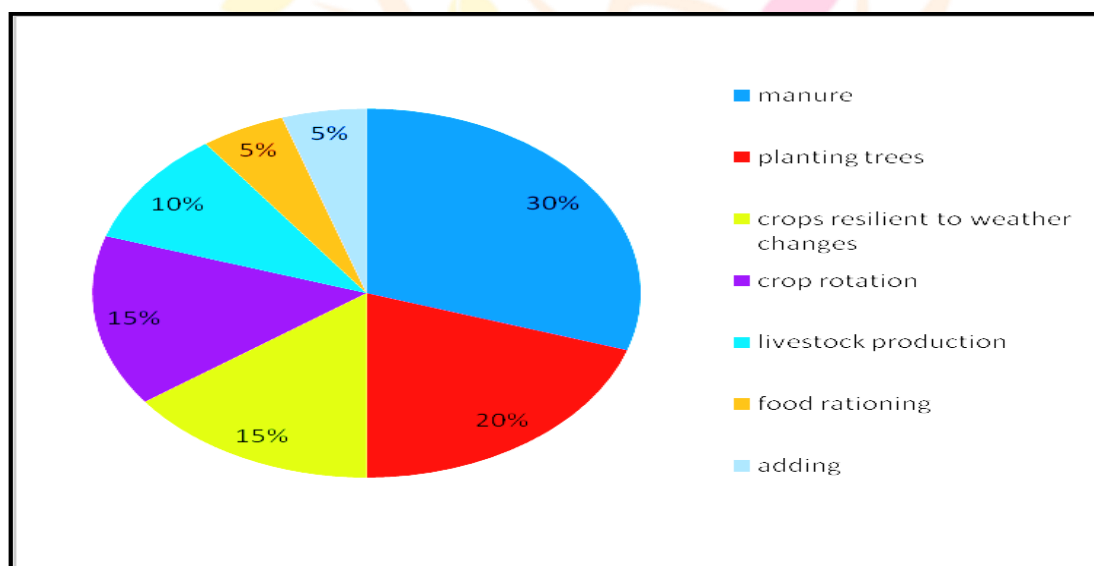


Figure 4. 3: Illustrating the findings from respondents

**4.2.4. Objective four:** To recommend on what should be done in order to minimize the effects of climate change on food security in the area of T/A Kilupula, Mwantende. According to the results from the research 25 % of the respondents in Focus Group discussion commented that *there should also be re-afforestation programs where trees are replanted in the communities to help solve the problem of deforestation which is one of the activities that contributes to climate change thereby reducing the onset and cessation of rains resulting into a food shortage*.

The findings also show that 25% percent of the Community members also acknowledged the need for population control policies to be at the forefront in the efforts towards addressing climate change effects considering that they are the people and custodians of practices that promote the effects of climate change. Community members agreed

that for instance, overpopulation is causing resources depletion and environmental degradation that threaten life support systems on which we all depend.

According to the results of the findings 20 % of the respondents suggested that *the area should develop laws that will regulate the cutting down of trees by tobacco estates and charcoal business that are situated in the upland areas from the source of the river.* Environmental officer suggested that *the laws should include enforcement of planting trees by estate owners as well as communities. Communities should also stop the practice of carelessly cutting down.*

Songwe River Basin Management Program Environmental Expert, contributed that *our organization has really stepped up to tackle climate change we are encouraging community members to use small scale irrigation, crop diversification and agro- forestry programmers to compliment farming livelihood.* On the same 30% of the respondents said that it would be more helpful if they put much focus on irrigation farming because it might enable them to harvest twice all year since they face a lot of problems when their crops fail in their fields.

Agriculture Extension Development Coordinator for Kaporo North Extension Planning Area commented that *“the best course of action we can tackle is to take care more about how we use our land and diversify the crops, fruits and animals we grow. This will enable communities to survive despite the heavy effects of climate change on food security as people will still have something to eat”* as shown in the graph below:

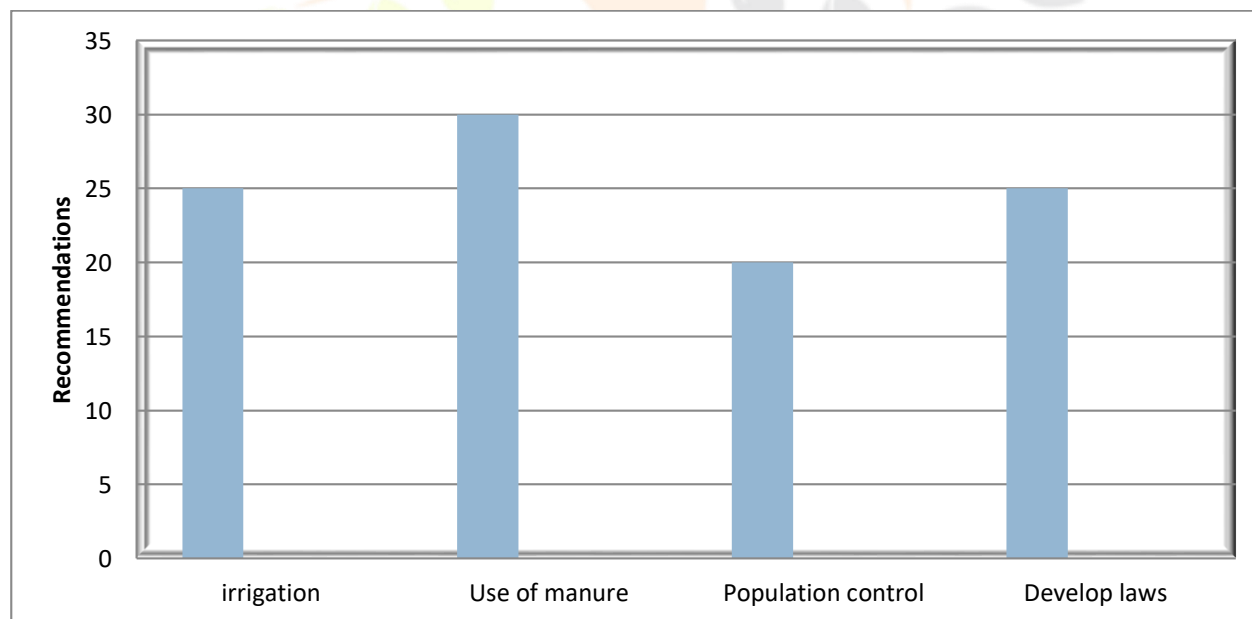


Figure 4. 4: Showing recommendations

## **CONCLUSION AND RECOMMENDATIONS**

### **5.0 Introduction**

This chapter presents a summary of conclusions and recommendations of the study. It is hoped that the recommendations presented here will contribute to future making of policies geared towards combating the effects of climate change on food security. These recommendations have been drafted to contribute to the challenge of halting food security that result into the growth of climate change.

### **5.1 Conclusion**

Research has been done all around the world regarding the topic of climate change effects but little has been researched regarding the extent of this problem to food security in rural areas. This research helped to add some knowledge regarding this gap that exists.

The results of the findings from the area of T/A Kilupula, Mwantende, Karonga district show that they carry out some activities that are contributing to climate change. For example, they just cut down trees for charcoal burning; constructing tobacco curing shades but they do not plant new trees.

The research looked at a number of objectives and the first one was to look at the activities that contributes to climate change effects on food security. The food security threat posed by climate change is great for T/A Mwantende, Karonga district where agricultural yields and per capita food production have been steadily declining. It was established that climate change has really affected the area understudy as rainfall patterns has changed which is reducing productivity, the rate of malnutrition is also high. Many people also become psychological hurt, low harvest and poor living condition. Addressing existing effects of climate change on food security, the people from T/A Kilupula, Mwantende, Karonga district stated that the effects of climate change can be minimizing if they can practice irrigation farming so that they can harvest twice in a year.

They also stated that they have to plant trees since climate change is hitting them so hard. They also recommended that the area should develop laws that will regulate the cutting down of trees. They also acknowledged the need for population control policies to be at the forefront.

### **5.2 Recommendations**

In view of the foregoing, the following specific recommendations are hereby being made to address the effects climate change on food security in T/A Kilupula, Mwantende, Karonga district

From a social development perspective, an adaptation strategy for the area should build on the capacity of communities to reduce their own vulnerabilities, diversify incomes and livelihood sources, and strengthen their capacity to cope with and mitigate the effects of climate variability. A community-based approach to adaptation



should not be shaped as a stand-alone response to climate change, but rather be based on principles of empowerment and participation in effective community-driven approaches to development.

In order to overcome climate change effects on food security, the Government must seriously implement policies that must dwell much on reforestation so that most people can take part in planting trees

I would recommend that Government and Nongovernmental organization and other private sectors must implement more projects that should aiming at civic educating people on the causes of climate change and implications it can bring about if they do not plant trees.

I would like to recommend Government to come up with policies that would aim at reducing dependence on fire wood because a lot of people like the cutting down of trees for the purpose of having fire wood, so this is contributing to climate change.

I would like to encourage Government to come up with policies that would encourage irrigation farming so that they can have food even if their crops fail in the field due to low rainfall.

### **5.2.1 Suggestion for further research**

Although the study has been exhaustive, the researcher recommends further studies on the phenomenon of climate change given the very dynamic society we live in. Studies should be conducted to ascertain why, despite concerted efforts in terms of policy and legal interventions, climate change effects are on an increase. The studies will not only widen the knowledge base, but also provide a viable way forward



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## APPENDIX 1: LETTER OF INTRODUCTION

Dear Respondent,

I am a student at DMI pursuing Master's Degree in Community Development. As a partial fulfilment of the Masters course, I am conducting a study on the effects of climate change on food security in T/A Kilupula, Mwantende, Karonga district

Please take a few moments to answer the attached questionnaire. Your contributions and answers will be treated with utmost confidentiality and no names of staff members will be published in the final research document.

Your assistance and cooperation will be highly appreciated.



Yours Sincerely,

SHEPHERD JERE



## APPENDIX 2: QUESTIONNAIRE

The general objective of this study is to determine the on the effects of climate change on food security. The study will focus on in T/Kilupula, Mwantende, Karonga district

The following questionnaire has been developed to help the researcher gather information necessary to answer the research questions of the study. Kindly fill it appropriately.

### **IMPACT OF CLIMATE CHANGE ON FOOD SECURITY AMONG VUNERABLE GROUPS: A CASE STUDY OF T/A KILUPULA, MWANTENDE- KARONGA DISTRICT**

#### **QUESTIONNAIRE FOR COMMUNITY MEMBERS**

##### **INSTRUCTIONS**

- a. Please do not write your name on the questionnaire
- b. You are required to tick the answer of your choice when answering multiple choice Questions
- c. This is not a test but opportunity to voluntarily participate in research study

1. Sex      Male  
              Female

2. Age group    15-29  
                    30-39  
                    40-49  
                    50-65

3. What do you do for a living?

- (a) Business
- (b) Farming
- (c) Work



**4. OBJECTIVE 1: To establish activities that are taking place in the T/A Mwantende, Karonga district that is contributing to climate change effects on food security**

What are some of the activities that are taking place in T/A Mwantende, Karonga district that are contributing to food security problem due to climate change?

.....  
.....  
.....

**5. OBJECTIVE 2: To evaluate the effects of climate change on food security in the area of T/A Kilupula, Mwantende, Karonga district**

a. In your view has inadequate of rains affected overall food availability?

Yes      No

b. If yes, what kind of effects are people facing on food availability in terms of rainfall shorten?

.....  
.....  
.....

**6. OBJECTIVE 3: To find out how community members cop with this problem of climate change effects on food security**

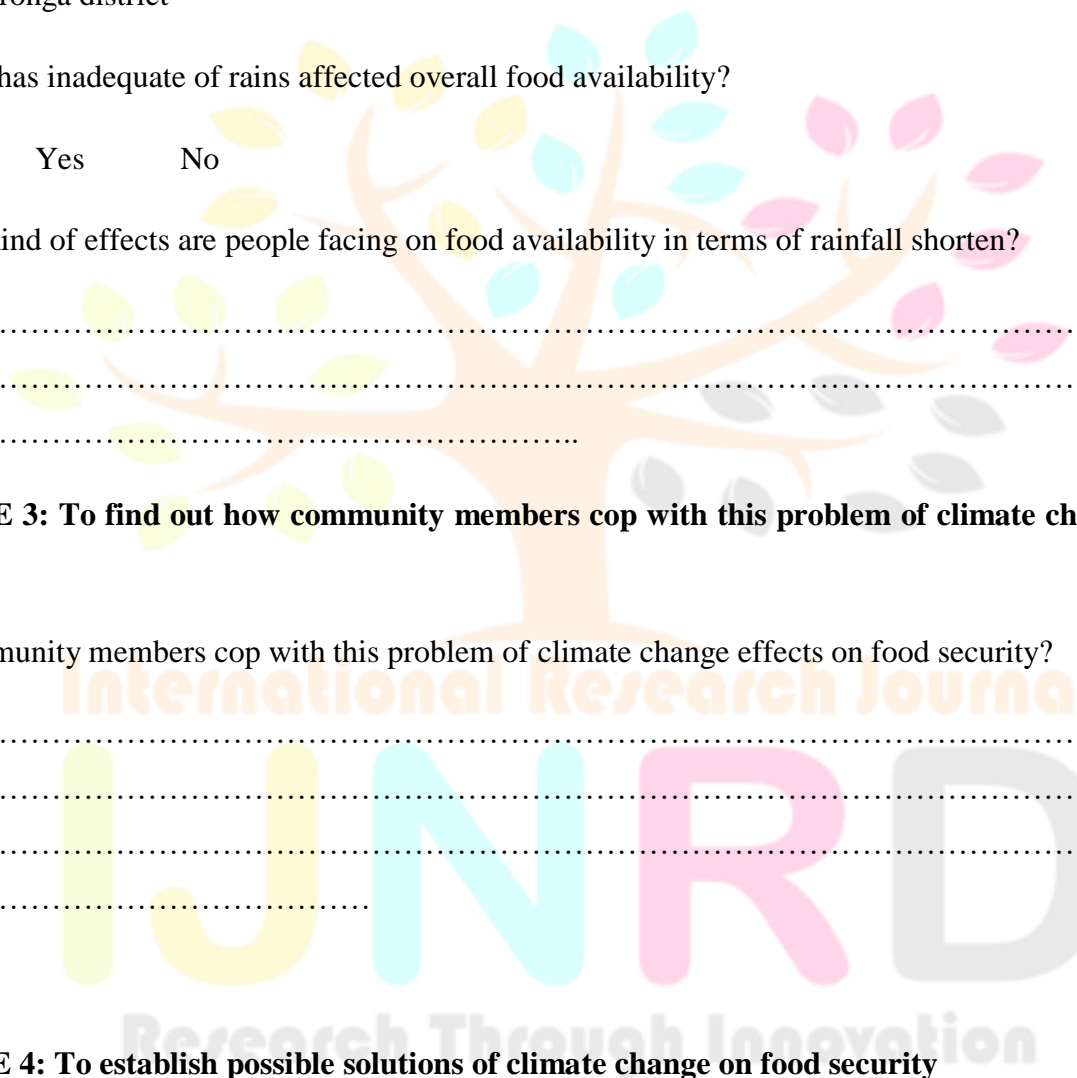
a. How do community members cop with this problem of climate change effects on food security?

.....  
.....  
.....  
.....

**7. OBJECTIVE 4: To establish possible solutions of climate change on food security**

a. What should be done in order to minimize the effects that have been brought by the changes in the coming of rains to food availability?

.....  
.....  
.....  
.....



**Appendices 2**

**QUESTIONNAIRE FOR KEY INFORMANTS**

1. Name of institution.....

2. What are the principal goals/functions of your institution?

.....  
.....  
.....

**3. OBJECTIVE 1: To establish activities that are taking place in the area of Mwantende that is contributing to climate change effects**

What are some that activities that are contributing to climate change effects on food security in the area of T/A Kilupula, Karonga district

.....  
.....  
.....

**4. OBJECTIVE 2: To evaluate the effects of climate change on food security in the area of T/A Kilupula, Karonga district**

a. What are the effects of the change in rainfall pattern on food security?

.....  
.....  
.....

**5. OBJECTIVE 3: To find out how community members in the area of T/A Kilupula, Karonga district cop with this problem of climate change effects on food security**

a. How do community members cop with this problem of climate change effects on food security?

.....  
.....  
.....

**6. OBJECTIVE 4: To establish possible solutions of climate change on food security in the area of T/A**

Kilupula, Karonga district

a. What do you suggest should be done to minimize the effects of climate change on food security in the area of T/A Kilupula Karonga District?

.....  
.....  
.....

b. What initiatives have been taken by your institution to address the issue of climate change to promote food security in the area of T/A Kilupula, Karonga District?

.....  
.....

