Gender and Climate Change in Malawi. Understanding the impacts on agricultural production systems and food security.

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Preface

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Special thanks also go to the GRO GEST for the support, it is very expensive to support a student like me throughout my studies. To my family and friends, thank you for the distractions that made me cope up with the pressure school exerted, the long phones calls, and the encouraging words were so helpful.

All in all, I owe it all to God.

Abstract

Most sub -Saharan African (SSA) countries including Malawi, rely on agriculture for food, income, and poverty reduction. The current and anticipated effects of climate change threaten the agricultural sector which is largely dominated by women. Worse still, there is limited information available on gender-related decision-making in resource allocation which influences climate change mitigation and adaptation legislations. Understanding the gender disparities among different rural households is a critical aspect in informing the gender policy on key climate change responses. This essay examines how the distinctive effects of climate change regarding agricultural production and food security affect Malawian men and women differently. With the Sustainable Livelihood Framework and the framework for building resilient food systems amidst climate change, the essay seeks to understand how gender roles intertwine in the process of climate change. The essay has based its inferences from available literature in countries that are contextually related to Malawi as the data from Malawi. The essay further employs an intersectional lens in the discussion and draws upon empirical evidence on the gendered effects of climate change. The essay finds that indeed women's vulnerability has been increased with the consequences that have come about with climate change. From the analysis, men and women seem to experience climate variations distinctively and this also affects how they adapt to the changes. It is imperative to understand such gender dimensions for policymakers to facilitate more gender-sensitive approaches to agricultural production systems and food security systems which would then improve the quality of life for Malawians.

Keywords: ***Climate change, gender, food insecurity, agriculture, intersectionality, Malawi***

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List of Abbreviations

CSA	Climate Smart Agriculture program
DFID	Department for International Development
FAO	Food and Agriculture Organization
FISD	Farm Input Subsidy Program
GoM	Government of Malawi
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IPCC	Intergovernmental Panel on Climate Change
MVAC	Malawi vulnerability assessment committee
NSO	National Statistical Office
SLF	Sustainable Livelihoods Framework
SSA	Sub- Saharan Africa
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
WFP	World Food Program

1 Introduction

1.1 The status of food security in Malawi

The definition that guides the discussion on food security in the context of Malawi is that of the 1996 World Food Summit Plan of Action. It defines food security as a condition that exists when everyone has access to affordable, sufficient, safe, and nutritious food to meet their dietary needs and food preferences for active life (Food and Agricultural Organisation [FA0], 1996). Malawi was one of the developing African countries that committed to employing strategies to achieve national food security. However, the progress towards achieving food security has rather been inconsistent and Malawi remains a food-insecure country (Jones et al., 2014).

In 2018, 3.3 million Malawians were food insecure, 1.8 million in 2019, and 2.6 million in 2020 (World Bank, 2020). In addition to this, four quantitative poverty analyses for Malawi have been done since the late 1990s and have shown consistently that between 50-55 percent of all Malawians have consumption levels below the poverty line (World Bank, 2013).

These data suggest that these individuals do not have enough access to foods that are required by an average person, based on the basic-needs poverty line set for recommended caloric requirements for an individual; an average adult in Malawi must consume 150 kg of maize in a year to fulfil the calorie requirements (World Bank, 2018). Studies have found out that rural Malawians who are primarily engaged in farming constitute about 80 percent of the overall population and they are most likely to have deficient food consumption when they are contrasted to the rest of the population (World Bank, 2008; United States Agency for International Development [USAID],2021).

For a comprehensive examination of the food security status in Malawi at a smallholder farmers' household level, this essay focuses on maize, which is a principal staple food in Malawi. Unfortunately, most food insecurity aggregations do not reflect the considerable variations in the food security of households within the country (Jones et al., 2014). Studies have found out that within the households themselves, the degree to which individuals have access to sufficient food may vary by their sex, age, or labour contribution (World Bank, 2018; Jones et al., 2014).

From this definition, it is worth noting and emphasize that food production does not mean food security. Food security can therefore be defined as the reliable access to food and its proper use to meet its dietary needs (FAO, 1996). According to Food and Agriculture Organisation, food security is made up of four aspects (FAO, 1996).

- Availability: Enough appropriate foods from own production, domestic production, or imports are available within reasonable proximity to all individuals.
- Access: Individuals have adequate incomes or other resources to buy, barter, or otherwise obtain enough appropriate foods to maintain an adequate diet. This dimension draws from the observations of Sen (1981) on the critical importance of entitlements to food to ensure food security, rather than food availability alone.
- Stability: Stability is conditioned to how frequent food availability is. This is the sequential and risk-related dimension of food security (Gross et al., 2000).
- Utilization: This is described as how value addition and the processing of food are properly done, it measures how sufficient knowledge of nutrition and childcare techniques exists and is applied (USAID, 1992). This dimension reflects dietary intake as an immediate determinant of the nutritional well-being of an individual, with food security as one of several underlying determinants of nutritional status (United Nations Children's Fund [UNICEF], 1990).

The conceptualization of how Malawians can become food secure has resulted in a production-based focus on food security strategies (Hadju et al., 2009). This has further resulted in the view that households' own production of food for themselves should be the dominant means by which Malawians are to become food secure (Government of Malawi [GoM], 2006; GoM, 2014).

1.2 National policies and institutions around food security in Malawi

Malawi developed its first national food security policy in 1998, which was then later revised in 2006, then 2014 respectively (GoM, 2014). As of current, the 2006 policy is being used since 2014 is currently in draft form. The 2006 national food security policy recognizes that market mechanisms are important for ensuring food security and commits the government to establish legislation, practices, and mechanisms to ensure competition in the market for food, food products, and agricultural inputs.

There are no details regarding specific actions government will take to deepen and strengthen Malawi's food markets, the policy's principal approach to achieving national food security remains increased own production of food crops (Clapp, 2017).

In terms of the institutional architecture, because food security is commonly perceived as a function of adequate food crop production, the Ministry of Agriculture is considered the

center of the action to ensure Malawians have reliable access to food. Reflective of this responsibility, the Ministry held the name "Ministry of Agriculture and Food Security" for many years through 2014, and in 2020 this name was restored.

The political leadership of the country has consistently considered this ministry to be responsible for carrying out the government's duty to ensure food security for Malawian citizens. More recently, social safety net programs have been added to support access to food for vulnerable Malawian households (World Bank, 2018). When crop production problems have led to food shortages for vulnerable households in the past, the government has always worked with its development partners to provide those households directly with food (World Bank, 2018).

1.3 Climate change situation in Malawi

Climate change affects food availability, access, and the much broader issue of food security. Malawi is one of the 12 countries most vulnerable to the adverse effects of climate change in the world and has low resilience to climate change (World Bank, 2010). The heavy reliance on rainfed agriculture by smallholder farmers is susceptible to the negative effects of climate change (International Fund for Agricultural Development [IFAD], 2020).

Studies have attested to the detrimental effects of climate change on agricultural productivity and ecosystem services (Aberman et al., 2018; Keane et al., 2009). The effects of climate change effects are highly contextualized, and people from westernized countries may not suffer the consequences as much. Research has predicted that the effects of climate change will much more detrimental to non-westernized countries already vulnerable (Keane et al., 2009).

Malawi relies heavily on rainfed cultivation not only for food security and employment but for also, for increasing export earnings important for economic development (GoM, 2016). This means that the key climate stressors of heavier and less predictable rains, heatwaves, extended dry periods and changes in growing or planting seasons are fundamentally undermining its economic performance and food availability (GoM, 2016; Burvinic, 2006).

Climate change already smallholder farmers that mostly depend on rain-fed agriculture and other natural resources-based subsistence farming livelihoods (Irish aid, 2016). The wild effects of climatic hazards such as localized droughts and floods have been reoccurring which are leading to increased poor yields and total crop failure, thus exacerbating problems of food security and malnutrition (Irish aid, 2016).

It is predicted that the projected higher temperatures and lower precipitation (mainly in the Southern parts of Malawi) will cause stress and yield loss to heat and water-stress intolerant crops (World Bank, 2020; World Bank, 2021). There has also been a report on the anticipated significant decrease in production and productivity as well as net imports of maize by 2050 because of increased population growth, underscoring the need for stabilizing future maize productivity and yield (Zulu, 2016).

1.4 Gender context in Malawi in food security and climate change.

In Malawi, women are the main contributors to agriculture, producing 80 percent of the food that is consumed locally (FAO, 2011). However, in most cases, women own one-third of the agricultural holdings (FAO, 2011). Very often, we see that females' accessibility to farmland is through the husband, the head of the household (Berge et al., 2013). In addition, based on wide research, it has been mostly found that female managed plots on average are 12 percent smaller than those managed by males, in terms of productivity they are 25 percent less productive because of differing levels of opportunities that would enable them to improve their farming efficiency (Kilic et al., 2013).

The land issue is not the only constraint women are faced with, other factors could include gaps in education or knowledge levels, reduced additional labour, harmful norms, and minimal access to production resources (Karamba, 2015). Coupled with other gaps such as the technical know-how and skill in improved production practices, and the ability of labor smart farming methods (Ragasa et al., 2019). With the endured differences that most female smallholders have, the climatic shocks have increased the situation. Malawi's food production is highly dependent on rain-fed agriculture; this puts most farmland on water vulnerability when a drought strikes (Karamba, 2015).

With the huge reliance the nation has on rain-fed agriculture, having a reliable water source will enable a farmer to harness through the variant effects of climate change, but in terms of having access and control to these resources women seem to be on the lower side, this eventually leads to different levels of productivity in maize from the women or male-led farmlands (FAO, 2011).

In the concerted efforts of the state to provide support in the agricultural sector, the government of Malawi introduced the Farm Input Subsidy Program (FISP) (GoM, 2006). The program supports poor smallholder farmers targeted by community leaders by providing them with

improved seeds and fertilizers. The program has contributed to a notable increase in the productivity of maize in both male-led and female-led farmlands (Karamba, 2015). The initiative has led to the increased modern maize variety adoption by women because they get free chemical fertilizer which would be difficult for them to afford without support (Fischer, 2014).

However, the FISP program has been gender blind, the program has seen to benefit much to men-owned and led plots as compared to women (Fischer, 2014). As a result, there remains a persistent gender gap in agricultural productivity (Karamba, 2015). It has been estimated that enhancing gender equality in crop production would eventually give rise to the 7.3 percent increase in the sector and would lift at least 230,000 Malawians from poverty by a rise of 100 million in GDP (World Bank, 2015).

In looking at the production praxis that exists when farming subsistence and Cash crops, a baseline study was conducted to understand the decision-making dynamics that thrive in Malawian dual households (Aberman et al., 2015). Overall, it was found out that men held much more decision power over care and income realized from the cash crops. The same would follow from the income that was realized from the cash crops. Women, on the other hand, had high decision-making power around subsistence crops this was mainly because the food was sought for home consumption (Aberman et al., 2015).

Stroked with the motive to increase agricultural production amidst climate change, the Malawi Government introduced the Climate Smart Agriculture program (CSA). Climate-smart agriculture is defined as "agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes greenhouse gases (mitigation), and enhances achievement of national food security and development goals" (FAO, 2011). However, CSA adoption has not been popular amongst the smallholder farmers themselves (Lipper,2014). Hence the need for a comprehensive gender analysis on power dynamics that relate to climate-smart agricultural practices and resource allocation and resource distribution (Doss, 2013).

In addition to that, more studies have pointed out the major challenge that eventually leads to unequal participation in climate-smart agriculture is the lack of comprehensive gender research and data in the production of food and cash crops (UNDP, 2014). Drawing a comparison on some of the causes in the global south with much focus on Africa and Asia also revealed that women in most scenarios when allowed to make decisions and control certain aspects of the production that goes in a household, at most times look beyond product and eye on food security (Cramer et al.,2016).

It was therefore proposed that undertaking a deeper analysis to uncover the role of gender in agriculture would illustrate how best women's and men's needs can be met to increase agricultural production which would then lead to the reduction of food insecurity, all things equal a population with healthy citizens contributes to the reduction of poverty (Doss and Keiran, 2016).

1.5 Problem Statement

Studies have shown that the overall impact of climate change will be adverse, Most likely leading to food insecurity (Keanu, 2009). The most hit will be rural populations in the global South, who are commonly poor, vulnerable, and are already experiencing food insecurity, and these will be among the people who will be in dire need of development assistance to cope with climate change patterns (IPCC, 2007). In many cases, those that are marginalized and of the lower class in the global South are the ones who will be heavily affected by the effects of climate change and may not be able to recover from them (Nelson et al., 2010).

In Malawi, women constitute 80 percent of the agricultural labor force, with 70 percent of these residing in rural areas (Hyder and Behrman, 2014). Reviews on gender-responsive climate service found out that socio-cultural norms that define women's and men's labor roles are the biggest influence in the resource use and decision-making that affects the conflicting climate needs and demand for both genders irrespective of their respective roles in food production (Gumucio et al., 2019).

In many cultures, norms and cultural institutions that hold male voices on the top have emancipated and prolonged the inequalities women face. Inducing gender equality programs or policies should therefore involve deliberate efforts to induce the decision power women have over themselves and their lives especially in rural empowerment programs (Booth et al., 2006).

It is therefore imperative to address gender inequality in agriculture because this is the dominant sector that most women are involved in, and it is the sector that Malawi's GDP depends on. However, addressing gender in agriculture will require support from other areas such as climate change because that is what is affecting their agriculture interventions. Empowering women in increasing their accessibility to resources and assets will help in achieving many gains in the long run, there will be an improvement in human life and this, in turn, will add to the aspect of sustainable development. It will also help enable women to have a decision on adoption practices that goes beyond food production in households.

1.6. Main objective and research questions

The objective of this essay is to examine how the differential effects of climate change regarding agricultural production and food security affect men and women in Malawi.

Further, the paper is guided by the following interlined research question:

a) How does climate change induce the differential vulnerabilities regarding food production between men and women?
b) How does climate change induce the differential vulnerabilities regarding food security between men and women?

For the sake of this study, an analysis of the gendered impacts of agriculture and climate change in Malawi will be made through the conceptualization of the Sustainable Livelihoods Framework (DFID, 2001). The Sustainable Livelihoods approach has evolved from three decades of changing perspectives on wellbeing, how poor people construct their lives, and the importance of structures and institutions, Collins (2002), and in this paper, the poor people are the smallholder's Malawian farmers.

The framework will be used to contextualize how upsets that arise through climate change affect the vulnerability marginality between the different genders in crop production amidst the processes of policy and structures such as governments and civil society.

In the context of studying differential adaptations of men and women to climate and seasonal changes, the analysis will be guided by a concept of climate change as a process (Babu and Bloom, 2014). The concept identifies gender relations as key immediate factors in determining how fast communities can adapt to climate change and how effective they can be in making their food system climate resilient. Gender dynamics have been recognized as a key factor in the adoption of technologies, that are considered climate-smart; yet little is known about how to go beyond the adoption of climate-smart agriculture practices to a holistic approach to transform the food system into a climate-resilient one (Jost et al., 2014; Pinca, 2016).

The analysis that will be given in the chapters will use intersectionality that was originally developed by Kimberle Crenshaw. However, in this analysis, intersectionality will be analysed along with its interactions with gender, ethnicity, and other categories of difference in an individual's life for example education, and how all these outcomes are based on the interactions of power (Davis, 2008). Furthermore, the analysis will adopt its discussion topics guided by a rapid scoping study that was used to draw the gaps and linkages that occur in gender and climate change by a literature review that was conducted on some of the global south´s developing countries (Dimitriades and Espein, 2008).

The discussion topics were selected because they give a clear description of the differential impacts that climate change portrays over the different sexes and its categorical inference of poor developing countries like Malawi. Two topics of discussion were selected namely: a) Gendered impacts of climate change in relation to agricultural production, b) Gendered impacts of climate change in relation to food security.

2 Theoretical and Conceptual Framework

2.1 The Sustainable Livelihoods Framework

Wide research on poverty deprivation has shown tha0t women experience in poverty is different from men (FAO,2011), this can be further exacerbated with the effect of a shock (Buvinic, 2013). The Department for International Development developed and uses this livelihood framework to analyse peoples access to resources and their diverse livelihoods activities, and relationship between relevant factors at micro, intermediate and macro level (DFID, 2001).

To date, most impact assessments regarding climate change adaptation in Malawi focus on the standard measures of poverty and consumption that are used as proxy for nutrition indicators (DFID, 2001). This framework goes beyond the aspects of people's lives and looks at more of the social aspects than narrow quantitative variables and how elements such as social capital play a figurative role in community structures (DFID, 2001).

A second feature of the framework is that it recognises people themselves, that they are responsible for their decisions in their livelihood aspirations. In many cases, poor people, which in a case of Malawi a rural agrarian farmer, is regarded as a passive recipient of government policies or external aid which is far from depicting the reality.

Below the framework for sustainable livelihoods is illustrated. The framework further, recognises and can be used to understand the changes of external actions and how they result into people's own actions.

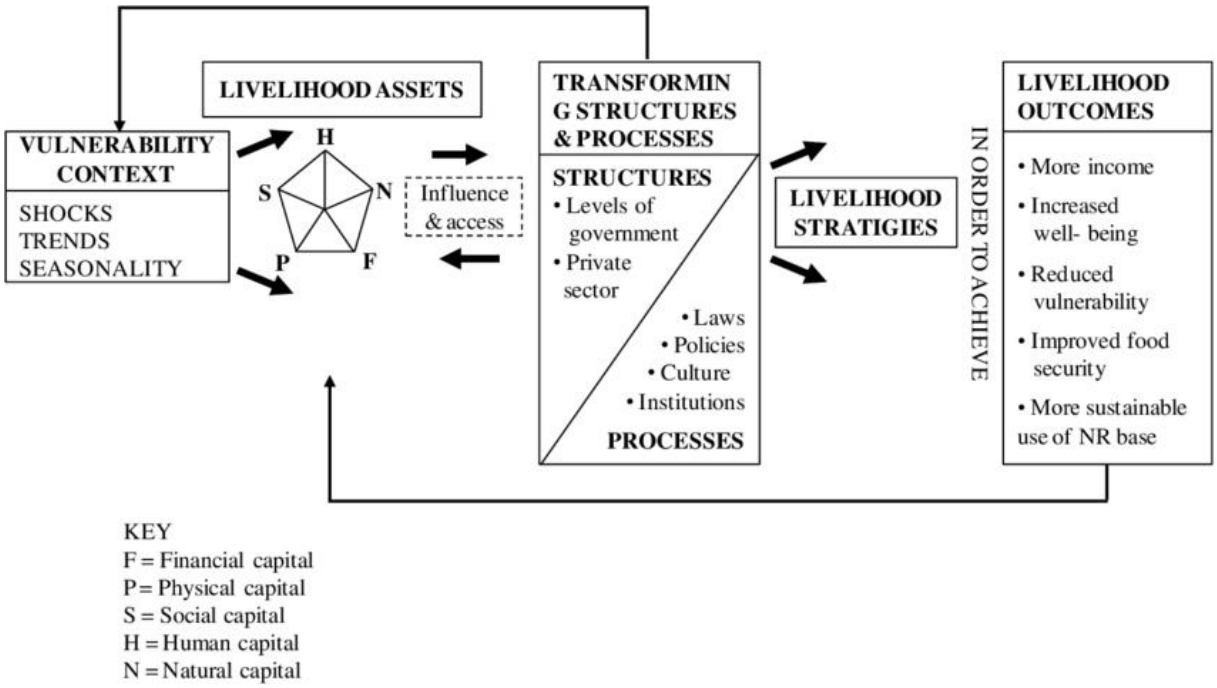

Figure 1: The Sustainable Development Framework (Source: DFID, 2001 page 1).

In this framework, the amount of assets one owns, together with the policies in place, institutions available, feed into the livelihood strategy one must live with. The livelihood outcome is then formed from the conditions, this is where one is considered better off or worse off. However, these outcomes do not represent an endpoint, they feed back into a future cycle which later feeds into the system again.

The vulnerability contexts encompass shocks as to regards to climate change as to our focus, trends in population, resources for example process and seasonality which in our case would be agricultural production and employment opportunities. Vulnerability here refers to things that are outside people's control (DFID, 2001). It is usually negative, but it can also provide positive opportunities.

People's livelihood strategies are then affected by the policies, institutions and they continually affect how people use and access their assets. These encompasses of all the formal and informal institutions that shape livelihoods by influencing access to adaptation strategies, assets, livelihoods strategies and vulnerability. These processes occur at multiple levels from household to community and national level.

In terms of the livelihood outcomes, for a positive achievement and change it means households that had easy access to information and were on the higher level of the social structures, or institutional support led to the quick adaptation in response to climate change. The ability

for women to adopt the adoption strategies is highly dependent on the assets they have in their possession as well as sociocultural contexts. Many factors may influence how climate change affects the well-being of women and men differently. For example, in many African households the decision power of control and access rests on the man, to understand and improve a response to climate change faced by the different genders a power analysis in households should be conducted (Carr, 2013).

2.2 A framework for Building Resilient Food Systems amidst Climate Change.

Building and expanding on the SLF, the conceptual framework below presents a set of three processes of studying climate change implications in relation to gender dynamics and building resilient food systems. The framework is considered as 'loose continuum' from the pre- climate and post adaptive in combination of the three factors that underline all the process that are presented below (Babu and Bloom, 2014).

In the pre-climate change stage, farmers' traditional practices are identified and studied. In stage two, the period when the climate change impact is realized, farmers' adaptation strategies are studied; in the third stage, we look at how such adaptive measures could result in resilient food systems. In all three stages, three sets of factors combine to facilitate the transition. For the purposes of this study, gender relations are a defining factor in all three sets of factors: underlying, intermediate, and immediate.

This helps us explore how, at various stages of the process of adaptation to climate change, gender relations and their dynamics can help use better understand the process and further help in developing policies and programs that are gender sensitive and more sustainable in the context of community-level strategies.

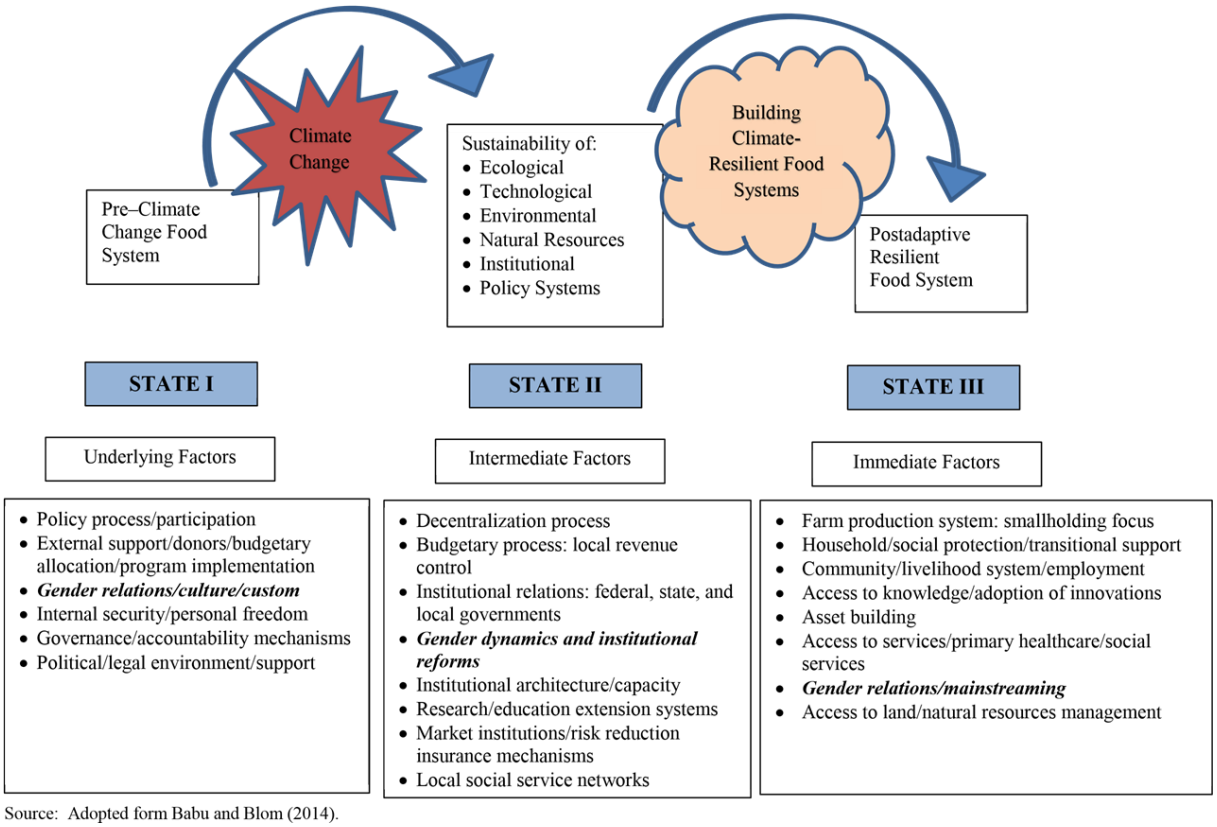

Figure 2: A Framework for Building Resilient Food Systems amidst Climate Change (Source : Babu and Bloom , 2014 page 5)

In the set of underlying factors, the following elements explained below form the broad basis for developing adaptation strategies moving toward resilient food systems. The policy process, which helps define the policy space and the participation of various actors and players, determines how climate change and resilient food systems appear in the policy agenda, policy design, adoption, implementation, and evaluation. In this process, the effectiveness of implementation also depends on the external support of development partners, combined with the budget allocation for specific programs and interventions.

Furthermore, gender relations, tradition, and customs play important roles in the policy process in identifying gender-based constraints. At the macro level, issues related to governance and accountability play an important role in the effectiveness of policy implementation. Finally, issues related to internal security and personal freedom play a major role in the adoption of strategies, as do the political and legal environments that help both men and women play their roles effectively in the adoption of strategies toward resilient food systems.

In many cases, seasonal changes accentuate the burden that is placed upon women, as they already face issues of gender disparities regarding access to, use of, and control over land and other productive resources. Barriers to women's access to and control over land are embedded

in traditional customary laws and discriminatory cultural practices at the community level, where men are regarded as heads of households and with land inheritance favours the male (Augoyi et al., 2011). This is common in Malawi, where a large percentage of females depend on the male counterpart for the provision of livelihoods incentives.

At the intermediate level, how the decision-making process operates in a country context is important. For example, countries (regional and decentralized governments) with a higher level of autonomy in the budgetary process and local revenue control can be more effective in facilitating the adaptive measures toward climate change. Institutional relations in terms of resource allocation, accountability, and reports at various levels can exert specific pressures to achieve the goals of climate change adaptations and resilience building (Babu and Bloom, 2014).

At this stage, how institutional reforms help mainstream gender relations becomes important. The capacity and interrelationships of local institutions matter as well. For example, the institutions that provide research and extension services and those that connect farmers to markets and risk-reduction mechanisms can shape the gender relations and their role in climate change adaptation and resilience building.

In most agrarian societies institutional characteristics such as access to extension and rural advisory services, are usually listed as a major indicator of adoption of innovation towards climate change and resilience building in communities (Modumbi, 2011). Access to extension rural advisory services is vital for climate change adaption and mitigation, as it provides farmers with information on weather data, new technology, and adaptation strategies, among others. In situations in which advisory services is not provided to farmers, chaos is set to follow because they wouldn't know what crop to plant or how to mitigate some climatic shocks.

The national government is responsible for the provision of an extension agent in each district to sensitize and provide up-to-date information on agricultural-related issues to farmers, although the coverage is not adequate (GoM, 2015). However, the differential roles and responsibilities of men and women in the community relating to social and economic activities and power relations make it difficult for certain individuals to benefit from extension services (Ngigi, 2009).

For instance, due to their multiple roles at the farm and household levels, women rarely participate in extension meetings due to limited time. This contributes to the difference in their understanding of climate change implications on their farming and food systems. Furthermore, the location and timing of meetings are unfavourable, especially to women in the study communities, as they would have to travel long distances to attend extension meetings (Ngigi, 2009).

The nature of farming systems, including land and water resource endowments and other resource constraints, can determine the nature of adaptations to climate change. Further, how communities are organized in terms of their livelihoods, mutual support, social protection, and access to knowledge can also influence gender relations and their differential roles of men and women in adapting to climate change (Goh, 2012). Such factors could further decide the nature of asset building among communities and access to land and other natural resources between men and women in all stages of climate change that lead the different levels of resilience of the food systems.

3 Analysis

3.1 Gendered Impacts of climate change in relation to Agricultural Production.

The agriculture sector in Malawi can be disaggregated by the objective of production between food production, including livestock, and the cash crop production on the other (GoM, 2015). Maize is the principal crop produced and the dominant staple food in almost all districts of Malawi (GoM, 2006).

Most households rely on their own food production as their own main source of food, this is because of the impending and unreliable food market prices and volatility, since people find it more expensive than their own production (Ragasa et al., 2019). The figure below depicts the rational choice of households in Malawi when approached with a choice to produce or buy food. The results below show information that was collected from 18 livelihood zones in Malawi, these zones are labelled very vulnerable; they all have a trend of being food insecure (GoM, 2017; GoM, 2021).

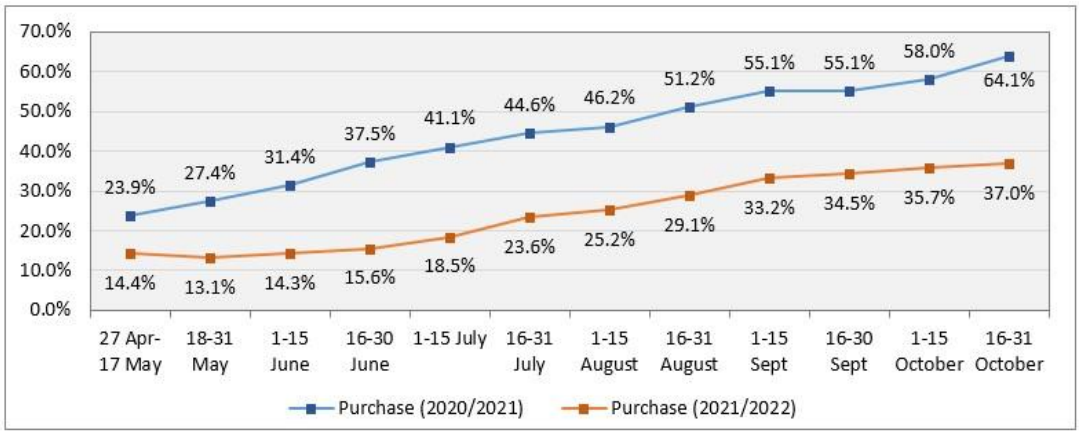

Figure 3: Percentage of households relying on purchase as the main source of food comparing 2020/2021 and 2021/2022 period (Source: GoM FEW-SNET ,2021; FAO data web)

Figure 3 shows the percentage decrease in the number of households that are depending on the food market. The figure depicts a 27.1 percent decrease from the record that was recorded last year, 2020, at the same time. In Malawi, when people are questioned about food, the response is always skewed to *Nsima*, a product that is made from the maize which is a dominant cuisine in most households (Ragasa et al., 2019; Mudenge et al., 2017). Malawi has in the past maintained a stable harvest and growing seasons, from the start of August and most households

harvest their crops and start replanting in early November. This decrease could be attributed to the result of unemployment that was spiked up with the COVID-19 pandemic. In most case scenarios, in an economy that people don't have enough money, finding cheaper alternatives to get food is what is often opted for, in this case farming.

The proportion of households relying on own food production as the main source of food was 33.2 percent higher as compared to 2020 (Figure 4).

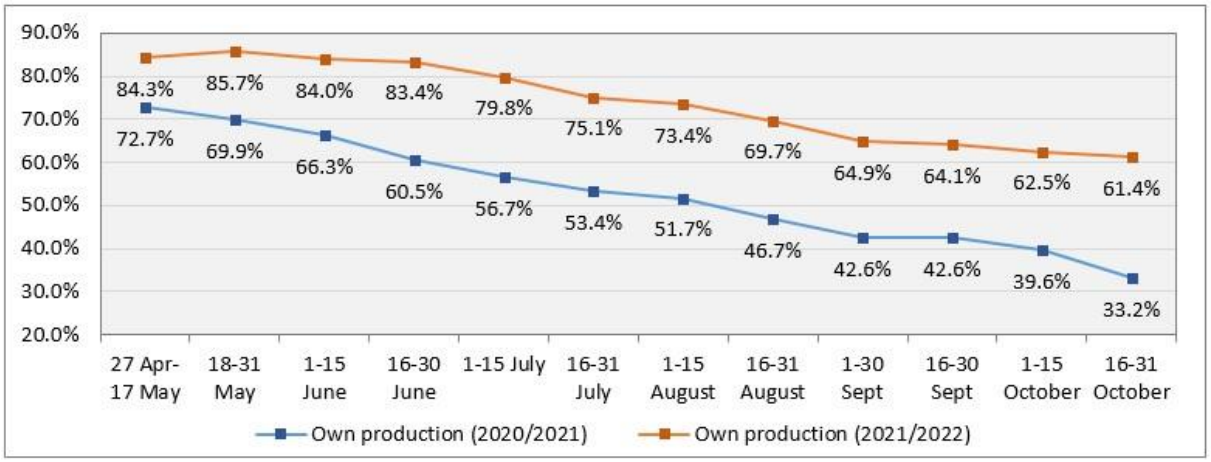

Figure 4: Percentage of households relying on own production as the main source of food comparing 2020/2021 and 2021/2022 period (Source: GoM FEWSNET, 2021; FAO Web)

From July to October 2021, there was a drop of reliance on own food production, which then induced the reliance in food purchase, this is highly attributed to the decrease in the in-food production that made households look for other food alternatives at the market (FAO, 2021).

Despite the increase in the number of people that are producing food for sustenance, low productivity remains a big challenge (GoM, 2021). Over the past years, climate change has led to unpredictable weather patterns, as of current, in Malawi each farming season has drought spans and floods (GoM, 2021). Even though the production of maize and other food products has increased, the increment will not be sufficient to cater for the remaining population that to meet their dietary requirements.

In Malawi, most agricultural production is rainfed, with only a few irrigated farms (International Food Policy Research Institute [IFPRI], 2016). In most instances, farms owned by women are limited and many don't have access to irrigation technologies or income to upgrade their farms. This has then contributed to the decrease in agricultural productivity by 25 percent

in female managed farms as compared male managed farms. This disparity is exacerbated by the difference in resource accessibility that eventually puts female farmers at a disadvantage (IFPRI, 2018).

When Malawi was hit with floods in 2015, many households farmlands were affected, this led to the increase in planting of trees and diversification of crops (IFPRI, 2016).Extension messages conveyed the importance of how deforestation is inducing floods in the districts, communities were told to diversify and plant other crops aside from maize that would mature early if floods were to come again the next season (GoM, 2015).Following this event, women's agency in terms of responsibilities would increase, because they would have to fend for their families through *ganyu* is casual labour that would be paid in the form of food rations or money enough for a bucket of maize when the food emergency handouts had been seized (IFPRI, 2016).

This means women would provide twice as much labour within their farms and neighbouring farms to feed the children at home. Men would only help their farm in most cases and spend the other hours chanting over beer (IFPRI, 2016). Some would migrate and never send remittances, this resulted into most houses being more vulnerable and this made more households food insecure (IFPRI, 2016).

While in Kenya, a study assessed the impacts of climate change and explored gender roles in the adaptation process in a pastoral community (Ongoro and Ogara, 2012). The results from the study showed that the impacts of climate change were unequally felt along the gender lines. With informal institutions that governed the gender roles, the study found that women were much more vulnerable to the effects of climate change compared to men. The women quickly adapted but it wasn't easy, they had formed social groups to ease share knowledge with fellow women for survival (Ongoro and Ogara, 2012).

Women formed income generating groups and merry go rounds, the formation of these social groups fostered social relationships within the community as a form of empowerment (Ongoro and Ogara, 2012). The results of this involvement brought about economic and social empowerment of the women. It was seen that women experienced obstacles from their husbands who did not allow them to join the groups because they feared women would be empowered adequately, which would lead to power imbalances (Ongoro and Ogara, 2012).

Using an intersectional lens, how individuals relate to climate change through agricultural adoption and adaptation depends on their positions in context-specific power structures based on social categorizations and attributes (Goh, 2012). It can be clearly seen in the adaptation

disparities what women in Kenya sought is not seen in Malawian contexts. The community relation that built up because of women coming together made women in Kenya self-reliant and empowered, they developed knowledge in business that enabled them to provide for their family in times of distress.

This could be related to the stereotypical gender roles that inform most empowerment programs in Malawi. In most interventions, business trainings are regarded are male opportunities while most that involve value addition, cooking etc. are considered appropriate for females (Mudege et al., 2017). These gender norms affect the limitation women face, thereby suppressing their capabilities.

In Malawi, gender norms strongly advise the roles men and women play in agricultural production and land use management .In most cases is conditioned by community culture use and the presence of patrilineal or matrilineal societies, as well as the institutional structures (Ragasa et al., 2019).Amidst climate change, some studies argued that the low productivity in agricultural production in the women plots is a result of the low adoption rate of climate smart initiatives by women farmers.

while indeed this may be true, there is a gap in evidence that seeks to respond/ support to the factors that induce the low adoption by women (Patel et al.,2014). In another study in Malawi, it was found that it wasn't a matter of choice, but factors such as that lack of access to credit, climate resilience information and decision-making power demotivated female farmers to adopt Climate Smart Agricultural (CSA) technologies. The lack of adoption of these technologies have been reported that they have further exacerbated the low agricultural productivity women face in food production (Murray et al., 2016).

Other studies, conducted in Malawi also suggest that addressing gender differences in agricultural production would decrease the inequality that is experienced through climate change. For example, a recent study in Malawi study suggested that hiring of more female extension workers could be more useful to both men and women (Fisher et al., 2014). This would lessen the gender gap that exists in the adoption of modern maize inputs when it comes to female and male farmers.

The Malawi government provides each district with an extension officer who sensitizes and provides up-to-date information on agricultural-related issues to farmers, though the coverage is not adequate (GoM,2017). Access to extension is a function of farmers' awareness and sensitization to the development and use of technologies (Modumbi ,2011). In Malawi, accessibility of extension services is much centered on the men, because women find it not accessible,

furthermore it was found that there the way extension is delivered expounds on these differences (Mudege et al., 2016). For instance, it was found that men had the opportunity to interact with extension officers while women would only access them during field demonstrations, some women were left out because of lack of land.

When looking at the aspect of access to and control of resources, we see how the country and other stakeholders induce the power dynamics that are existent. We see how the guidelines employed by the structures could either construct or re-enforce injustices between male and female farmers. For example, a study on land markets in Malawi found that user rights over land are well established and driven by inheritance (Berge et al., 2013).

When we look at the agrarian society in Malawi, it comprises of the poorest of the poor group, and based on their assessment they found out that selling out of land was deemed illegitimate (Berge et al., 2013). This depicts how the law, and the cultural values work together, to oppress female farmers. In an agrarian society, it is difficult for a woman on her own to raise money to even buy land, if so, it means she will buy land elsewhere, away from her family land.

Furthermore, to factor out the key drivers in a household setting that contribute to food security, a study compared households in Kenya and Uganda (Silvestri et al., 2015). The study found out that that unequal land access and ownership rights over productive resources and assets have further exacerbated the gendered impacts of climate change on agricultural productivity, but the access to land alone did not eventually lead to food security. The study further explored that besides land, other factors such as availability of farm inputs, labor, knowledge in farm technology, ownership of assets and accessibility of cropping technology are to combine if we are to make female headed households more food secure (Silvestri et al., 2015). This study calls for programming and policy that looks beyond addressing one issue in a developmental problem.

In Malawi those that have the patrilineal lineage, inheritance of land and resources is mostly to the male heir and to the matrilineal side, lineage is through the mother but will depend on the man they marry for financial support. The question of who has access and control over resources is important. However there exists a relationship of who controls the use of land and what the distribution of labor is going to be like. In the matrilineal side, even though the women would control the land, the supply of labor from the males would be too low, this then exerts pressure and the burden to produce on women (Munsu et al., 2020).

From the above examples, we see that asset i.e., all forms of assets as stipulated in the sustainable livelihoods framework, when they are accessed and controlled freely by women,

they could connotate a direct straight forward impact to agricultural production. In the agricultural sector we see that it is mostly women that actively participate, women would be able to make decisions on land they have proprietor rights on.

Although both men and women both put in much effort in agricultural production, because of increasing climate change effects, there still exists an unequal access to resources that still impedes on women production, moreover, responds to climate signals additional human hoards in the form of labor and time. Although both women and men may be involved in agricultural production women become overburdened due to other domestic chores they have to perform. The low contact with extension workers may be demanding a lot more time from women, which consequently contributes to their time demand for psychological and physical health.

In Malawi, despite having effects of climate change, considering agricultural and land policies, there is always a gap between law and practice. In conceptualizing the approach to climate change we see how gender relations amidst the institutions, tradition, and customs are shaped to conform to the dominant situated knowledge that sometimes inform the policy process (Babu and Bloom, 2014). Climate change is a process that is dependent on the political environment. The problem trickles back to the policies and institutions, if the policy instruments are not leveraging its activities in a gender-neutral way to small holders, a reform in the programming of the policies and institutions should take place.

In the feminist theory Harding (1991), it is argued that subjects are situated, and the products of power have subjects that are situated. A person´ situatedness or location in the intersection of power, is crucial for how she understands or perceives power. Small holder female Malawians, under the formal and informal institutions combined with their male counterparts seem to face the aspects of power dimensions that trickles down to them. The situated knowledge of expecting women to be resilient, persistent, submissive and take the role of care work without questions usually overburdens them.

While it may be interesting to analyze this in a power display, a study of how women themselves define their sense of agency (having too many roles) could also be sought to be understood, given that situated knowledge is not static, norms and values are continually in the need to be sought to understand a proposition of induced power relations that studies should be able to answer correctly. Institutional characteristics, such as access to land, financial services and extension and rural advisory services just to mention a few are also major indicator of low agricultural production which is associated adoption of innovation toward climate change and resilience building in communities.

3.2 Gendered Impacts of climate change in relation to Food Security

In Malawi, food security has been a constant element of agricultural policy since the colonial period. Consequently, national maize production serves as a suitable measure of food self-sufficiency in Malawi, at least for calorie consumption. The recent national food balance sheet computations assume Malawi's annual maize consumption requirement is about 2.75 million metric tons, at the individual lens it means one person is supposed to consume about 150 kg per year (Babu et al., 2018). Similarly, maize prices provide a suitable measure to the degree to which food is accessible to Malawians. The figure below addresses the production pattern of variety of foods in the 2021 cropping season.

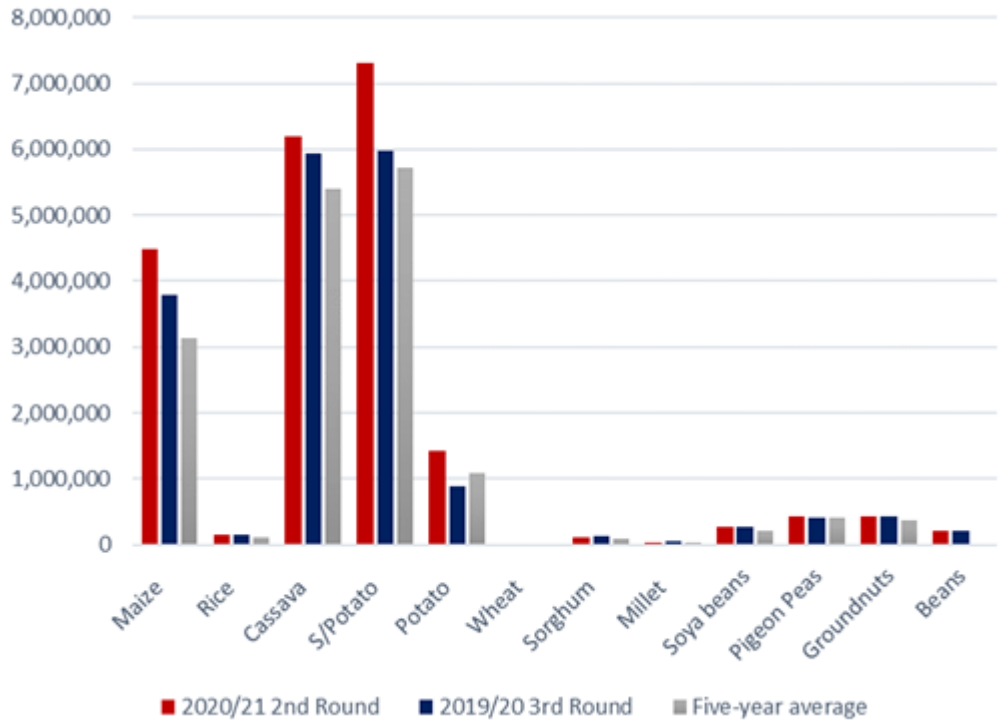

Figure 5: Production of food crops (MT) in the 2020/21 season, compared to the 2019/20 season in the different varieties of crops. (Source: FAO ,2021)

According to the second-round production estimates from the Ministry of Agriculture and Food Security, the production of maize and rice have been rather high compared to the last season and the five-year average. This has been shown by being 18 percent above last year and 43 percent above the five-year average (site). It was noted that, some households in the Lower Shire livelihood district zones Chikhwawa and Nsanje recorded reduced crop production in the current season due to prolonged seasons of drought (GoM FEWSNET, 2021; FAO, 2021).

Based on the data from the 18 livelihoods zones in Malawi, a comparison between female and male headed households in terms of food security was assessed (GoM, 2021). The results found an existing gender gap in each of the food insecurity indicators that were assessed on (the number of meals they have in a day, how many times they consume fish etc.) (MVAC, 2021). Female headed households were assessed to have fewer quality diets as compared to male headed households. From the Figure 6 we see that 13 percent of female headed households have a poor food consumption score compared to 7 percent in male headed households.

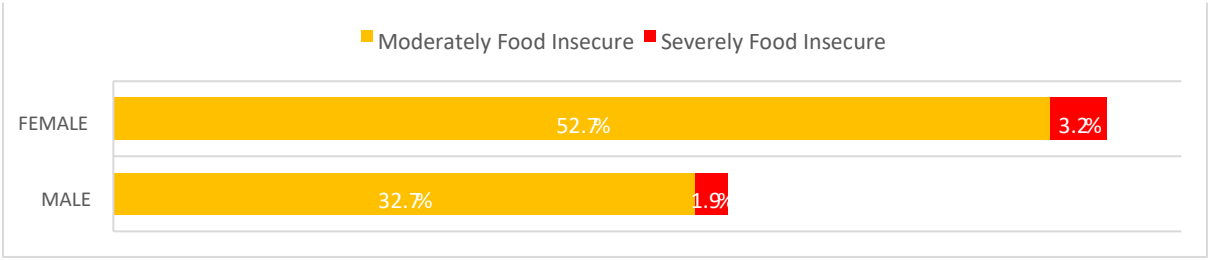

Figure 6: Food security status in male and female headed households (Source: GoM MVAC ,2021) page 37

From the statistic shown in Figure 6, it can note that these gender disparities that contributed to the maize production between male and female households could be a result of the different access to resources and technical know-how when it comes to climate change adoption practices (Fisher et al., 2014). This would eventually lead to food insecurity in the country and can be captured by the aspect of low food -sufficiency (Snapp et al., 2015).

The heavy reliance on maize as the only crop that provides food and the dependency on rainfed agriculture has resulted in the annual food shortages, without eliminating the effects of climate change (GoM, 2015). In Malawi, the data shows that 37 percent of children under five are stunted, only 8 percent of these children between the ages of 6-23 months are fed a minimum acceptable diet, and 33 percent of women are anaemic (NSO, 2017).

Much of the research in household food security has pointed out that most of the times female headed households are the ones that experience food insecurity than male headed households due to issues of constrained access to income, resources, labour, and prospects. A study that was conducted in Malawi and Kenya revealed that the collaboration between income and gender mattered mainly when it came to the proportion of the amount of money being controlled by women for household nourishment. It was found out in households where women controlled

the money, there was an outcome of having foods that had high caloric intake (Kennedy et al., 1992).

One study that was an assessment of gender gaps in male headed households concluded that increasing women's decision-making power and control in agriculture resulted into positive diets (Sraboni et al., 2014). Another study in Ghana found that women's empowerment is more strongly associated with the quality of infant and young child feeding practices and only weakly associated with child nutrition status (Malapit et al., 2015). Womens ´empowerment in credit decisions is positively and significantly correlated with women's dietary diversity but not necessarily body mass index. It was then proposed that improved nutritional status is not necessarily correlated with empowerment across all domains i.e., decision making and access (Malapit et al., 2015).

In examining the impacts of droughts in Kenya, it was found that when food shortages were rampant, women reduced their meal intakes (Serna, 2011). This presented a huge backlash in terms of health to lactating mothers and children (Serna, 2011). Men on the other hand found other means of earning an income, whereas women experienced body weaknesses that was caused by the low quantities of food intake whilst doing farm labour (Serna, 2011). From the examples above climate change affects all the household members, but the impact can be seen much more detrimental to women and children in terms of growth and development.

Other investigations on differential impacts of weather shocks on household welfare between men and women in Malawi have been studied (Asfaw and Maggio, 2017). The results of the study showed that temperature shocks had severe effects on household welfare. Further, household consumption, food consumption, and daily caloric intake also reduced due to temperature shocks. These negative welfare effects were more critical for households where land was exclusively managed by women.

Further, their results suggest that women's vulnerability to weather kicks was directly correlated to women's land tenure security. These results therefore shed more light on unequal gender impact of temperature shocks on households in Malawi. The study further analysed these impacts on male headed households, it was found that women would serve the husband and children first when the food levels where diminishing and this led to low caloric intake by women (Asfaw and Maggio, 2017).

Looking at the power dynamics that exists in male headed households in Malawi in relation to the production of subsistence and cash crops (Aberman et al., 2015). It was found that, men pay much attention to cash crops that fetch a higher market value. Contrasting women, pay

much attention to crops of subsistence and contribute more to home consumption (Aberman et al., 2015). The less attention that is paid on food crops, affects the produce, in many communities most men are the ones that get in contact with the extension officer. There have been reports of low information sharing that occurs between men and women in a household setting (Ragasa et al., 2019). This implicates the care that the subsistence crops need for improved productivity.

These later effects the supplements that the household would require for a nutritious meal, since the decision power of the income made from the cash crops rests on the men, women cannot provide an input on the amount of money that would add in the dietary needs of the family. In some of the crops that are grown in Malawi however, gender inequality echoes. For example, the way the tobacco market in Malawi is centred with a lot of travelling that is involved to and from the auction floors, women's absence affects their programming because most times they have other responsibilities when associations have meetings, this has then led to the gendered segmentation of the crop, in most cases husbands participate in these which results into the subliminal control of income from the proceeds (IFPRI, 2016).

Generally, in Malawi, the equal decision making on income within male headed households is rare and sometimes not present at all in many communities regardless of the whether you are in matrilineal or patrilineal setting (Anderson et al., 2018). On many occasions, in the lean seasons it is found that income raised by the male spouse is generally used for personal use and the income from the women that would be supplemented from casual labour was used to cover food expenses of the households (Anderson et al., 2018).

It is quite evident that women are given a double aside from conducting domestic chores of providing meals for their families, since they are primarily responsible for ensuring that the household has food, and they also reduce their meal intake. Alongside the gender norms that oversee communities of viewing the male counterpart as the household head. These power dynamics that are in the intrahousehold level and the gender division of responsibility stresses out women which may lead to the detrimental effects of their body's nutritional needs. An explanation of why body mass index seemed to have lowered in women during lean season is because of the triple role's women provide. Amidst the cultural norms, this provision of unproductive roles seems to be an acceptable norm in a community.

It is essential that national studies go beyond describing a household unit as a homogeneous unit, rather inferences should be made along the lines of decision power and how unproductive roles that are existent in households are perceived by both genders. Women are inherently sensitive to the effects of food insecurity and resulting nutritional deficiencies due to increased

needs during menstruation, pregnancy, and nursing. Furthermore, nutritional scarcity can be intensified by cultural practices that prioritize food provision to children and adult males. In a study done in Zimbabwe, (Hoddinott,2006) found out that adult women who were adversely affected by the droughts in terms of body mass index recovered at a faster rate as compared to under five children, the recovery also differed in well off to do households as compared to poor households.

Health and good nutrition of women in a household serves as an end to achieving sustainable food security and improved health in the household in the long run as well. The impact of poor health and nutrition in women is heavily affected by the whole household since it feeds into the food productivity and potentially to that of their children, through intergenerational effects (Ragasa et al., 2019).

In an agrarian household situation would mean that the woman would have to take care of the sick child, and with the demands that are there in climate change adaptation, women will not be able to perform their best in the far these transforms to the indirect impacts on agricultural productivity. A woman time is lost in taking care of the sick, as such this impends on the labour that is to be made available by the other household members, this eventually affects household productivity additionally, women may bear a greater burden to provide food for the family, when climate events occur.

In this scenario, we see the effect of womens' level of education, lack of income, and additionally with the lack of decision making in Malawi affects the impacts that they face in a male headed household. On the other hand, female headed households, do not usually have enough assets (livestock) that would be traded for or income that would help in supplementing dietary needs of the family (UNDP, 2008).

The treatment of women as a homogenous group among other generalizations and stereotypes has resulted into misleading information which has also contributed to the poor engendering in climate adaptation and agricultural program and policy plans which affect their nutritional aspect. This has also led to the misunderstanding of women's needs and priorities, caused by the widely missing differentiation of social categories among women such as age, lineage, status, ethnicity, and class. Many societies cannot see the connection of how these differentiated impacts could result into problematic effects of the different sexes.

From the literature, we see that food insecurity mostly affects women and children more in terms of health, growth and development which affect their human capital as compared to men. We see a lot of women not being able to eat full meals as they had to provide their food to the

husband and children. Drawing in an intersectional lens we see how norms direct the nutrient intake a household member can take in, and the availability of opportunities is dependent with the level of education, location, income, and class.

Drawing a comparison on some of the differential impacts of climate change in the different genders was rather difficult because some of the content either focused more on women and less on men or vice versa. This made their data, observations much more skewed on their needs of the research. It would be imperative to acknowledge that men and women include people of different social categories, such as education, class, ethnicity, and income, who interact with and are connected to each other in each context and over specific issues, including access to and control over resources and information. It is therefore important to ensure that all levels of climate change initiatives consider the interconnectedness of climate change and gender relations.

4 Conclusion

The effects of climate change are manifesting in the rural Malawian communities that strongly depend on the natural resources for their agrarian livelihoods and well-being. If not acted upon, climate change might become a more significant challenge in hampering sustainable development and poverty alleviation in the country. In this paper, the gender – climate change- smallholder agriculture nexus is analyzed through the perceptions of male and female farmers, the effect of climate change on their productivity, and their differential responses to the changes imposed on by climate change.

The essay presents empirical evidence of small holder male and female farmers experiences with climate change regarding food production and food security in Malawi. With the help from the empirical evidence surrounding other contexts of SSA, we see that climate change has serious repercussions and that the farmers´ resilience to these challenges is contextual based and cannot be generalized across different countries. From the reviewed evidence we also see how the impacts could be the same but the recovery rate and methods that are employed by women and men from these different contexts are different.

The essay discusses both food security and agricultural production across gendered households, mostly focusing on the individual experiences to climate change as it relates to men and women, since this was heavily dependent on the available literature. The essay further assessed the various circumstances that affect agricultural production and food security. It was analyzed that these factors such as level of education, access to land, access to extension services were correlated with household food security. In addition, having other sources of income and crop diversity were associated with better household food security, which demonstrates that having multiple streams of income strengthens food security.

The essay further brought to light how gender issues are deeply rooted in Malawian culture, world views, institutional arrangements, and legal and social systems and how these impede women. From the examples above, gender inequality within small holder farmers, is further exacerbated with the informal institutional structures that are developed or constructed through the values and norms each context.

The findings from this essay indicate that household food security and agricultural production could be improved if there were more recognition of different needs that would make both men and women responsible for achieving household security outcomes. The results also have implications for the future nutrition policy, since more than 30 percent of the children are

stunted (NSO, 2017). This demonstrates that there is a need of constructing a gendered approach that makes nutrition in a household a shared responsibility and not as a women's responsibility alone.

References

Aberman, Noora-Lisa, and Terrence Roopnaraine. (2015). To Sell or Consume? Exploring Gendered Household Decision-Making on Cash Crop Production, Consumption and Sales. Washington DC & Lilongwe, Malawi. https://doi.org/10.1007/s12571-020-01021-2

Aberman, Noora-lisa, Janice Meerman, and Todd Benson, eds. (2018). Agriculture, Food Security, and Nutrition in Malawi: Leveraging the Links. Food Policy. Washington DC: IFPRI.

Andersson-Djurfeldt, A., Hillbom, E., Mulwafu, W., Mvula, P., Djurfeldt, G. (2018). The family farms together, the decisions, however, are made by the man – matrilineal land tenure systems, welfare and decisionmaking in rural Malawi. Land Use Policy 70, 601–610.

Aoyagi, M., E. Suda, and T. Shinada. (2011). Gender Inclusion in Climate Change Adaption. ADBI Working Paper Series 309. Tokyo: Asian Development Bank.

Asfaw, S. and Maggio, G. (2017). Gender, weather shocks and welfare: Evidence from Malawi. The Journal of Development Studies, Vol. 54, Issue 2, 2018.https://doi.org/10.1080/00220388.2017.1283016

Babu, S. C., and S. Bloom. (2014). Capacity Development for Resilient Food Systems: Issues, Approaches, and Knowledge Gaps, Vol. 6. Washington, DC: International Food Policy Research Institute.

Babu, S. C. (2014). Policy Processes and Food Price Crises: A Framework for Analysis and Lessons from Country Studies. In Food Price Policy in an Era of Market Instability: A Political Economy Analysis, edited by P. Pinstrup-Andersen, 102–132. Oxford, UK: Oxford University Press.

Berge, E., Kambewa, D., Munthali, A., & Wiig, H. (2013). Lineage and land reforms in Malawi: Do matrilineal and patrilineal landholding systems represent a problem for land reforms in Malawi. Centre for Land Tenure Studies Working Paper 09/13. Norwegian University of Life Sciences.https://doi.org/10.1017/S0021932020000140

Béné C., Waid J., Jackson-deGraffenried M., Begum A., Chowdhury M., Skarin V., Rahman A., Islam N., Mamnun N., Mainuddin, K., and Amin S.M.A. (2015). Impact of climate-related shocks and stresses on nutrition and food security in selected areas of rural Bangladesh. Dhaka, the World Food Programme, 150 p.

Booth, D., Cammack, D., Harrigan, J., Kanyongolo, E., Mataure, M. and Ngwira, N.,. (2006) Drivers of change and development in Malawi, ODI Working Paper 216, London, 83p

Carr, Edward R. and Thompson, M., (2013). Gender and climate change adaptation in agrarian settings. Report prepared for USAID, Washington DC.

Clapp, J. (2017). "Food Self-Sufficiency: Making Sense of It, and When It Makes Sense. Food Policy 66:88–96.

Collins, J.P. (2002). May you live in interesting times: Using multidisciplinary and interdisciplinary programs to cope with change in the life sciences. Bioscience 52, 75-83.

Cramer, L., Foerch, W., Mutie, I., and Thornton, P.K., (2016). Connecting women, connecting men. How communities and organisations interact to strengthen adaptive capacity and good security in the face of climate change. Gender, Technology and Development, 20(2) 169-199.

Crenshaw, K. W. (1994/2005). Mapping the margins: Intersectionality, identity politics, and violence against women of color. In M. A. Fineman, & R. Mykitiuk (Eds.), The public nature of privateviolence (pp. 93–118). New York: Routledge.

Davis, K., (2008). Intersectionality as buzzword: a sociology of science perspective on whatmakes a feminist theory useful. Feminist Theory, 9 (1), 67–85.

Demetriades, J., and E. Esplen.(2008). The gender dimensions of poverty and climate change adaptation. IDS Bulletin, 39 (4): 24–31.

Department for International Development (2001): Sustainable Livelihoods Guidance Sheets. . https://www.ennonline.net/dfidsustainableliving

https://www.soas.ac.uk/cedep-demos/000_P528_RF_K3736-Demo/unit1/page_22.htm.

Doss, C. and Kieran, C., (2014), Standards for collecting sex-disaggregated data for gender analysis. A guide for researchers. Paper presented at the Workshop on Methods and Standards for Research on Gender and Agriculture, Montpellier June 19-21, 2013.

Eastin, J. (2018). Climate change and gender equality in developing states. *World Development*, Vol. 107, July 2018, Pages 289-305.

Esha Sraboni, Hazel J. Malapit, Agnes R. Quisumbing, Akhter U. Ahmed, (2014). Women's Empowerment in Agriculture: What Role for Food Security in Bangladesh, World Development, Volume 61, 2014, Pages 11-52.

Food and Agricultural Organisation. (1996). Rome Declaration on World Food Security and World Food Summit Plan of Action. Rome.

Food and Agricultural Organisation. (2011). Gender inequalities in rural employment in malawi policy context. Rome: Food and Agriculture Organization at the United Nations.

Food and Agricultural Organisation (2021). Food and Agriculture data. Malawi .https://www.fao.org/faostat/en/#home accessed November 2021

Fisher, M. and Kandiwa, V. (2014) .Can agricultural input subsidies reduce the gender gap in modern maize adoption? Evidence from Malawi, Food Policy 45, 101-111.

Gelzinis, G. and Steele, G. (2019). Climate change threatens the stability of the financial system. Centre for American progress.

Goh, A.H.X. (2012). A literature review of the gender-differentiated impacts of climate change on women's and men's assets and well-being in developing countries. CAPRi Working Paper No. 106.

Government of Malawi, National Food Security Policy. (2006). Ministry Agriculture and food security. Food Affairs Department, Malawi.

Government of Malawi. (2015). Malawi Agricultural Sector Wide Approach.

Government of Malawi. (2016). Strategic program for climate resilience: Malawi pilot program for climate resilience (PPCR). Available at: https://www.climateinvestmentfunds.org/sites/cif_enc/files/ppcr_strategic_program_for_climate_resilience_for_malawi.pdf. Accessed November 2021

Government of Malawi. (2019). Malawi 2019 Floods Post Disaster Needs Assessment (PDNA).

Government of Malawi. (2021). The Malawi vulnerability assessment committee (MVAC) National Food and nutrition security forecast, April 2020 to December 2021. Malawi: Lilongwe https://fews.net/southern-africa/malawi/food-security-outlook/june-2021.Acccesed November 2021.

Gross, R., H. Schoeneberger, H. Pfeifer, and H.-J. Preuss. (2000). "The Four Dimensions of Food and Nutrition Security: Definitions and Concepts." SCN News 20:20–25.

Gumucio, T., Hansen, J., Huyer, S., and Huysen, T. (2019). Gender-responsive rural climate services: a review of the literature. *Climate and Development*, 12:3, 241-254, DOI:10.1080/17565529.2019.1613216 .

Hajdu F, Ansell N, Robson E, van Blerk L and Chipeta L .(2009). 'Socio-economic causes of food insecurity in Malawi' Society of Malawi Journal 62(2) 6-18

Harding, S., (1991). Whose science? Whose knowledge?. Buckingham: Open University Press.

Hazel Jean L. Malapit, Suneetha Kadiyala, Agnes R. Quisumbing, Kenda Cunningham & Parul Tyagi. (2015) .Women's Empowerment Mitigates the Negative Effects of Low Production Diversity on Maternal and Child Nutrition in Nepal, The Journal of Development Studies, 51:8, 1097-1123, DOI: http://dx.doi.org/10.1080/00220388.2015.1018904

Hoddinott, J. (2006). Shocks and their consequences across and within households in rural Zimbabwe. Journal of Development Studies 42 (2): 301–321.

Hyder A, Behrman JR. (2014). Female economic activity in Rural Malawi. J Dev Leadership. Jun;3(1):1-10. PMID: 26120564; PMCID: PMC4480682.

IFAD. (2020). Synthesis of Climate Change, Gender, Youth and Nutrition Issues in Malawi. Lilongwe.

IFPRI. (2011). Conceptual framework – Enhancing women's assets to manage risk under climate change: Potential for group-based approaches. Climate change, collective action, and women's assets: Project Outputs. Washington, D.C.: International Food Policy Research Institute.

IFPRI. (2016). Enhancing the impact of agriculture extension in Malawi. Household survey data set. IFPRI Washington.

IPCC. (2007). Contribution of working groups I, II and III to the fourth assessment report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland: Intergovernmental Panel on Climate Change

Jones, A. D., Shrinivas, A., & Bezner-Kerr, R. (2014). Farm production diversity is associated with greater household dietary diversity in Malawi: Findings from nationally representative data. Food Policy, 46(June), 1–12.https://doi.org/10.1016/j.foodpol.2014.02.001

Jost, C., N. Ferdous, and T. D. Spicer. (2014). Gender and Inclusion Toolbox: Participatory Research in Climate Change and Agriculture. Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS), CARE International, and the World Agroforestry Centre (ICRAF).

Karamba, R.W., Winters, P.C.(2015). Gender and agricultural productivity: implications of the Farm Input Subsidy Program in Malawi, Agricultural Economics 46(3), 357-374.

Keane, J., S. Page, A. Kergna, and J. Kennan. (2009). Climate change and developing country agriculture: An overview of expected impacts, adaptation and mitigation challenges, and funding requirements.

Eileen Kennedy, Pauline Peters. (1992). Household food security and child nutrition: the interaction of income and gender of household head, World Development, Volume 20, Issue 8.https://doi.org/10.1016/0305-750X(92)90001-C

Kilic, T., Palacios-López, A., & Goldstein, M. (2015). Caught in a product ivity trap: A distributional perspective on gender differences in Malawian agriculture. World Development, 70, 416–463.

Lipper, L., Thornton, P., Campbell, B. et al. (2014). Climate-smart agriculture for food security. Nature Climate Change 4, 1068–1072 https://doi.org/10.1038/nclimate2437.

Hazel Jean L. Malapit, Agnes R. Quisumbing, What dimensions of women's empowerment in agriculture matter for nutrition in Ghana?, Food Policy, Volume 52,2015,Pages 54-63.

Mayra Buvinic, Monica Das Gupta, Ursula Casabonne, Philip Verwimp. (2013). Violent Conflict and Gender Inequality: An Overview, The World Bank Research Observer, Volume 28, Issue 1, Pages 110–138, https://doi.org/10.1093/wbro/lks011.

Modumbi, G. (2011). "Factors Affecting Perceptions and Responsiveness to Climate Variability Induced Hazards." MSc thesis, Department of Agricultural Economics and Extension, University of Zimbabwe, Harare.

Mudege, T. Chevo, T. Nyekanyeka, E. Kapalasa, P. Demo.(2016). Gender norms and access to extension services and training among potato farmers in Dedza and Ntcheu in Malawi J. Agric. Educ. Ext., pp. 291-305.https://doi.org/10.1080/1389224X.2015.1038282

Murray U, Gebremedhin Z, Brychkova G, Spillane C. (2016). Smallholder Farmers and Climate Smart Agriculture: Technology and Labor-productivity Constraints amongst Women Smallholders in Malawi. Gender Technology.https://doi.org/10.1177/0971852416640639

Mutsaka, B., Dlugosz, A., Kanike, B.G., Harris-Sapp, T. and Juillard, H., (2019). Real-Time Response Review–DEC programme for Cyclone Idai.

Nelson, V. (2011). Gender, generations, social protection & climate change. London: Overseas Development Institute.

Ngigi, S. N.(2009). Climate Change Adaptation Strategies: Water Resources Management Options for Smallholder Farming Systems in Sub-Saharan Africa. The MDG Centre, East and Southern Africa. New York. The Earth Institute at Columbia University.

National Statistical Office, and ICF. 2017. "Malawi: Demographic and Health Survey 2015-2016.

Malawi: Demographic and Health Survey 2015-2016. Zomba, Malawi and Rockville, MD.

http://www.nsomalawi.mw/index.php?option=com_content&view=article&id=222&Itemid=108

Onyango L, Mango J, Loo L, Odiwuor H, Mwangangi M, Mutua E, Mutuo T. (2013).Village Baseline study: site analysis report for Makueni–Wote, Kenya. Copenhagen: CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS).

Pauw, K., Thurlow, J., van Seventer, D. (2010). Droughts and Floods in Malawi. Assessing the economy-wide effects. IFPRI Discussion Paper 00962,

Washington DC, 44p. http://ebrary.ifpri.org/cdm/ref/collection/p15738coll2/id/1370

Pauw, K., Thurlow, J., Bachu, M., Van Seventer, D.E. (2011). The economic costs of extreme weather events: a hydrometeorological CGE analysis for Malawi. Environment and Development Economics: 16 (2), 177–198.

Pinca, V. (2016). Gender and Climate Change Amongst Smallholder Agricultural Producers. Background paper for The State of Food and Agriculture (SOFA). Rome: Food and Agriculture Organization of the United Nations.

Place, F., & Otsuka, K. (2001). Population, tenure, and natural resource management: The case of customary land area in Malawi. Journal of Environmental Economics and Management, 41, 13–32.

Ragasa, Catherine, Noora Lisa Aberman, and Cristina Alvarez Mingote. (2019). Does Providing Agricultural and Nutrition Information to Both Men and Women Improve Household Food Security? Evidence from Malawi. Global Food Security 20 (December 2018): 45–59.

Raj Patel, Rachel Bezner Kerr, Lizzie Shumba & Laifolo Dakishoni .(2015). Cook, eat, man, woman: understanding the New Alliance for Food Security and Nutrition, nutritionist and its alternatives from Malawi, Journal of Peasant Studies.

Sen, A. (1981). Poverty and Famines: An Essay on Entitlement and Deprivation. London: Clarendon.

Serna, J.M. (2011). Drought assessment Northern Eastern Kenya (Wajir East, South and Mandera). Save the Children.

Snapp, S., T. S. Jayne, W. Mhango, T. Benson, and J. Ricker-Gilbert. 2014. Maize Yield Response to Nitrogen in Malawi's Smallholder Production Systems. Malawi Strategy Support Program Working Paper 06. International Food Policy Research Institute, Lilongwe. https://doi.org/10.1007/s12571-014-0410-0

United Nations Children's Fund. (1990). Strategy for Improved Nutrition of Children and Women in Developing Countries: A UNICEF Policy Review. New York.

United Nations Development Program. (2009). Resource guide on gender and climate change.

https://www.google.com/url?client=internal-element-cse&cx=016364595556873131513:lgp43v3tam&q=https://www.undp.org/content/dam/undp/library/gender/Gender%2520and%2520Environment/UNDP%2520Linkages%2520Gender%2520and%2520CC%2520Policy%2520

Brief%25201-WEB.pdf&sa=U&ved=2ahUKEwjWtL2_3Lv0AhX4SfEDHbV5CSkQFnoECAAQAQ&usg=AOvVaw0yOx7Wyq8W_h8UKDo2UfF_

United Nations Development Program .(2014). Gender-Environment and Natural Resources Data and Indicator Rapid Assessment, http://www.unpei.org/sites/default/files/e_library_documents/Gender_ENR_Data_and_Indicator_Rapid_Assessment_0.pdf

United States Agency for International Development. (1992). Definition of Food Security. USAID Policy Determination 19. Washington, DC.

United States Agency for International Development. (2018). Malawi: Nutrition Profile. website: https://www.usaid.gov/sites/default/files/documents/1864/Malawi-Nutrition-Profile-Mar2018-508.pdf.

United States Agency for International Development (2021). Country profile Agriculture and Food security in Malawi. https://www.usaid.gov/malawi/agriculture-and-food-security.

World Food Programme. (2014). "Protracted Relief and Recovery Operations—Malawi 200692." Project document for WFP executive board approval, second regular session, November 10–13.

World Bank, Food and Agriculture Organization, & International Fund for Agricultural Development. (2009). Gender in agriculture sourcebook. World Bank Publications.

World Bank. 2015. The cost of the gender gap in agricultural productivity in Malawi, Tanzania, and Uganda. Washington, D.C. accessed at http://hdl.handle.net/10986/22770.

World Bank (2018). Malawi Economic Monitor—Realizing Safety Nets' Potential. Macroeconomics and Fiscal Management Global Practice. Washington, DC.

World Bank reports 2020-2021; Malawi | Data (worldbank.org), GNI per capita, Atlas method (current US$) - Malawi | Data (worldbank.org),. Date accessed November 2021.

Zulu, L. 2016. Existing Research and Knowledge on Impacts of Climate Variability and Change on Agriculture and Communities in Malawi. Technical Report of the Malawian Innovation Activity, Improving Food Security and Resilience to Climate Change.