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Research paper

Evaluating the impacts of agricultural interventions by Faith Based Organisations (FBOs) and non-FBOs on Sustainable Consumption and Production of rural community livelihoods in the climate change adaptation process in Malawi

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This research was commissioned as part of the Action on Climate & Consumption Project, funded by the KR Foundation.

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This paper is commissioned by the Humanitarian Academy for Development (HAD).

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Acknowledgements

This research study was commissioned as part of the Action on Climate & Consumption Project, funded by the KR Foundation through the Humanitarian Academy for Development of the UK and the researchers are grateful for the support. All communities, DADO Offices, EPA Officials, NGO and various players in the agriculture sector in Dedza (Kampolola and Kaboola GVHs), Balaka (Mpulula and Phimbi GVHs), Mangochi (Zimbayuda and Koma GVHs), Machinga (Pulika and Chipojola GVHs), Nkhotakota (Nkwakwa GVH), Salima (Mawale and Kalichelo GVHs) and Zomba (Chilembwe GVH) are thanked for their support and cooperation's during the field work. The contributions from the Field Assistants namely: Allena Njala, Elena Kambuyake, Gertrude Tomoka, Jimmy Mandauka, Tadala Chibwana, Thabitha Tauzie, Zoe Ngongondo and Zola Manyungwa, are greatly appreciated.

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List of abbreviations

AFIDEP:	Africa Institute for Development Policy
APF:	Adaptation Policy Frameworks
CBO	Community Based Organisation
CA:	Conservation Agriculture
CSA:	Climate Smart Agriculture
DADO:	District Agriculture Development Office
EPA:	Extension Planning Area
FAO	Food and Agriculture Organisation
FBO:	Faith Based Organization
FGD:	Focus Group Discussions
FIDP:	Farm Income Diversification Programme
FISP:	Farm Inputs Subsidy Programme
GDP:	Gross Domestic Product
GEF:	Global Environmental Fund
GVH:	Group Village Headman
HAD:	Human Academy for Development
HDDS:	Household Dietary Diversity Score
HIS:	Integrated Household Survey
IPCC:	Intergovernmental Panel on Climate Change
MK:	Malawi Kwacha
NAPA:	National Adaptation Programme of Action
NSO:	National Statistical Office
NGO:	Non-Governmental Organization
RCB:	Religious Coordinating Body
SCP:	Sustainable Consumption and Production
SLA:	Sustainable Livelihoods Approach
SRES	Special Report on Emission Scenarios
UNDESA:	United Nations Department of Economic and Social Affairs
UNEP:	United Nations Environment Programme
UNFCCC:	United Nations Framework Convention on Climate Change
USD:	United States Dollar

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Summary

Climate change and variability, coupled with other pressures such as environmental degradation and rapid population growth, are negatively impacting on agricultural production in many parts of Malawi. Consequently, rural livelihoods have been greatly affected as most of the communities depend on subsistence agriculture. To alleviate from further impacts and improve agricultural production, many stakeholders have introduced various agriculture based interventions. This study was aimed at evaluating the impacts of agriculture based interventions on Sustainable Consumptions and Production (SCP) on community level rural livelihoods in Malawi. A focus of the study was on those interventions by Islamic Faith Based Organizations (FBOs) as well as non-Islamic FBOs and other players. The study was undertaken in seven districts in Malawi with significant Muslim and non-Muslim populations namely Dedza, Salima, Mangochi, Balaka, Nkhotakota, Machinga and Zomba. A participatory approach was applied to consult the local population (n=102) in two villages in each of Balaka, Dedza, Salima, Machinga, Mangochi and Salima Districts and in one village in each of Nkhotakota and Zomba Districts. These consultations were also complemented by key informant interviews with key stakeholders such as agriculture officials, chiefs, model farmers, development partners and representatives of Islamic and Non-Islamic FBOs and focus group discussions. Checklists and structured questionnaires were used in these consultations, where various indicators of rural livelihoods and SCP were highlighted in terms of how these have been integrated into the interventions being implemented under changing climate as well as the actual situation on the ground. In addition, climate and environmental changes from the people's perceptions were evaluated and compared with empirical climatic evidence from the nearest climate stations to each of the villages.

The study has established that although the study villages have significant Muslim populations, most of the active implementing agencies are non-Islamic or Islamic related FBOs, NGOs as well development partners to the Malawi Government or their agencies. The exception was in Salima District where Islamic FBOs and their agencies were found to be more active. However, in areas where Islamic FBOs were active, their focus was mainly on relief work. In addition, most of the interventions are centered on Climate Smart Agriculture (CSA) techniques such as Conservation Agriculture (CA). It was also observed that some of the CSA based interventions are being duplicated when different players are working in the same area, thereby creating some confusion among the intended beneficiaries. In addition, most respondents demonstrated a considerable lack of knowledge on the intended role of the interventions, as many expected to continue receiving emergency relief food and support such as farm inputs such as fertilizer and seeds on annual basis for their agronomic practices. This suggests that some of the interventions have created a dependency syndrome and are therefore not assisting the communities in achieving food security and sustainable livelihoods. Consequently, the results further show that most people in the study villages are stuck in the poverty web with low nutrition health status, taking at most

2 meals per day and a maximum of 2 food groups per day out of the daily minimum recommended of 5 food groups. However, some interventions such as re-afforestation and agro-forestry have incorporated elements of the concept of SCP, with the introduction of energy saving cooking technologies and good nutrition. Nevertheless, the level of uptake of such SCP elements was noted to be rather low in most of the study villages.

Evidence on the ground also suggests a considerable level of environmental degradation, which the communities are aware of as well as how their livelihoods are being negatively affected. In addition, there are strong perceptions among the communities that the climate regimes in all the study villages have changed, through indicators such as rainfall reductions, prolonged dry spells and increased temperatures. These perceptions were however not fully supported by empirical evidence which showed: annual rainfall declines that were not statistically significant; increased consecutive number of wet days; varied trends in the consecutive number of dry days, decreases in simple daily intensity. However, increasing temperature trends were indeed found to be significant and agreed with the people's perceptions. The results of this study will inform policy formulation as well as future interventions.

Keywords: Climate change, agriculture, rural livelihoods, Sustainable Consumption and Production, Faith Based Organisations

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Evaluating the impacts of agriculture interventions by Faith Based Organisations (FBOs) and non-FBOs on Sustainable Consumption and Production of rural community livelihoods in the climate change adaptation process in Malawi

Introduction

Malawi is a landlocked country in southern Africa, lying on the southern most arm of the great East African Rift Valley system. The country largely depends on agriculture which sustains the socio-economic livelihoods of over 90% of the population[1]. The country's agrarian system generates about one third of the gross domestic product (GDP), half of total export earnings and two thirds of employment[2]. However, most of the agricultural production is rain-fed which is largely characterised by low or declining levels of productivity[3].

The over-dependence on rain-fed agriculture has rendered Malawi highly vulnerable to the negative impacts of climate change and variability, such as droughts and floods[4]. In addition, over 94% of the subsistence agriculture population is found in the predominantly resource-poor rural areas of Malawi[5]. The livelihoods of such resource-poor communities are therefore even more vulnerable to the impacts of climate change and variability.

Climate change is a global challenge with pronounced impacts in largely agrarian economies like Malawi. The Inter-Governmental Panel on Climate Change (IPCC) defines climate change as an identifiable change in the climate of the Earth as a whole that lasts for an extended period of time (decades or longer). On the other hand, the United Nations Framework Convention on Climate Change (UNFCCC) defines it as changes forced by direct or indirect human activities that change the atmosphere in addition to natural variability. Rainfall and temperature related indices are among the most used indicators of climate change in many parts of the world owing to their direct relevance on human livelihoods sustaining activities such as agriculture.

Over most parts of southern Africa, significant upward temperature trends were reported in the thirty years between 1979 and 2007[6]. In addition, Most future projections suggest that temperatures will increase between 4°C and 6°C by the end of 21st century under the A2 (a low

[1] Andersson, 2011; Chinsinga et al., 2012
[2] Douillet et al., 2012; Arndt et al.,2014
[3] Thirttle et al., 2001
[4] Joshua et al. 2016; Boko et al., 2007
[5] Government of Malawi, 2006; Joshua et al., 2016
[6] Morishima and Akasaka 2010, Maure et al., 2018

mitigation) scenario of the Special Report on Emission Scenarios (SRES)[7]. On the other hand, rainfall has been on the decreases in many parts of southern Africa have been reported[8]. Studies in Malawi[9] have shown that the climate regime of the country has experienced increased temperatures with statistical significance and a decreasing rainfall pattern that is not yet statistically significant but is coupled with increased inter-annual variability. The increase in inter-annual variability has also seen increased frequencies and intensity of extreme events such as floods and prolonged drought episodes[10]. For instance, the country experienced intense El Niño weather conditions in two consecutive seasons of in 2014/15 and 2015/16 rain seasons, which resulted in widespread drought conditions in central and southern Malawi. Despite the well-known historical impacts of El Niño conditions on the climate regime of Malawi, the country however experienced widespread heavy rainfall in the middle of the El Nino affected 2014/15 season which resulted in extreme flooding. These patterns further demonstrate considerable uncertainty in the climate regime of Malawi.

The high inter-annual climatic variations in many parts of Malawi are evidenced through climatic shocks such as drought and floods. These climatic shocks, coupled with other pressures such as environmental degradation, macro-economic shocks and demographic pressures are contributing to declining rural livelihoods[11]. Consequently, most rural communities are food insecure for most times of the year and live in relatively deepening poverty as their livelihoods are largely agriculture based. Food security has been defined as a situation when all people at all times have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life[12]. For instance, following the most recent severe drought in the 2015/16 cropping season, nearly 6.7 million people in central and southern Malawi suffered food insecurity[13], representing over 40% of the total national population.

Owing to the critical interface between agriculture, community level livelihoods and climate, the Malawi Government together with international development partners such as the Food and Agriculture Organisation (FAO), the European Union, governments such as the UK, Germany and Norway as well as various Faith Based Organisations (FBOs) have introduced some community level interventions. These interventions, which can be categorized along the lines of either mitigation or adaptation, are aimed at building or strengthening the resilience of the rural communities in a changing and varying climate. Joshua et al. (2015 & 2016) documented some of the risks and water governance challenges associated with some of the community level interventions in climate change adaptation and mitigation in Chikwawa district, which is among the drought and flood prone areas of southern Malawi.

However, the climate of Malawi is also heavily influenced by additional factors like topography and proximity to water bodies such as Lake Malawi and topography[14], rendering it very heterogeneous even at relatively low spatial scales. Furthermore, most of the studies conducted have found no

[7] Engelbrecht et al., 2015
[8] Nel, 2009; Mazvimavi, 2010
[9] Mc Sweeney et al., 2012; Ngongondo et al., 2011 & 2015
[10] New et al., 2006; Ngongondo et al., 2014
[11] Hajdu et al., 2009
[12] World Food Summit, 1996
[13] Babu et al., 2018
[14] Kumbuyo et al., 2014; Nicholson et al., 2014

regionally homogenous countrywide climate trends, especially in rainfall[15], the most critical parameter in rain-fed agricultural production. Consequently, any interventions need to be innovative and should consider these low spatial scale climate variations.

In addition, the concept of Sustainable Consumption and Production (SCP) is a key component that any intervention should highlight on, especially post-project life where many interventions in Malawi have gradually weaned out in the absence of continued donor support or initiatives. UNEP[16] defined SCP as the production and use of services and related products, which respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardize the needs of future generations. Among the key elements of SCP are household energy sources and consumption patterns. In the Sub-Saharan Africa, energy sources have been found to be largely dependent on inefficient biomass combustion systems. These systems are considered unsustainable as they emit large amounts of Carbon Dioxide (CO_2) thereby causing more damage to the environment[17]. There is therefore a clear need to understand how effective and relevant, in the context of SCP, the various agriculture based climate change adaptation and mitigation interventions are on the socio-economic livelihoods of vulnerable rural communities in Malawi.

1.1 Study Objectives

This study aimed at providing a situation analysis on the nature of community level agriculture based climate change adaptation interventions by various FBOs and non-FBOs, their role on the livelihoods of the targeted communities and consideration/delivery of SCP in focal areas. A special focus was on those interventions by Islamic affiliated FBOs. The study learns from the experiences of the actual beneficiaries and various players in the process on how effective and sustainable such interventions in the context of SCP have been as well as their challenges. This is vital in informing climate change adaptation and mitigation policy frameworks and future interventions.

1.2 Specific Objectives

To achieve the main objective, the study specifically:

1. Identified key actors (including Islamic and non-Islamic FBOs) that are active in the selected study sites and the nature of their agriculture based climate change adaptation interventions;
2. Assessed how the concept of SCP has been incorporated into the interventions and delivery on the ground;
3. Evaluated the impacts of the Islamic FBOs' agriculture based interventions on the rural livelihoods in the context of SCP;
4. Examined challenges, gaps and other factors impeding the SCP in the agriculture based adaptation process;
5. Analysed climate trends for evidence of change, occurrence of weather related calamities and disasters in the study areas.

[15] Ngongondo et al., 2011
[16] 2015
[17] United Nations Department of Economic and Social Affairs, UNDESA, 2007

2.0 Methodology

This study focused on agricultural interventions by Islamic and non-Islamic FBOs in Malawi. FBOs can be defined as religious, faith-based, and/or faith-inspired groups, which operate as registered or unregistered non-profit institutions[18]. Subsequently, Islamic FBOs are those affiliated to Islam as a religion in some way or to an organization with Islamic beliefs. The FBOs can be further categorized into four groups as: congregational at the local level such as a mosque; Religious Coordinating Body (RCB) which are responsible for coordinating and supporting congregations; Non-Governmental Organisations (NGOs) which employ staff and receive external donor support and report to a broader group other than RCBs or congregation; and Community Based Organizations (CBOs) which do not employ staff[19]. The study was implemented in seven districts namely: Dedza, Mangochi, Machinga, Balaka, Nkhotakota, Zomba and Salima[20]. These districts have been selected as they have significant Muslim populations with cultural diversity as well as active Islamic FBOs implementing agriculture-based interventions in the climate change adaptation process. However, gaps remain in our understanding of how these interventions impact on people's livelihoods and how they integrate and deliver SCP practices. In addition, the selected districts provide a range of agro-ecological conditions which are vital in examining the relevancy of some of the interventions.

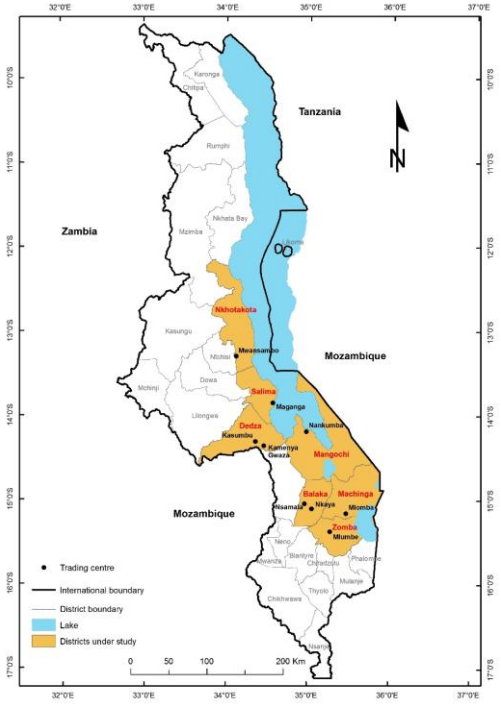

Figure 4.Map of Malawi showing the study districts and Traditional Authorities

[18] UNFPA, 2009
[19] Foster, undated
[20] Figure 1

The methodology and process involved the following steps (i) literature review; (ii) designing baseline survey tools; (iii) data collection; (iv) data analysis; (v) report writing; and (vi) presentation of results.

The concept of Sustainable Consumption and Production (SAP) in agriculture and livelihoods under changing climate was the guiding framework for the study. Other guiding frameworks were based (1) the Global Environmental Fund (GEF) Adaptation Policy Frameworks (APF); (2) Sustainable Livelihoods Approach (SLA)[21]; (3) National Adaptation Programme of Action (NAPA) for Malawi; (4) Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (version 2)[22]; and (5) Minimum Dietary Diversity for Women: A Guide for Measurement (FAO and FHI 360, 2016)

2.1 Data Collection and Analysis

The study draws on a mixture of qualitative and quantitative data. To collect the qualitative data, two villages with significant Muslim and Non-Muslim populations in Dedza, Balaka, Machinga, Salima and Mangochi Districts and one village each in Zomba and Nkhotakota districts were identified. A total of 12 Villages across the seven districts were identified. Another criteria that was used to identify the study villages was the presence of both Islamic and Non-Islamic FBOs and other stakeholders implementing agriculture related interventions in climate change adaptation. A comparative assessment was undertaken to establish the effectiveness of agriculture interventions in the context of SCP in each of the two villages per district. To select the actual study villages, the entry point was the District Agriculture Development Office (DADO) in each of the seven districts. The DADO oversees various types of projects being implemented in their district. The DADOs then guided the researchers to the relevant Extension Planning Areas (EPAs) where the actual villages were selected. A survey was then undertaken between 24 July 2018 and 2 August 2018 in each village to consult various actors as follows:

1. Focus Group Discussions (FGDs) using a specially designed checklist (Appendix A). To ensure maximum participation, mixed focus groups (women and men) with 6 to 8 participants were held in each village. The exception was in Kalichero GVH where over 20 participants turned up for FGD;
2. Face to face, interviews with about 10 randomly selected people in each village using a structured questionnaire[23]. Gender balance was however ensured during the sampling. A total of 102 respondents were consulted against the targeted 120 respondents, representing 85% success rate;
3. Key informant interviews (including Chiefs, agricultural extensions workers, DADO, selected FBO and non-FBO representative) using a designed checklist[24];

[21] Chambers, 1989; Chambers and Conway, 1992
[22] Swindale and Bilinsky, 2006
[23] Appendix B
[24] Appendix C

2.1.1 Evaluation Indicators and Qualitative Data Analysis

The captured information in structured questionnaires included various indicators but not limited to: household characteristics; household income sources; agricultural production and livelihood security; household food security and copping strategies; current situation regarding climate risk; current efforts and interventions to adapt; climate change related success and constraints; factors that determine the current vulnerability; current vulnerability to climate change and weather variability; health; water, sanitation, child care, public health; natural resource and environment base; household energy sources and consumption pattern; capacity needs assessment; gender roles; poverty; household assets; and people's perceptions of the FBO based interventions. Furthermore, the concept of SCP as a subsequence of the interventions was evaluated using nutritional status indicators as outlined by Herforth and Ballad[25]. The qualitative data collected from the study areas were transcribed and analysed thematically, disaggregated by gender and socio-economic status. The theory that the higher the consumption, the more likely it is to be unsustainable was also tested. The Quantitative data were analyzed using standard statistical packages to generate summary statistics.

2.1.2 Analysis of Quantitative Climate Data

In addition, empirical weather data (minimum of temperature and rainfall) from the nearest weather stations to the villages were collected for the longest period available. For rainfall, the longest period of record was daily from 1 January 1958 to 31 December 2012 and were collected from the WATCH project[26]. The WATCH data is a gridded dataset at 0.5° by 0.5° (55 km by 55 km) derived from observed daily total rainfall centered at each of the stations listed. In addition, temperature data for the period 1970 to 2001 were also used. The stations used were:

- Dedza Station for Kaboola and Kumpotola GVHs;
- Balaka Station for GVH Mpulula in Balaka District;
- Chingale Station for GVH Phimbi in Balaka District;
- Mangochi Station for Zimbayuda GVH in Mangochi District;
- Monkeybay Station for Koma GVH in Mangochi District;
- Namwera Station for Pulika and Chipojola GVHs in Machinga District;
- Chitala Station for Kalichelo GVH in Salima District;
- Salima Station for Mikute GVH in Salima District;
- Nkhotakota Station for Nkwakwa GVH in Nkhotakota District;
- Makoka Station Chilebwe GVH in Zomba District.

This data were analysed for evidence of change using standard approaches[27] as recommended by the World Meteorological Organization (WMO). Quantitative data were analysed using R, the freely available statistical computing software.

[25] 2016
[26] Wheedon et al., 2011
[27] Kundzewicz and Robson, 2000

3.0 Results and Discussions

Table 1 shows the demographics in the 12 study villages across the 7 districts.

Table 1. Demographics in the study area

Serial	District	TA	GVH	Village	Number of Households	Population	Main Tribe(s)
1	Balaka	Nkaya	Phimbi	Chimimba	1640	8400	Mang'anja
	Balaka	Nsamala	Mpulula	Kusigala	170	2600	Yao
2	Dedza	Kamenyagwaza	Kaboola	Kaboola	NA	NA	Chewa &Yao
	Dedza	Kasumbu	Kumpotola	Kumpotola	275	1150	Yao &Chewa
3	Nkhotakota	Mwansambo	Mgombe	Mkwakwa	72	288	Chewa
4	Machinga	Mlomba	Pulika	Pulika	500	3000	Yao
	Machinga	Mlomba	Chopojola	Elias	85	1800	Yao & Lomwe
5	Mangochi	Namkumba	Koma	Pakamwa	200	NA	Mang'anja
	Mangochi	Nankumba	Zimbayuda	Zimbayuda	300	2000	Yao & Chewa
6	Salima	Maganga	Ngolowindo	Kalichero	349	2,094	Yao & Chewa
		Maganga	Mikute	Mawale	600	2400	Yao
7	Zomba	Mulumbe	Bwanado	Chikwekwere	300	1500	Yao & Lomwe
		Mlumbe	Mkanda	Chazima	250	1200	Yao& Lomwe

3.1 Socio-Economic Characteristics of Respondents

3.1.1 Age of respondents

The average age of the respondents was 39.7 (standard deviation of 14), with a minimum of 18 and a maximum of 91[28]. The modal age range was in the most productive years of humans between 20 and 40 years whereas the actual mode age was 32 years. However, 4.9% of the respondents did not know their age, although most of these had stayed in their study village for over 20 years.

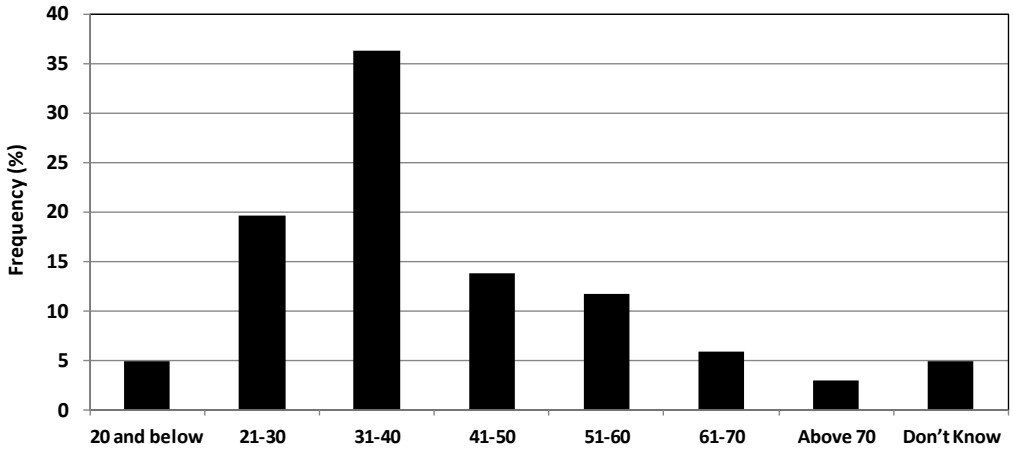

Figure 5. Age ranges of the respondents (n=102)

[28] Figure 2

3.1.2 Gender Distribution

Out of a total of 102 respondents that were interviewed, 26.5% were male and 73.5% were female. In Balaka, Dedza, Salima and Zomba, the majority of the respondents were females at 89.5%, 73.3%, 85.7% and 77.8% respectively[29]. On the other hand, Machinga and Mangochi were slightly dominated by male respondents with 55% and 52.6% respectively whereas Nkhotakota had an equal proportion of respondents.

Table 2. Gender distribution of respondents in the study districts

District	Female (%)	Male (%)
Balaka	89.5	10.5
Dedza	73.3	26.7
Nkhotakota	50.0	50.0
Machinga	45.0	55.0
Mangochi	47.4	52.6
Salima	85.7	14.3
Zomba	77.8	22.2

3.1.3 Marital and Household Status

The results also showed that 77.5% of the respondents were married, with 3.9% single, 2.9% separated, 5.9% divorced and 9.8% were widowed. The distribution of marital status by district is shown Figures 3 & 4.

In addition, 56.9% of the respondents were the house head while 41.2% were spouses and the rest were dependents. Furthermore, the results showed that 12.7% of the respondents were married females who indicated that they were the head of their house whereas 39.2% were just spouses Single females who were household heads were 1.95% of the respondents whereas widowed females constituted 7.84% of the respondents and there were no widowed males.

Figure 6a. Marital Status of the individual Respondents (n=102)

[29] Table 2

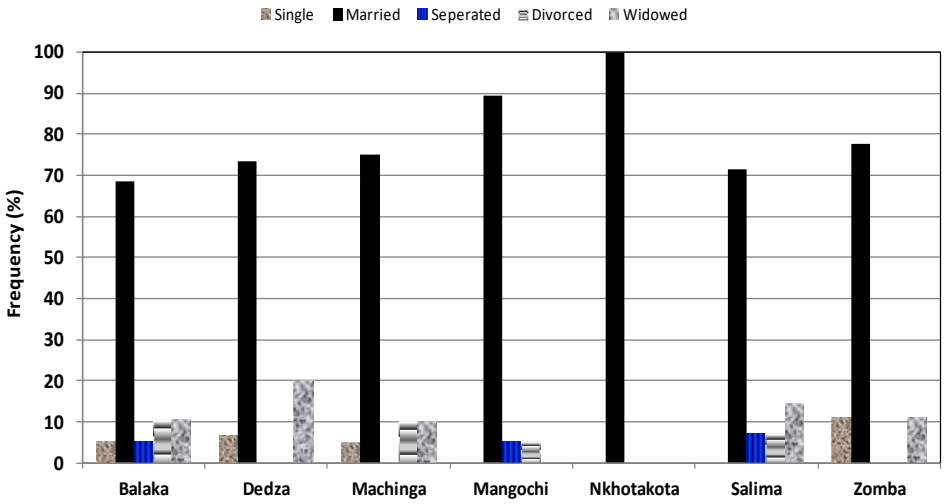

Figure 3b. Marital status of the respondents by district (n=102)

3.1.4 Education Attainment

Education attainment is an important aspect having direct and long term returns to an individual, their family and society through increased income, better health and decision making[30]. The results from this study showed that 73.5% the respondents were literate, with 56.86% having attained primary level education and 16.7% having attained secondary level education while 26.5% were illiterate. The literacy level from this study is comparable to the national level for those aged 15 and above which was at 73% as of 2017 according to the National Statistics Office[31]. There were no respondents with post-secondary, university or adult literacy education. In addition, 39.2% of the respondents were head of household who had attained either primary or secondary school level education while 17.6% were head of household who were illiterate.

Table 3 shows the literacy levels in the seven districts. From Table 4, the highest literacy levels among the respondents were in Zomba district where all respondents can be taken as literate, having attained either primary or secondary education. On the other hand, Dedza had the lowest literacy rate at 60%. This finding is in contrast to NSO[32] which reported that Balaka had the highest literacy rates of 75.1% among the 7 study districts while Salima had the lowest literacy rates at 60.3%.

[30] Mutisya et al., 2016
[31] NSO, 2017
[32] 2017

Table 3. Literacy rates among the respondents by district.

Education Level	Balaka (%)	Dedza (%)	Machinga (%)	Mangochi (%)	Nkhotakota (%)	Salima (%)	Zomba (%)
Primary	73.7	53.3	55.0	57.9	50.0	35.7	66.7
Secondary	15.8	6.7	10.0	10.5	33.3	28.6	33.3
Post Secondary	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Adult	0.0	0.0	0.0	0.0	0.0	0.0	0.0
University	0.0	0.0	0.0	0.0	0.0	0.0	0.0
None	10.5	40.0	35.0	31.6	16.7	35.7	0.0

3.1.5 Household Size

The average household size for the study districts was 6.26 persons per household against a national average of 4.3 persons[33]. At district level, Mangochi had the highest average number of persons per households with 8.22 and was followed by Salima (7.14), Balaka (6.21), Dedza and Nkhotakota (5.67 each), Machinga 5.50 and Zomba (4.22)[34]. These figures are relatively higher than the NSO[35] district figures of 4.1 for Mangochi, 4.5 for Machinga, 4.2 for Balaka, 4.3 for Dedza, 4.1 for Salima, 5.0 for Nkhotakota. The household size for Zomba is however relatively comparable to the 4.22 reported by NSO[36].

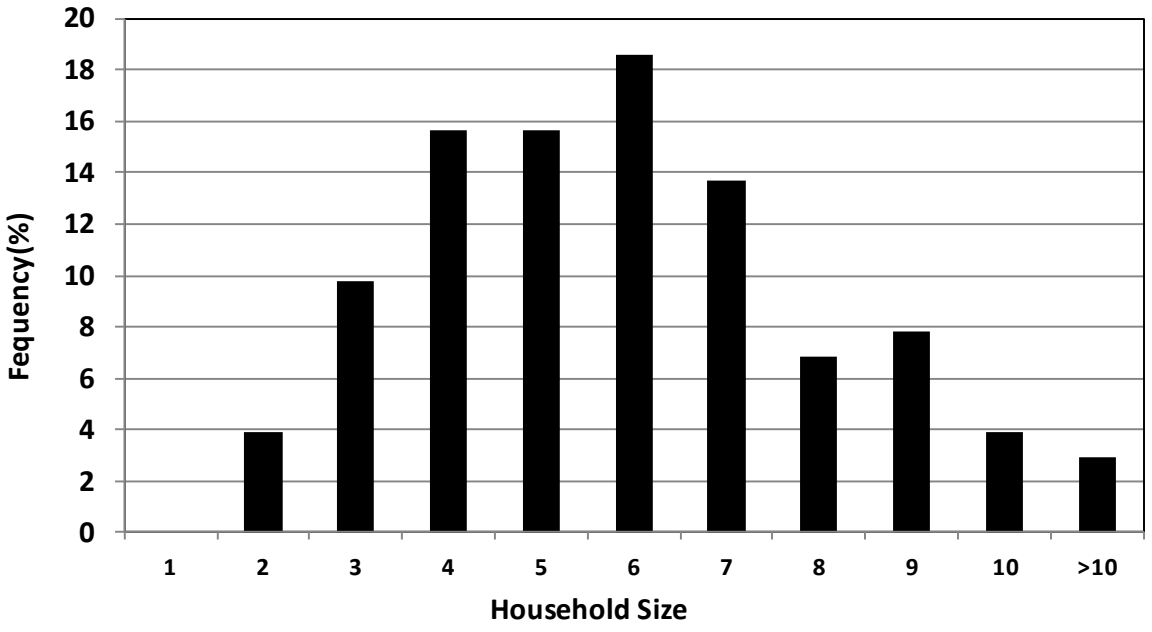

Figure 4. Household sizes for the respondents (n=102)

[33] NSO, 2017
[34] Figure 4
[35] 2017
[36] 2017

3.1.6 Residence Time

On average, the respondents had stayed in their study village for 26.5 years. The maximum residence time was 70 years and a minimum of 1 year. Out of these, 38% percent of the respondents were born and had stayed in their village since birth. Table 4 shows the residence time per district.

Table 4. Residence time of respondents per district.

Residence Period	Balaka	Dedza	Machinga	Mangochi	Nkhotakota	Salima	Zomba
1 to 10	5.9	9.1	52.6	29.4	0.0	36.4	37.5
11 to 20	11.8	9.1	26.3	41.2	0.0	18.2	12.5
21 to 30	17.6	27.3	15.8	29.4	20.0	0.0	25.0
30-40	47.1	27.3	5.3	0.0	60.0	36.4	12.5
>50	17.6	27.3	0.0	0.0	20.0	9.1	12.5

3.1.7 Household Assets

The most common type of house building[37] in the study villages were brick houses with iron sheets (41.2% of respondents) which are classified as permanent structures and brick houses with grass thatch (39.2% of respondents) which are classified as semi-permanent. Mud houses with grass thatch, classified as traditional had 19.6% of respondents while mud houses with iron sheets, classified as semi-permanent structures was the lowest reported by 5.9% of the respondents.

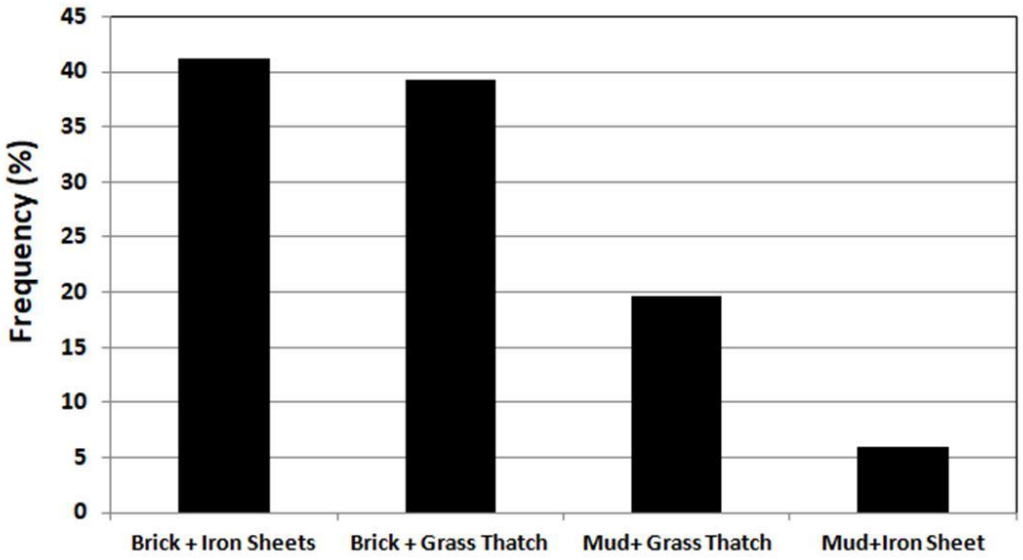

Figure 5a. Types of dwelling structure

From the preceding, the results show that the study villages had a predominance of semi-permanent structures with a total of 58.8% of the respondents. Most of the respondents indicated that they built their dwelling houses using their own income, mostly from agricultural production (agriculture related activities). Less than 2% of the respondents indicated that they inherited their dwelling houses from parents or that an organization built it for them. In addition, the floor in most of the

[37] Figure 5

houses[38] was of earth soil (72.5%), while 22.6% had cemented floor type and 5.9% had tiled floor. The dominant type of housing (semi-permanent and traditional) make households more vulnerable to climate risks such as flooding and strong winds.

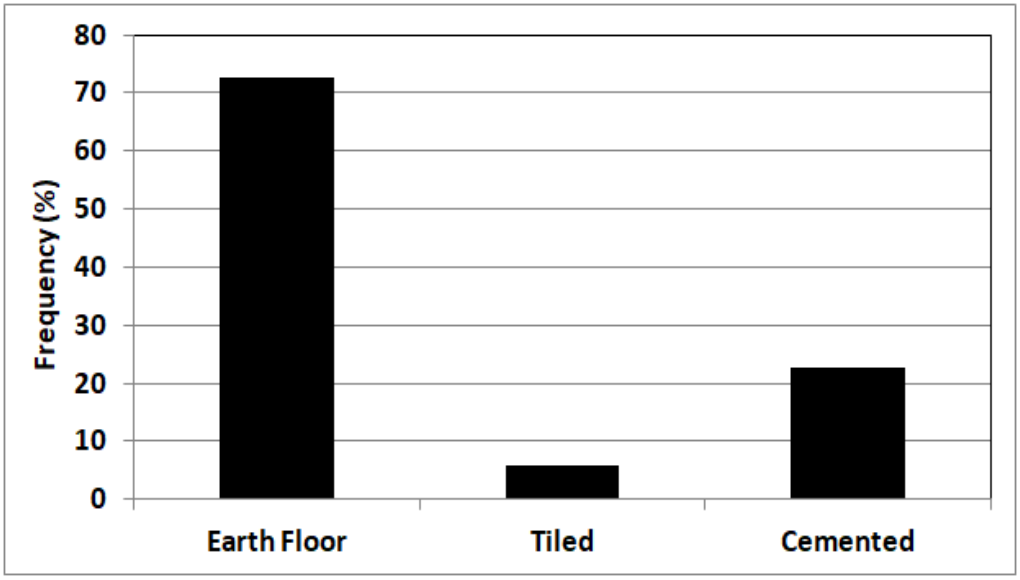

Figure 5b. Type of floor in the dwellings

Ownership of household assets among the respondents was however modest, as shown in Figure 6. From Figure 5, 49% of the respondents owned at least one bicycle while 48% owned a bed. In addition, 44.1% owned a radio, 32.4% owned at least a chair, 29.4% had at least a table and 27.5 had at least a mattress.

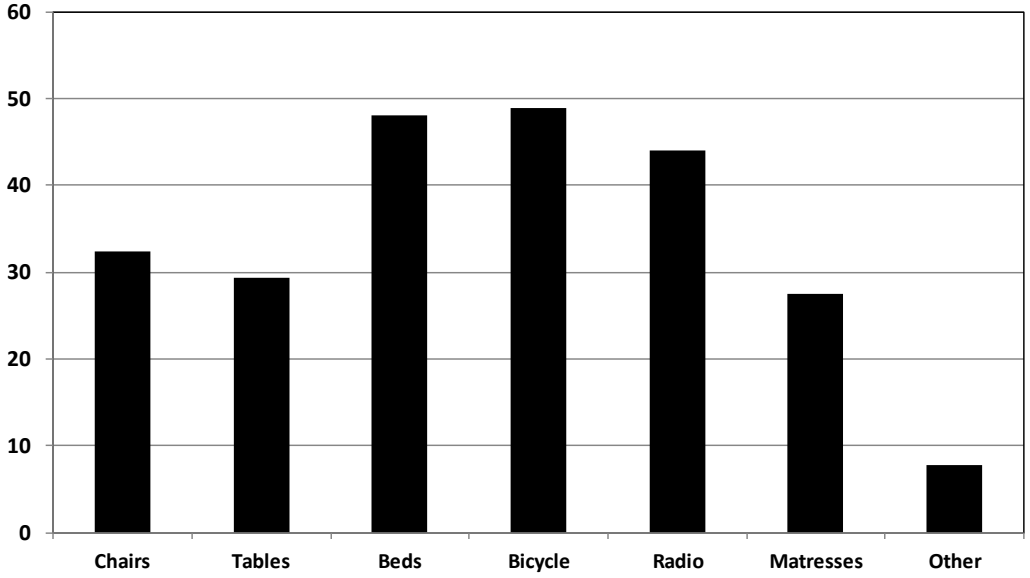

Figure 6. Household items owned by the respondents

[38] Figure 5b

Among the implements used for farming, the results showed that modernization of farming through mechanization is quite low in the study districts. This is evidenced from 94.1% of the respondents who indicated that they owned at least a hoe for their farming activities[39]. On average, a household owned 3.3 hoes. In contrast, none of the respondents owned a plough or a ridger whereas 15% owned a shovel, 12% owned at least a sprayer, 8.8% owned at least a water can and 5% owned an oxcart. Other implements mentioned in small frequencies were panga knives and axe (3.92% each), slasher (2.94%) and sickle (0.98%). The overdependence on the hoe as the main farming implement as opposed to mechanized means has implications in terms of productivity and food security as it is very labour intensive hand tool. Most of the practice is largely dependent on family labour. The levels of dependency on the hoe as the main agricultural implement from this study higher than the 40% national average reported by Chirwa and Matita[40].

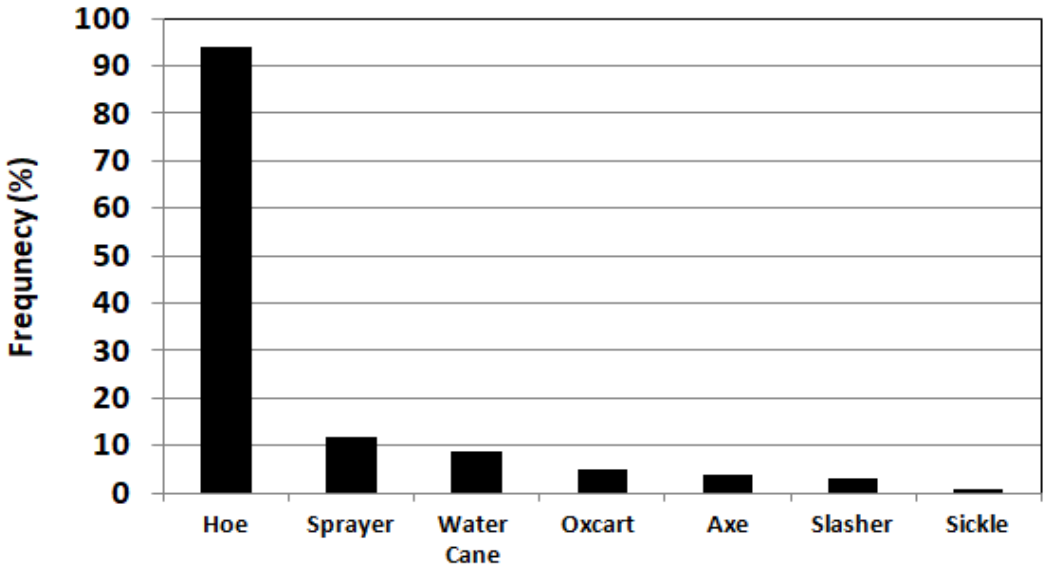

Figure 7. Farm implements owned by the respondents

3.1.8 Energy, Water and Sanitation

Access to reliable energy, water and sanitation facilities are ideal indicators of progress and general quality of living standards in a society. The results from the study show that a battery powered torch or bulb was the commonest source of lighting in the study villages with 84.3%[41]. Other sources include wood fire (4.9%), Solar and candles (2.94% each), paraffin (1.96%) and 0.98% for both Electricity grid and gas. These figures are quiet comparable with those in NSO[42] which found most rural households used battery powered torches as a source of lighting with a national average of 75%. In that study, usage of battery powered torches for lighting was: 84.3% in Balaka, 86.8% in Dedza, 88.7% in Machinga, 92.5% in Mangochi, 84.7% in Salima, 83.0% in Nkhotakota and 85.5% in Zomba.

[39] Figure 7
[40] 2011
[41] Figure 8
[42] 2017

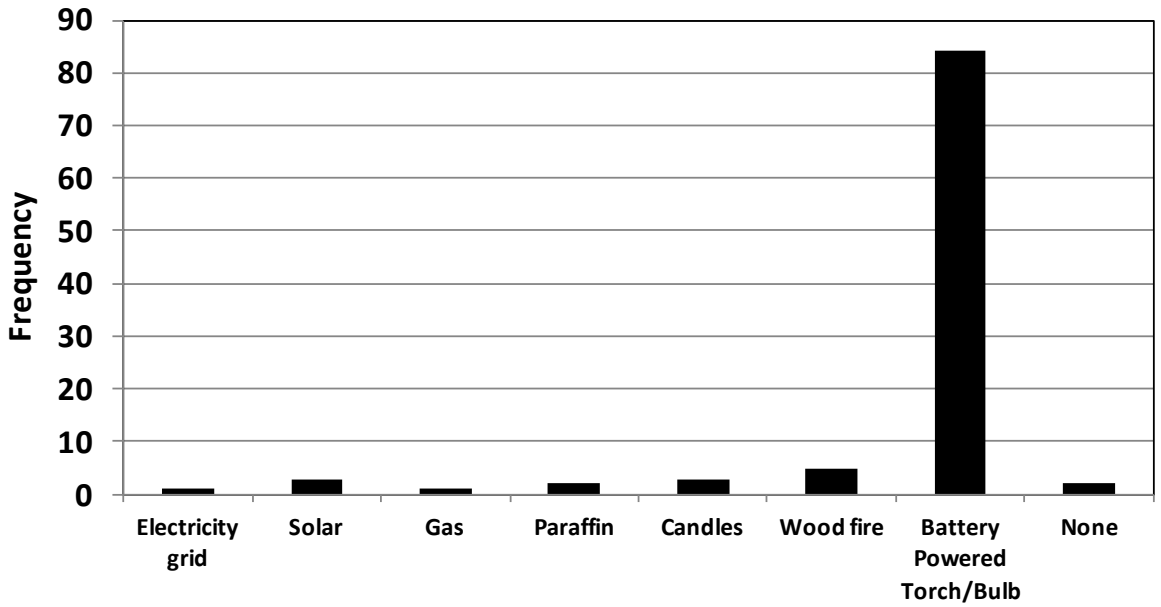

Figure 8. Source of lighting among the respondents

The source of energy for household cooking is very important in sustainable environmental management and conservation. Much as the sampled respondents have demonstrated some advances in reducing the usage of fossil fuels (e.g. paraffin) for their household lighting thereby reducing Greenhouse gas emissions (GHGs), the situation is basically being offset by their overdependence on fuel wood. The results showed that over 97% of the households depend on fossil fuels such as firewood (70.87%), charcoal (7.77%), others such as dry maize stems (8.74%) or a combination of these three sources[43].

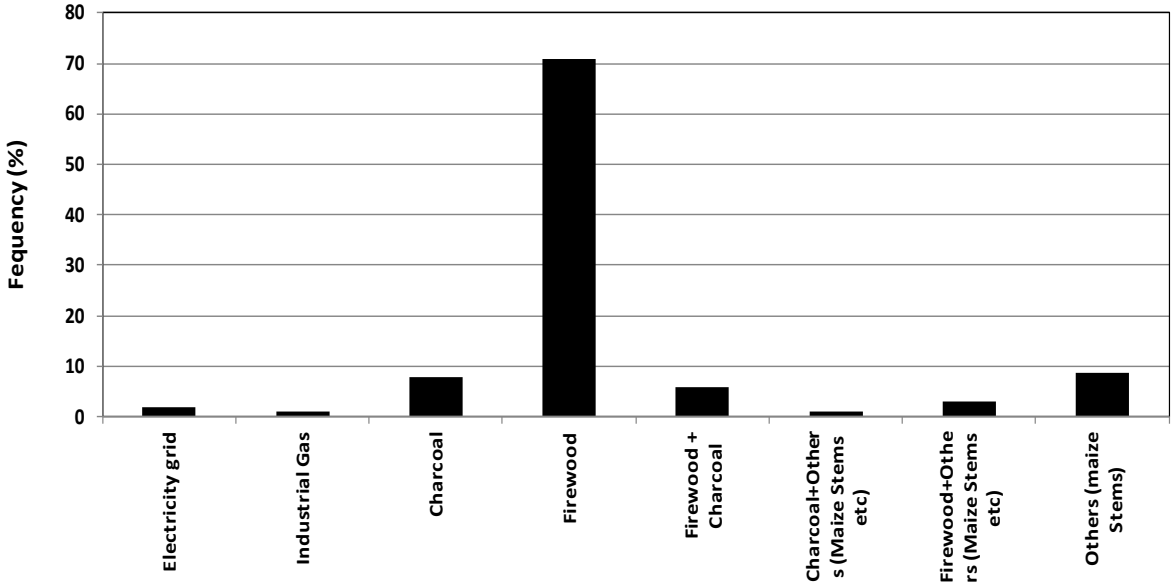

Figure 9. Source of cooking energy for the respondents

[43] Figure 9

The reliability of the various sources of cooking was inconclusive, with 29.1% of respondents indicating they were poor, 20.4% indicating they were very good, 13.6% indicating they were just good, 9.7% indicating they were fair while 27.2% felt they were excellent.

In terms of access to portable water for household use, 64.7% of the respondents were dependent on a protected borehole or spring while 25.5% had access to piped through a tap located inside or outside their dwelling. In cases of water problems, some of the respondents with either piped tap water or who access their water from a protected spring would also use a nearby unprotected well as a fall back. The average distance to a water source was 0.3km, which is below the maximum recommended distance of 0.5km by the Malawi Government. Nevertheless, some respondents indicated that they walk up to 5 km in times of water scarcity. The average time to the water source was 25 minutes, with some respondents indicating that they in years of severe drought, they have to walk for a total of 5 hours to and from the water source. Similar findings were echoed in FGDs. The amount of time to water source in this study is slightly better than that of Pickering and Davis[44] who estimated 32 minutes in their study of over 10,000 households in Malawi.

3.1.9 Livelihood activities and status

The livelihoods of the respondent communities are largely agro-based although some few respondents had other sources. These results are also supported by findings from FGDs and key informants. Sources of livelihood to support their food and income needs can be categorised into those that are purely agriculture based, agriculture related and those outside agriculture. Table 5 shows the various agriculture activities as a percentage of the respondents per district.

Table 5. Agricultural activities in the study districts

Activity	Balaka	Dedza	Mangochi	Machinga	Nkhotakota	Salima	Zomba
Crop farming	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Livestock	68.4	53.3	30.0	25.0	66.7	42.9	33.3
Aquaculture	0.0	13.3	5.0	5.0	0.0	0.0	11.1
Apiculture	0.0	0.0	5.0	5.0	0.0	7.1	11.1
Horticulture	52.6	0.0	10.0	30.0	50.0	28.6	22.2
Other	0.0	0.0	0.0	0.0	0.0	7.1	0.0

From Table 5, it can be seen that all the respondents in all the study districts depend on crop farming as their main source of livelihood. However, most farmers combine crop and livestock production with considerable horticultural production in Balaka and Nkhotakota which was mainly achieved through irrigation farming.

The average land holding size per household across the study districts was 1.80 acres, with a minimum of 0 and a maximum of 12 acres. This is against a national average of 1.5 acres[45]. Figure 10 shows the average land holding sizes in each of the seven districts.

[44] 2012
[45] NSO, 2017

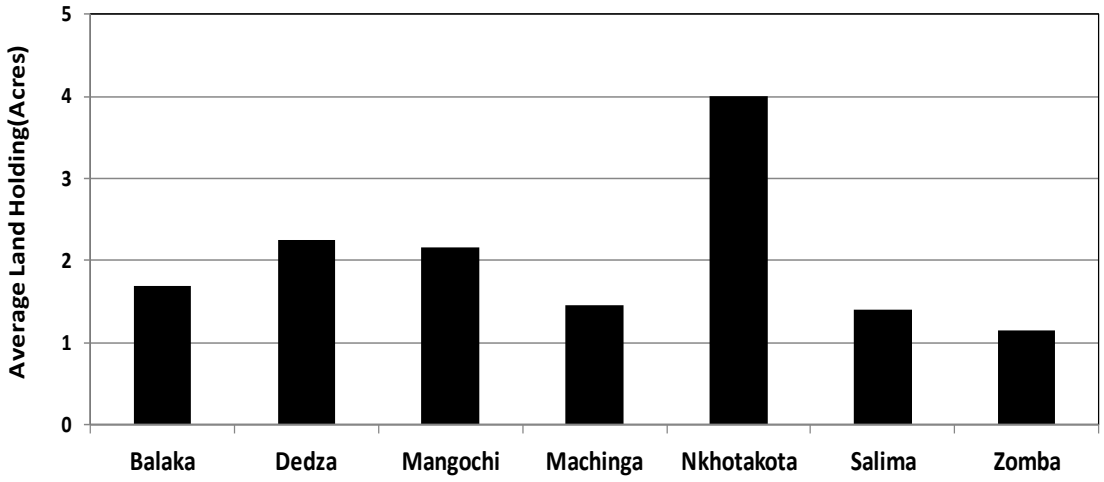

Figure 10. Average land holding sizes in the seven districts

The results at district level shows that Nkhotakota had the largest average land holding size of 4 acres per household. This was followed by Dedza with 2.25 acres and Mangochi with 2.15 acres. The lowest land holding size was in Zomba with 1.14 acres.

Figure 11 shows crops grown in the study areas that were frequently mentioned by the respondents. It can be seen that Maize was the most frequently mentioned asa source of economic livelihood with 22.41% of the respondents. This was followed by groundnuts (9.48%), common beans pigeon peas (6.47% each) and cassava, cotton, millet and rice had less than 5% of the respondents. The **other** category combined crops such as cowpeas, dimba vegetables (such as mustard, tomato and cabbage), paprika and soya beans. In addition, 58% of the respondents indicated that they grow these crops for food as well as to earn some income. Out of these crops for income, 16.3% mentioned maize, 2.4% mentioned Cassava, 3.7% mentioned Common beans, 3.7% mentioned Pigeon peas, 3.3% mentioned Rice, 0.4% Sorghum, 6.1 Groundnuts, 2.0% Cotton,
0.8% Millet and 20.3% others.

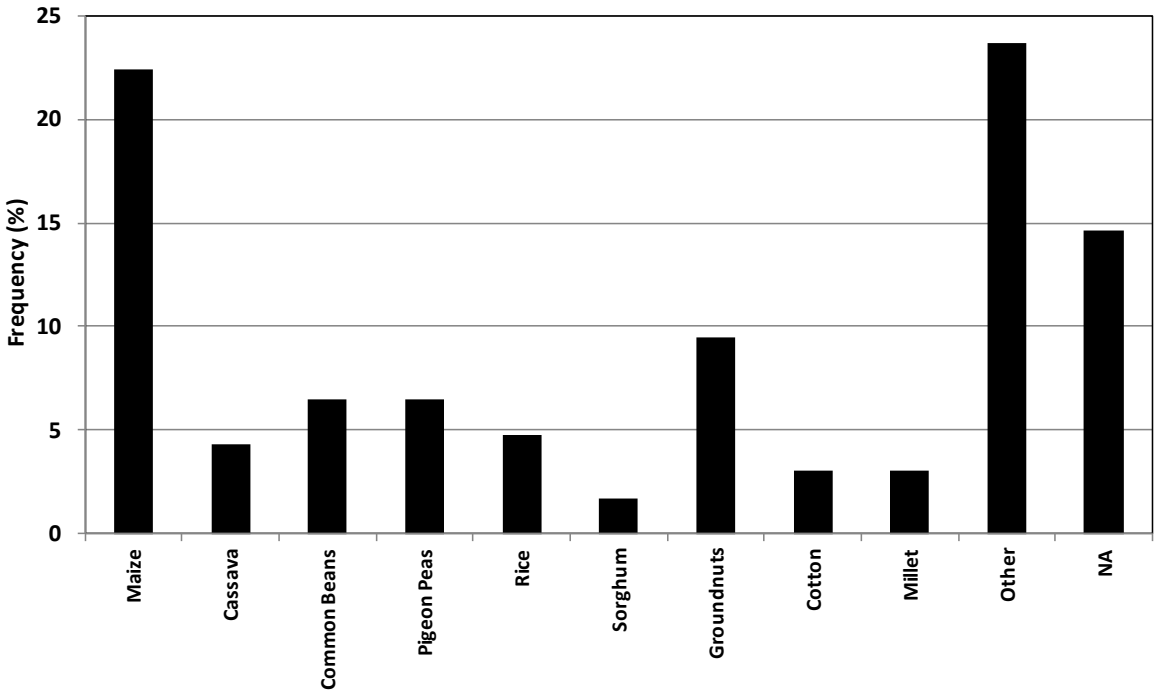

Figure 11. Main crops grown by the respondents

Table 6 shows the most important crops for food and sale in each of the study villages per district. Among the food crops, maize is grown in all the 12 villages. The main reason given is that communities have depended on maize (*nsima*) as their staple and have no concrete alternative. This was followed by cassava, a drought tolerant crop which is grown in 7 of the study villages. Sweet potatoes, which can provide an alternative to maize when the later (maize) fails, are grown in 6 of the villages. Each of rice, groundnuts, sorghum, pigeon peas and vegetables are grown in only 4 of the 7 study villages. The vegetables include crops such as tomato, mustard, cabbage and onion among others. Irish potato was only grown in the two Dedza villages. The agro-ecological conditions in the Dedza area are known to support a wide variety of vegetables including Irish Potatoes.

Table 6. Crops grown for food and sale in order of importance

	District / GVH											
	Balaka		**Dedza**		**Machinga**		**Mangochi**		**Nkhotakota**	**Salima**		**Zomba**
	Mpulula	**Phimbi**	**Kumpotola**	**Kaboola**	**Pulika**	**Chipojola**	**Koma**	**Zimbayuda**	**Mkwakwa**	**Kalichero**	**Mikute**	**Chilembwe**
Staple food(s)	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize	Maize
	Pigeon peas	Sweet potato	Irish potato	Irish potato	Rice	Cowpeas	Cowpeas	Pigeon peas	Groundnuts	rice	Cassava	Cassava
	Sweet potato	Cassava	Vegetables	Cassava	Pigeon peas	Sorghum	Sorghum	Hyacinth beans	Soya beans	Cassava	Rice	Pigeon peas
	Vegetables	Vegetables	Soya beans	Sweet potato	Sweet potato			Cassava	Sweet potato	Potatoes	Sweet potato	Sweet potato
	Cow peas	Sugar cane		Soya beans				Groundnuts	Rice	Soya beans	Vegetables	Beans
				vegetables					Cassava	Groundnuts	Bananas	Groundnuts
										Sorghum	Sorghum	
											Pigeon peas	
Cash crop(s)	Vegetables	Cotton	Potato	Potato	Rice	Cotton	Cotton	Maize	Groundnuts	Rice	Tomatoes	Maize
	Maize	Pigeon peas	Hybrid maize	Vegetables	Maize	Cowpeas	Cowpeas	Cotton	Paprika	Cassava	Rice	
		Cowpeas	Common beans	soya		Sorghum	Sorghum	Tomatoes	Tobacco		Vegetable	
		Vegetables	Soya beans	Beans							Sweet potato	

Among the cash crops grown, none is grown across all the study villages. Maize and cotton were the most grown cash crop in four of the villages, followed by rice and cowpeas in three villages.

3.1.10 Yield Trends in the last 10 years

Agricultural yield normally varies inter-seasonally due to various factors. Climate is among the most important factors accounting for this variation. Most respondents (46.1%) felt that their agricultural yield has been decreasing over the last 10 years. In contrast, 33.3% were of the view that their yield has stayed the same while 17.6% felt that it has been increasing. A few felt (2.9%) felt that their yield varies from year to year, with increased yield during good rainfall years and lower yield during bad years. Table 7 shows the yield trend across the seven districts.

Table 7. Yield trends in the last 10 years (% respondents)

Yield trends	Balaka	Dedza	Machinga	Mangochi	Nkhotakota	Salima	Zomba
Stayed the same	10.5	13.3	40.0	73.7	16.7	14.3	55.6
Decreased	47.4	53.3	55.0	26.3	16.7	64.3	44.4
Increased	36.8	26.7	5.0	0.0	66.7	14.3	0.0
Variable	5.3	6.7	0.0	0.0	0.0	7.1	0.0

From table 7, 73.7% of the respondents in Mangochi and 55.6% in Zomba indicated that their yields had stayed the same. In contrast, most respondents in Nkhotakota felt that their yield had increased while the majority in Balaka, Dedza, Machinga and Salima felt that it had decreased.

From the FGDs, the main factors for the decreases in yields across all villages were:

- A lack of access to inputs such as seeds and fertiliser as most of the people cannot afford them. Subsequently, most of the communities have been dependant on subsidies from either the government Farm Income Subsidy Programme (FISD) or various NGOs and development partners.
- Changes in the rainfall regime in terms of amount and distribution during the growing season. These changes in the rainfall regime are further compounded by increased temperatures which reduces soil moisture availability.
- Pests and disease outbreaks during the growing season. In recent years, outbreaks of fall army worms have been frequent in Malawi in many parts of Malawi. Consequently, a state of emergency was declared in the country in December 2017 when fall army worms attacked crops in 20 out of the 28 districts.

Table 8 shows the average amounts of income from the proceeds of the various crops in the 2016/17 growing season.

Table 8. Household average earnings per crop in the study districts

(2016/17)

Crop	MK	USD
Maize	60,619	84.5
Cassava	24,000	33.5
Common Beans	44,600	62.2
Pigeon Peas	98,400	137.2
Rice	23,125	32.3
Sorghum	5,000	7.0
Groundnuts	73,000	101.8
Cotton	42,500	59.3
Millet	6,000	8.4
Other	65,976	92.0

From the agriculture related activities, piece work in other people's gardens (*ganyu*) was the most frequently mentioned source of income with 16.8% of the respondents. This was followed by poultry (7.4%), land rents (4.3%) and livestock such as goats or sheep (3.53%). None of the respondents mentioned dairy or beef livestock.

From other sources of income, 6.36% of the respondents indicated that they operate small scale businesses like groceries while 4.66% mentioned house level income generating activities (IGAs) such as baking. Other sources of income mentioned were formal employment (2.54%), village bank/savings and aid from government and Non-Governmental Organisations (1.69% each) and gifts and remittances from relatives elsewhere (1.27% each). However, although fishing was on the list of other sources of income, none of the respondents mentioned it, including in the predominantly fishing districts of Mangochi, Salima and Nkhotakota.

3.2 Household Food Security and Nutrition Status

3.2.1 Household Food Security

The livelihoods of the communities in the study villages are largely supported by agricultural production. However, the results show that the majority of the households were food insecure. Out of the 102 respondents, 88% indicated that they had faced household food insecurity in each of the last five years. This figure is greater than national records of 60% chronically food insecure households[46]. Those who had faced food insecurity also indicated that they have been forced to eat less preferred foods during the periods that they faced household food shortages. Out of these 88% who have faced food insecurity in the last 5 years, 34.1% said they substitute food for less preferred foods rarely, 20.0% indicated at least once a month, 28.2% at least once a week and 17.6% indicated

[46] GoM, 2012

every day during the food lean period. In this case, food was mainly with reference to the availability of maize in the household.

3.2.2 Food Consumption Patterns

The normal number of meals taken when food is available was three for 64.4% of the respondents, two for 34.7% and one for 1% of the respondents. During food insecure months, 43% of the respondents indicated that they take one meal per day while 39% take two meals and 16% take three meals.

At district level, it can be seen from Table 9 that during food secure months, the majority of the respondents in Mangochi take 2 meals per day as opposed to 3 for the other districts. During the food insecure months, most of the respondents from Dedza and Mangochi indicated that they take 1 meal per day, reducing from the majority of 3 per day during the food secure months[47].

Table 9. Number of meals taken during food secure months

(% respondents) per district

	Number of meals		
District	**1**	**2**	**3**
Balaka	0	15.8	84.2
Dedza	0	42.9	57.1
Machinga	5	30.0	65.0
Mangochi	0	63.2	36.8
Nkhotakota	0	0.0	100.0
Salima	0	21.4	78.6
Zomba	0	50.0	50.0

Table 10. Number of meals taken during food insecure months

(% respondents)

	Number of meals		
District	**1**	**2**	**3**
Balaka	33.3	44.4	22.2
Dedza	61.5	23.1	15.4
Machinga	50.0	50.0	0.0
Mangochi	55.6	33.3	11.1
Nkhotakota	0.0	50.0	50.0
Salima	28.6	42.9	28.6
Zomba	50.0	37.5	12.5

[47] Table 10

In some food insecure months, people are forced to consume their less preferred foods. Figure 12 shows that the majority of the respondents (34%) rarely eat less preferred foods where 27% indicated that they eat less preferred foods least once a week during the period. The lowest proportion (17%) indicated that they eat less preferred foods on daily basis during the period.

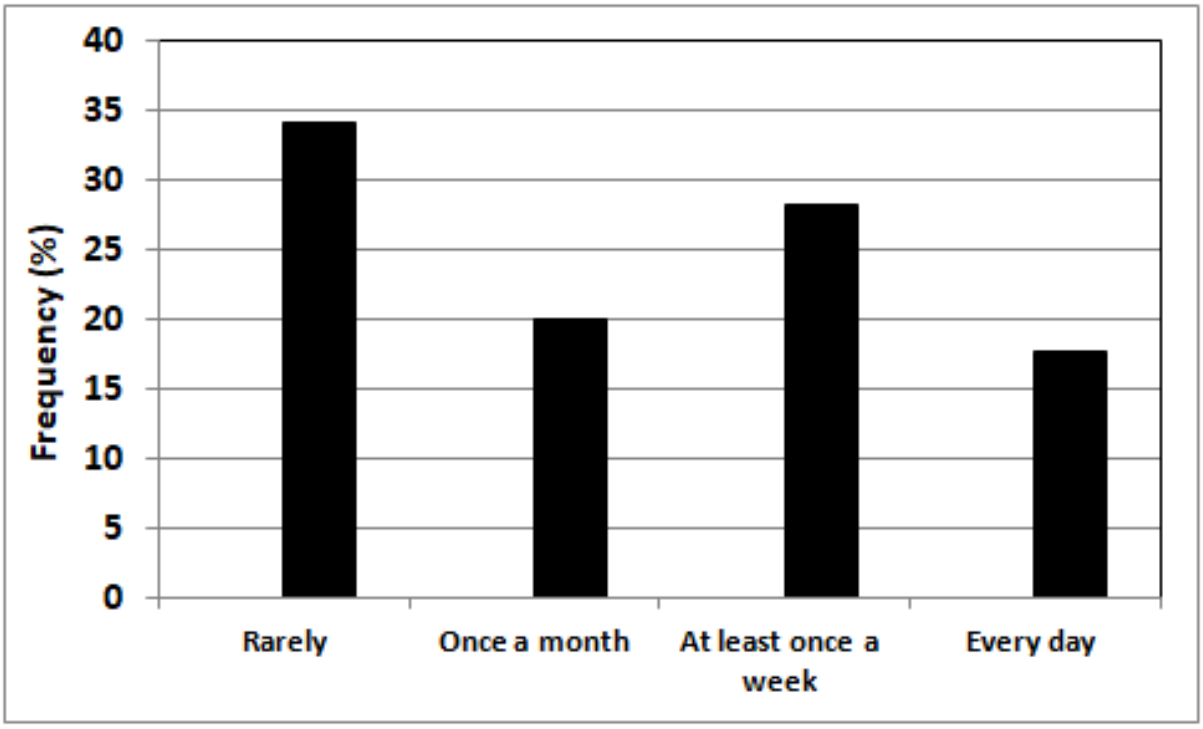

Figure 12. Frequency of eating less preferred foods during food insecure months

3.2.3 Factors for Food Insecurity

Among the factors for the causes of food insecurity, 34% of the respondents mentioned shortage of inputs as the most common factor followed by drought which had 26.5% of the respondents (Figure 13). Other factors were poor soils which can be directly related to the shortage of inputs (11.4%), labour shortage (8.8%), land shortage (7.6%), floods (5.7%), pests and diseases (3.2%) and lack of information on weather and agriculture (2.53%). It was observed that shortage of labour was commonly mentioned by the elderly. This is because most of the household still use the labour intensive hoe as their main farm implement which in turn is dependant the availability of family labour. During the study, it was observed that the elderly normally live alone as their children might have moved elsewhere either for marriage or greener pastures. In some cases, a shortage of labour was among the reasons for hiring out of portions of their farming land, especially those with relatively large farming lands.

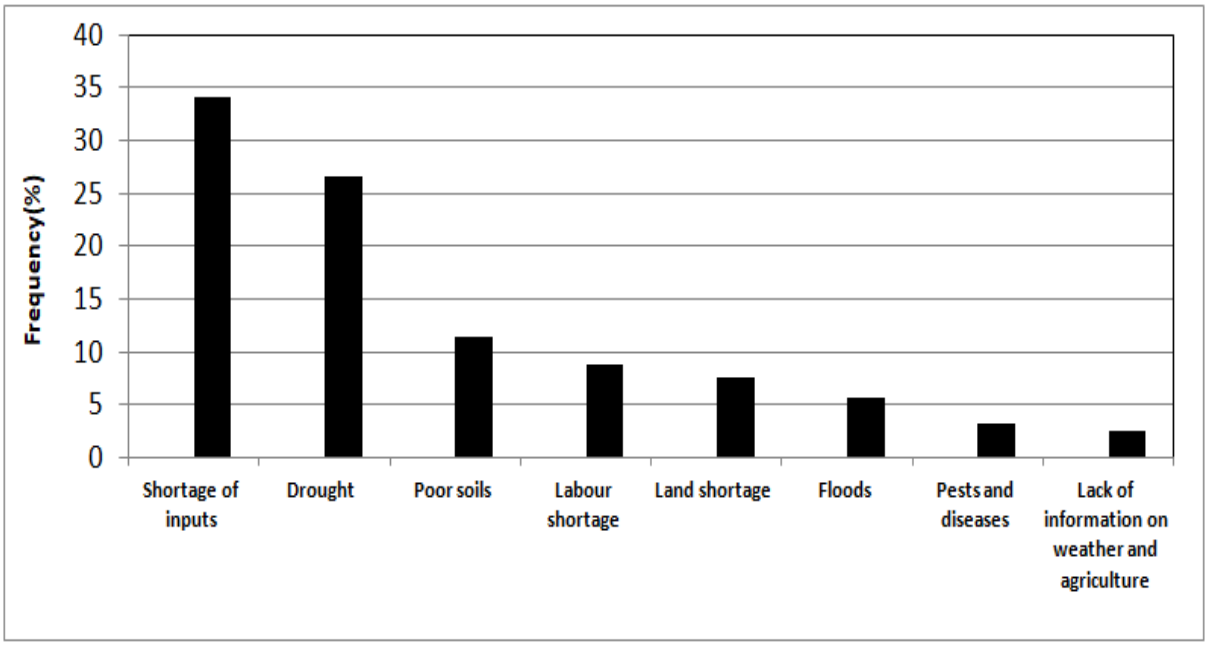

Figure 13. Factors for food insecurity

The agriculture calendar for maize, the main food crop[48] in the seven districts starts in July with land preparation and ends between April and June in the next year when crops are harvested. Most of the respondents (23.16%) indicated that after harvest, they run out of food in December. This means that on average, the households are food secure for a 6-8 month period. The month of December was followed by February (16.84%) and October which had 14%. On the other hand, the months of March and April had the least responses of 3.16% each. This is probably due to the availability of early maturing maize varieties for food. In contrast, the few households which indicated that they have never faced food insecurity added that they were still consuming harvest from the previous season i.e. 2016/17 cropping season as of June 2018.

Table 11. Typical farming calendar for Maize

Activity	Month											
	Jul	Augus	Sep	Oc	No	De	Ja	Fe	Ma	Apri	Ma	Ju
Land												
Making												
Planting												
Weeding												
Harvesting time												

[48] Table 11

3.2.4. Coping Strategies to food insecurity

Various strategies are being employed to alleviate food shortages by the communities. These are in addition to agricultural interventions being introduced by various stakeholders. Among such strategies, piece work or *ganyu* to raise money and buy food was the most widely employed strategy with 53.1% of the respondents across the seven districts[49]. Other strategies mentioned include receiving food aid from government and NGOs (8.9%), participating in food for work programmes and reducing the number of meals (7.3% each), receiving donations from relatives or friends (6.8%) and selling livestock (6.3%).

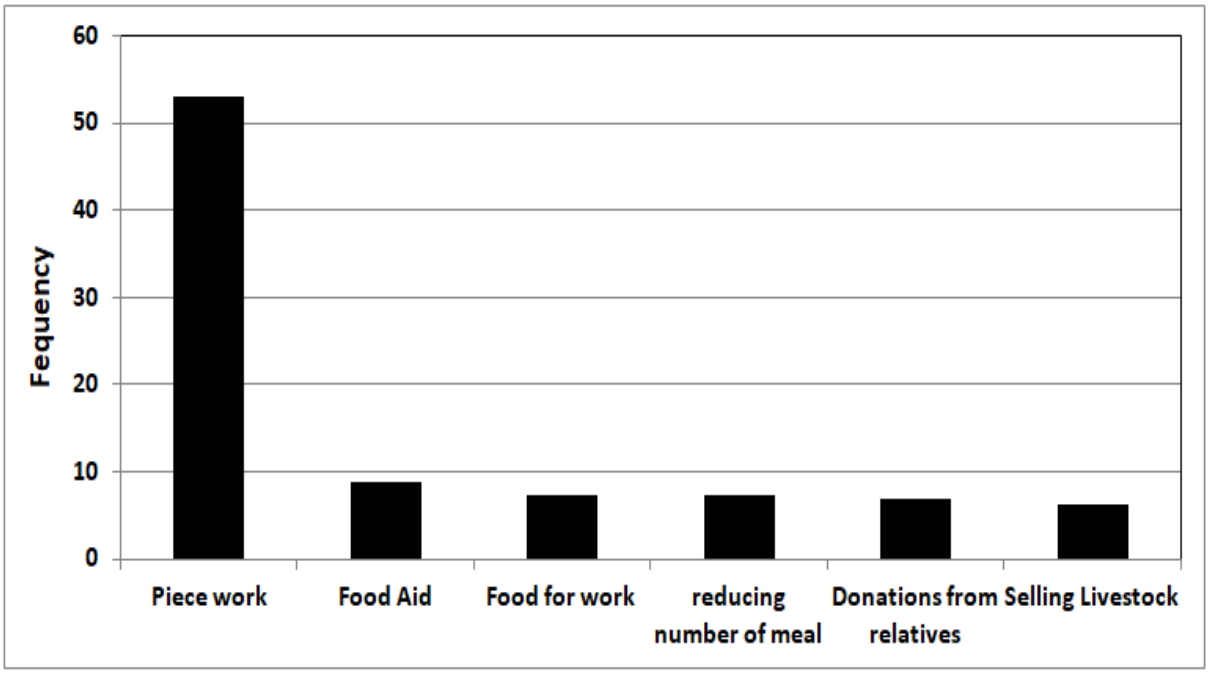

Figure 14. Coping strategies during food insecure months

In some communities, it is very common that food shortages affect a certain group more than others in a household. However, the majority of the respondents (54.3%) indicated that their households share equally whatever is available irrespective of the actual food quantities involved. On the other hand, 5.17% of the respondents said children's share is reduced so that adults have larger shares. On the hand, 19% indicated those adult women's shares are reduced, leaving the larger quantities to men and children. Finally, 21.6% stated that adult men's shares are reduced so that women and children eat more share. In most communities, it very common to have the men consume the larger quantities and the women consume the lowest quantities.

[49] Figure 14

3.2.5 Nutritional Health Status Assessment

The study adopted the nutrition health status called Minimum Dietary Diversity for Women (MDD-W) by FAO and FHI 360[50] to assess the nutritional health status across the seven districts. The tool is comprised of 10 food groups as a proxy indicator of micronutrient adequacy to diet quality. Out of the 10 food groups listed[51], women of productive age between 15 and 49 years are supposed to consume at least 5 of these in the previous day or night (last 24 hours).

The results from the study show that the average score was 2.73, which is way below the minimum threshold of 5. Only 2% of the total number of respondents had consumed at least 5 of the listed food groups while 97% had consumed less than the required five food groups in the last 24hrs. The extreme case of 1% of the respondents indicated that they had not consumed anything at all in the previous 24 hours. Figure 15 shows the distribution of each of the food groups that the respondents indicated they had eaten in the last 24hrs before the interview.

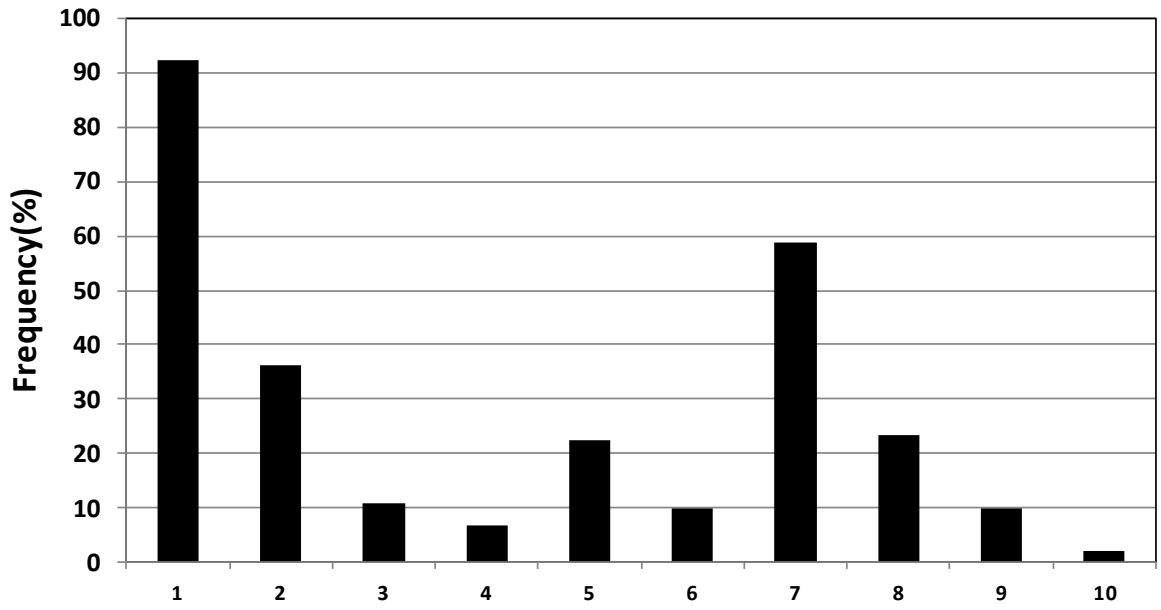

Figure 15. Food groups eaten by the respondents in the previous 24 Hrs

From Figure 15, food group 1, composed of Grains, Cereals, White Roots and Tubers, and Plantains (Starchy Foods) was the most mentioned with 92.2%. This was most frequently accompanied by Dark Green Leafy Vegetables Pulses from group 7 (58%), followed by pulses (Beans, Peas and Lentils) from group 2. The least consumed food group were other fruits (excluding vitamin A-rich fruits- e.g. green mangoes). It is quite evident that most of the respondents have low nutritional health status in all the seven districts. Group 1 is the most consumed simply because of the people's overdependence on maize (*Nsima*) which is grown as the main staple and is readily available in certain seasons of the year. On the other hand, the dark leafy vegetables of Group 2 are also quiet cheap and readily available. In some cases, these are grown in the people's own rain fed and irrigation fields or around the homestead throughout the year. The pulses, especially beans and peas

[50] 2016
[51] Appendix D

are also among the most grown crops. In a contrast, the other food groups (e.g. 4, 5 and 6) need some purchasing power to enable the people buy them from the markets.

3.3. Climate and Environment

Malawi has been categorised among the 15 climate and population hotspot countries in the world[52]. This is due to a myriad of factors such as high population growth rates, high projected declines in agriculture production and low resilience to climate change. Consequently, many parts of the country are experiencing rapid environmental degradation and food insecurity thereby accelerating poverty. In the study villages, the people have their perceptions on climate, changes in the climate regime and the state of their environment as well as the forcing factors.

3.3.1 People's Perceptions on the Environment

Across the 7 districts, 98.8% of the respondents acknowledged the existence of environmental problems in their villages. Among the various environmental problems, deforestation was the most perceived key challenge with 33.7%, followed by climate change and soil erosion with 24.7% and 21.1% respectively[53].

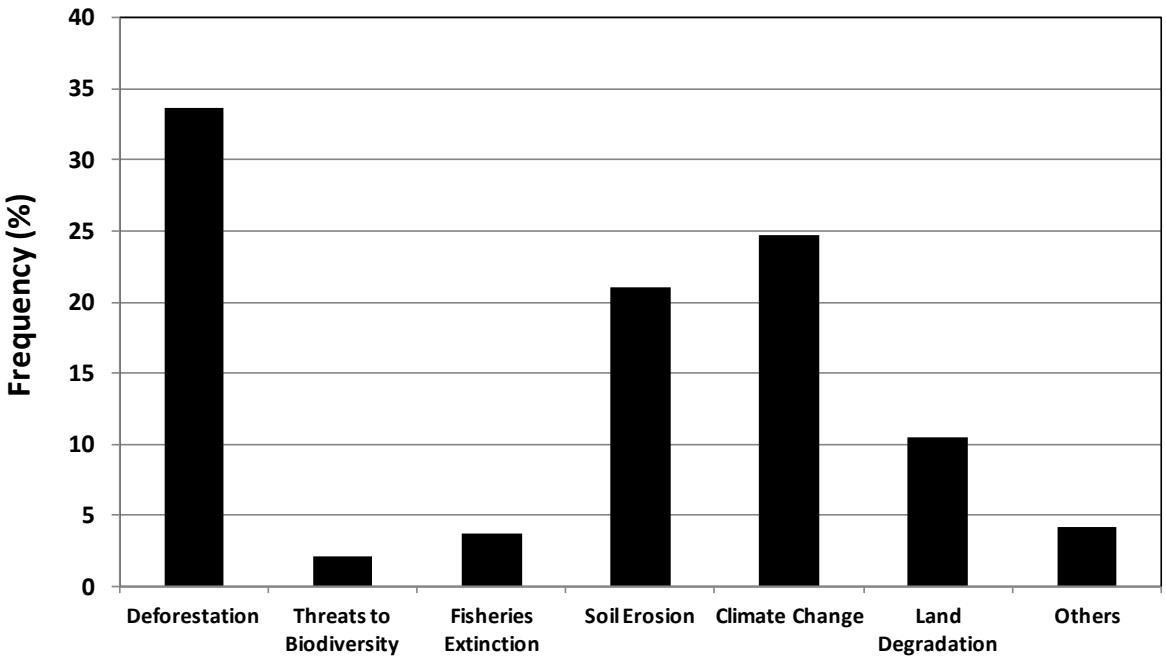

Figure 16. Environmental Challenges according to respondents

The other category with 4.2% covered issues such as increased floods incidences, high temperatures and heavy wind in winter, reduced temperatures during rainy season, increased cases of pest and disease outbreaks and reducing groundwater levels resulting in increased distance for women to fetch water. Some of the key environmental issues that were highlighted in each village are shown in Table 12.

[52] AFIDEP, 2012
[53] Figure 16

Table 12. Indicators of Environmental degradation from the people's perceptions

Environmental Degradation Indicator	**District/GVH**											
	Balaka		**Dedza**		**Machinga**		**Mangochi**		**Nkhotakota**	**Salima**		**Zomba**
	Mpulula	Phimbi	Kumpotola	Kaboola	Pulika	Chipojola	Koma	Zimbayuda	Nkwakwa	Kalichero	Mikute	Chilembwe
Deforestation		✓	✓	✓	✓		✓	✓	✓	✓		✓
Soil Erosion	✓	✓	✓	✓					✓	✓	✓	
Fish Extinction						✓	✓					
Climate Change	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pest and Disease outbreaks	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓

3.3.2 People's Perceptions on Climate Change and Variability

Communities have their own perceptions with regards to the climate regime and the any changes. Such changes normally affect the people's livelihoods. Most of the respondents (95.6%) indicated that they perceived the climate regime of the area had changed in their area. Figure 17 shows the people's perceptions of climate across the study villages in the seven districts.

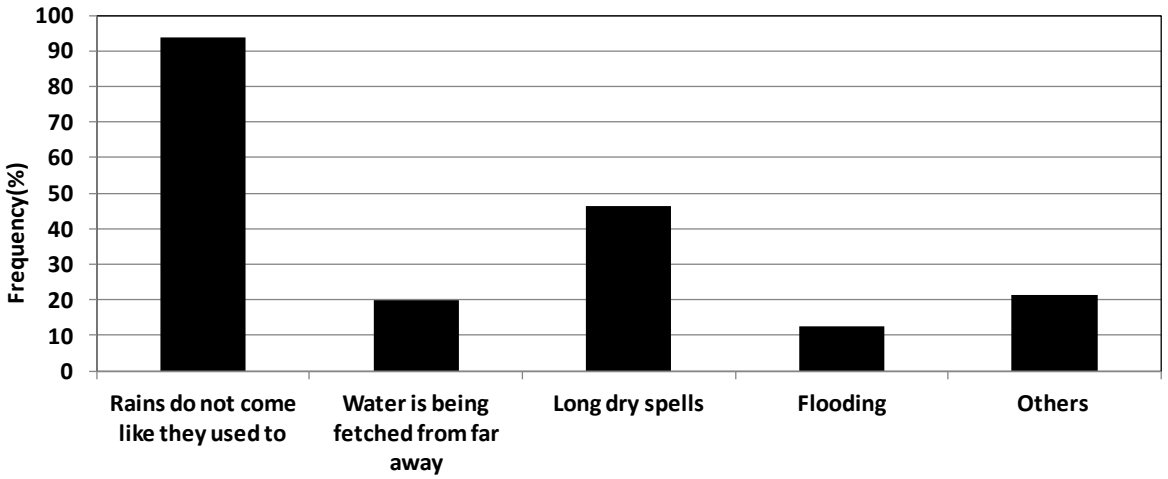

Figure 17. People's perceptions on climate change

From Figure 12, the most widely reported indicator of climate change by the people was that rains no longer come like they used to in the past (95.6%). In addition, the villages are also experiencing long dry spells. Consequently, due to the reduced amounts of rainfall, water is now being fetched from far away due to reduced groundwater recharge.

From the FGDs at village level, the people's perceptions varied. At Zimbayuda and Koma GVHs in Mangochi, the individual respondents, FGDs and key informants perceived that there have been changes in rainfall patterns and winds. These are marked by:

- Reduced rainy season;
- Late rainfall onset;
- Increased temperatures.

Consequently, the villages have experienced an emergence of new pests like army fall worms. In addition, the higher temperatures are posing a challenge to irrigation farming owing to high evaporative demands. Overall, the people perceive that these changes are leading to yield reduction.

In Kalichelo and Mikute GVHs in Salima District, the people perceived that climate change is reflected through changes in rainfall, temperature and wind regimes. Indicators of change include:

- Delayed and unreliable onset of rains. In some years (e.g. 2017/2018), the rains came quite early when they are normally expected to start in November;
- Decreased amount of rainfall;
- Reduced rainy season from 6 months to 3 months;

- Increased amounts and frequency of individual rainfall events;
- Strong winds are frequent and marked by prolonged periods of *Mwera* winds, a south-easterly local wind over Lake Malawi. Initially, *Mwera* would start around March and end in June but now extend up to September.
- Prolonged cold seasons. Normally, temperatures were expected to pick by 15th July to mark the onset of summer. However, the whole of July is now colder than before in most years;
- Poor distribution of rains marked by prolonged dry spells and a high frequency of droughts;
- Early cessation of rains.

In Nkwakwa GVH in Nkhotakota, the people perceive changes in the rainfall, temperature and wind regimes marked by:

- Delayed and unreliable onset of rains;
- Decreased amounts of rainfall;
- Poor distribution of rains;
- Prolonged dry spells;
- Stronger winds.

In Pulika and Chipojola in Machinga District, the climate regime is perceived to have changed marked by:

- Late onset of rains;
- Unreliable rains;
- Change in rainfall pattern;
- Different weather pattern;
- Much lower and higher temperatures;
- Unevenly rainfall distribution;
- Heavy winds;
- Early rainfall cessation;

In Chilembwe GVH in Zomba District, the main indicators of climate change were:

- Uneven rainfall distribution in a season;
- Rains starting late than before;
- Heavy and destructive winds;
- Rain stopping early than before
- Higher temperatures;
- Heavy and destructive rainfall.

In Kumpotola GVH in Dedza indicators of climate change were:

- Uneven rainfall distribution;
- Reduced amount of annual rainfall;
- Increased heavy winds incidences;
- Late onset of rains.

In Kuusigala GVH in Dedza, climate change indicators according to people's perceptions include:

- Early onset of rains;
- Early rainfall cessation;
- Prevalence of pests.

In Kaboola GVH in Dedza, the people perceived their climate to have changed through the following indicators:

- Late onset of rains;
- Uneven distribution of rainfall in the season;
- Strong winds.

From the foregoing people's perceptions, it is evident most of the study villages have experienced considerable changes in the climate regime. Rainfall onset, distribution and cessation, temperature increases and stronger winds were the commonest key indicators of climate change across the study areas.

3.3.3 Climate Change from Empirical Information

The results of the people's perceptions on climate change were compared with empirical data from the nearest weather station to the villages. Table 13 shows the statistical summaries of annual rainfall. The highest mean annual rainfall of 1608.8mm was in Nkhotakota (GVH Nkwakwa) whereas the lowest was in Monkeybay (963.8mm). The Coefficients of variability (CV), an indicator of inter-annual variability, were low to medium. Looking at the minimum annual rainfall, all study villages except those in Balaka, Mangochi and Machinga had adequate rains for maize production throughout the years of record (1958-2009) as maize needs about 700 mm per year for optimal growth.

Table 13. Annual Rainfall Statistics (1958-2009)

Station	Mean	Stdv	CV	Skew	Kurt	Min	Max
Balaka	1003.0	196.6	0.20	0.4	3.5	586.1	1530.4
Chingale	1087.7	226.9	0.21	0.5	3.6	708.3	1712.3
Chitala	1133.2	182.2	0.16	0.1	3.1	767.4	1560.7
Dedza	1008.1	184.8	0.18	0.5	3.7	630.9	1507.2
Makoka	1211.9	238.3	0.20	-0.1	3.0	736.8	1785.1
Mangochi	976.7	209.9	0.21	0.1	2.6	497.9	1402.7
Monkebay	963.8	187.6	0.19	0.3	3.2	510.6	1375.8
Namwera	976.7	209.9	0.21	0.1	2.6	497.9	1402.7
Nkhotakota	1608.8	318.3	0.20	0.0	2.6	1057	2313
Salima	1144.5	207.9	0.18	0.5	3.3	777.3	1718.1

The trend of annual rainfall at the stations[54] shows that all the stations were experiencing decreasing rainfall pattern during the period. This agrees with the people's perceptions. However, the annual rainfall decreases were not statistically significant at □=0.05 level[55].

Table 14. Annual rainfall MK trends at stations closest to the study villages

Station	a	z	b
Balaka	-1.96	-0.33	1.96
Chingale	-1.96	-0.92	1.96
Chitala	-1.96	-0.95	1.96
Dedza	-1.96	-0.54	1.96
Makoka	-1.96	-1.30	1.96
Mangochi	-1.96	-0.22	1.96
Monkebay	-1.96	-0.03	1.96
Namwera	-1.96	-0.22	1.96
Nkhotakota	-1.96	-0.67	1.96
Salima	-1.96	-0.05	1.96

A rainfall index that was perceived by the people to have changed is an increase in prolonged dry spells. This can be represented by the Consecutive number of dry days (CDD) per year. Table 15 shows the CDD summaries. The mean CDD was the highest at Mangochi (149 days) and lowest at lowest at Makoka station (53 Days). Makoka Station is located in a relatively high rainfall area than Mangochi station. Dedza Station, also considered a high rainfall area, experienced the maximum CDD of 244 days whereas Makoka station again experienced the lowest maximum CDD (180 Days) as well as the minimum CDD of 17 days. This is an indication that rainfall conditions at Makoka have been very favorable for production during most of the period 1958 to 2009.

Table 15. Summary statistics for Consecutive number of dry days (CDDs) at stations closest to the study villages

Station	Mean	Stdv	Cv	Skew	Kurt	Min	Max
Balaka	119.6	42.4	0.4	0.1	2.7	25	216
Chingale	83.6	42.9	0.5	0.9	3.1	24	187
Chitala	157.4	26.9	0.2	0.0	3.2	105	232
Dedza	125.8	46.4	0.4	0.2	2.8	42	244
Makoka	53.9	30.9	0.6	1.8	7.8	17	180
Mangochi	149.4	25.4	0.2	-0.2	2.4	99	196
Monkebay	138.5	39.8	0.3	0.0	2.5	61	232
Namwera	149.4	25.4	0.2	-0.2	2.4	99	196
Nkhotakota	105.6	39.2	0.4	1.0	4.8	43	233
Salima	114.2	40.9	0.4	0.3	3.0	42	229

[54] Figure 18
[55] Table 14

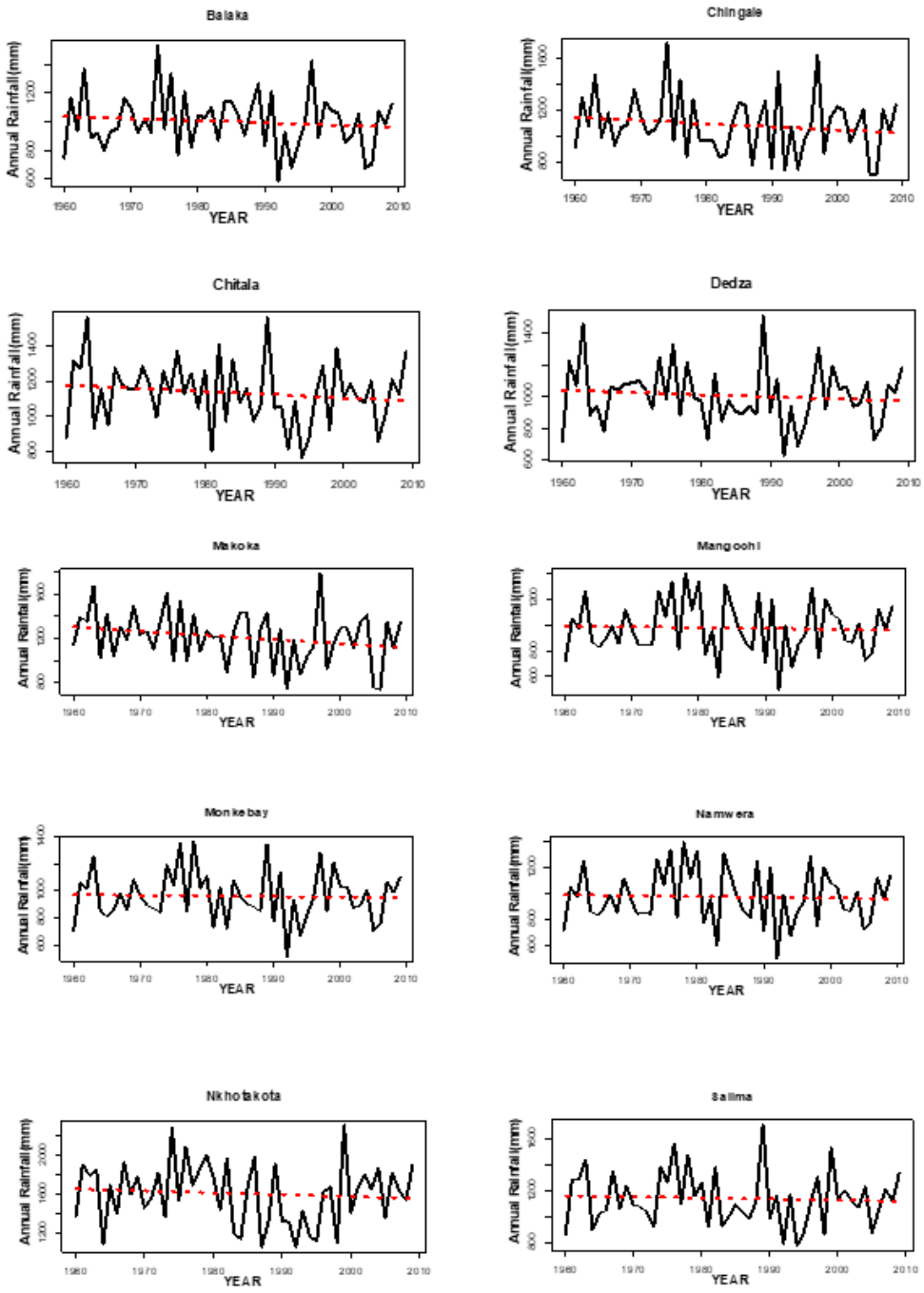

Figure 18. Annual Rainfall and linear regression trends at the stations closest to the study villages (Dashed is the linear regression trend line).

However, the CDD has been increasing in Balaka, Chingale and Makoka while this has been decreasing at the other stations[56]. The MK trends[57] show that Balaka, Chingale and Makoka had significant positive trends of CDD, suggesting a prolongation of dry periods during the rainy season. On the other hand, the significant negative trend in Nkhotakota is an indication of a reduction in

[56] Figure 19
[57] Table 16

CDD at the station. This is in contrast to the perceptions of the local community that dry spells have prolonged in the area.

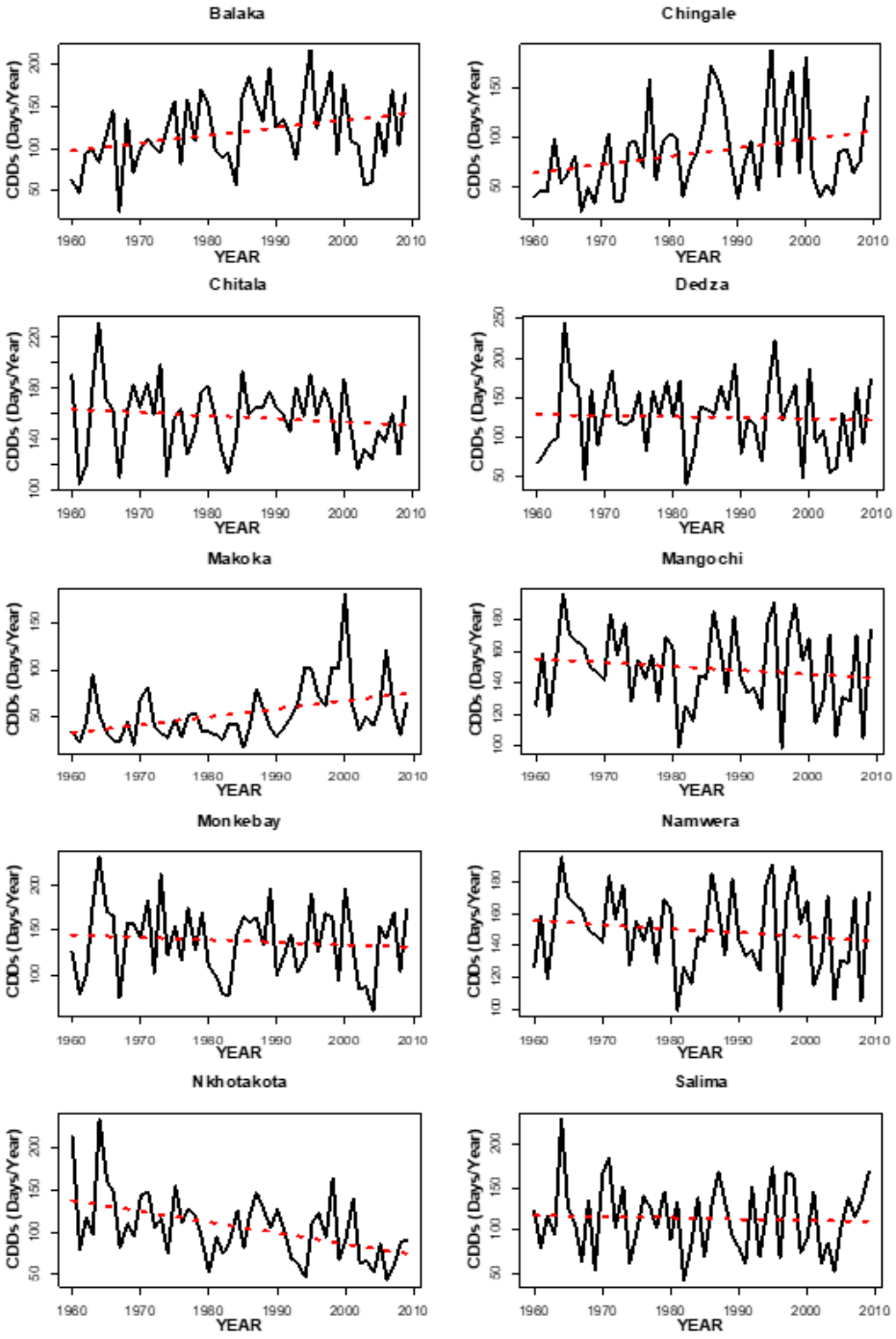

Figure 19. CDD and linear regression trends at the stations closest to the study villages (Dashed is the linear regression trendline)

Table 16. MK Trends for CDD at stations closest to the study villages

Station	a	b	z	N
Balaka	-1.96	2.16	1.96	50
Chingale	-1.96	2.19	1.96	50
Chitala	-1.96	-1.07	1.96	50
Dedza	-1.96	-0.06	1.96	50
Makoka	-1.96	3.03	1.96	50
Mangochi	-1.96	-0.85	1.96	50
Monkebay	-1.96	-0.61	1.96	50
Namwera	-1.96	-0.85	1.96	50
Nkhotakota	-1.96	-3.30	1.96	50
Salima	-1.96	-0.14	1.96	50

The Consecutive number of wet days (CWD) is an index for the longest number of days an area received rainfall in a year. Table 17 summarises the CWD statistics at the stations in the study areas. The mean number of days for CDDs was between 21 and 35.1, the highest (31.2 days) and maximum (116 days) was at Nkhotakota (close to GVH Nkwakwa) and the lowest at Chingale (Closest to GVH Phimbi in Balaka).

Table 17. Summaries of CWD at the stations closest to the study villages

Station	Mean	Stdv	Cv	Skew	Kurt	Min	Max
Balaka	22.5	14.6	0.7	1.6	5.9	6.0	69.0
Chingale	21.6	14.2	0.7	1.6	6.1	6.0	69.0
Chitala	27.0	17.7	0.7	1.2	4.8	6.0	86.0
Dedza	24.2	15.6	0.6	1.8	7.3	7.0	81.0
Makoka	22.2	12.5	0.6	1.4	6.1	7.0	69.0
Mangochi	22.7	15.9	0.7	1.6	6.3	6.0	83.0
Monkebay	22.6	16.0	0.7	1.5	6.2	5.0	81.0
Namwera	22.7	15.9	0.7	1.6	6.3	6.0	83.0
Nkhotakota	35.1	22.5	0.6	1.3	5.2	6.0	116.0
Salima	26.1	16.4	0.6	1.3	5.7	6.0	86.0

Figure 20 shows the CWDs and linear regression trends at the stations closest to the study villages. An increase in the CWD can be observed at all the stations during 1958 to 2009. The MK statistics show that the increases are all statistically significant at □=0.05 level[58]. The implication is that in a seasonal climate typical of the study villages and districts, an increase in the CWD is an indication that most of the rainfall is concentrated in one period during the season. After that concentration period ends, the rainfall pattern becomes erratic and the people may perceive that as an early

[58] Table 18

cessation. This is not ideal for agriculture production especially for crops such as maize which need a staggered rainfall pattern evenly distributed across the growing season.

The Simple Daily Intensity Index (SDII) on the other hand is an index dividing the total amount of annual rainfall against the number of rainy days in a year. It gives an indication of how much it rains per day on average whenever it rains[59]. The results show a decreasing rainfall pattern at all stations[60], with statistical significance[61].

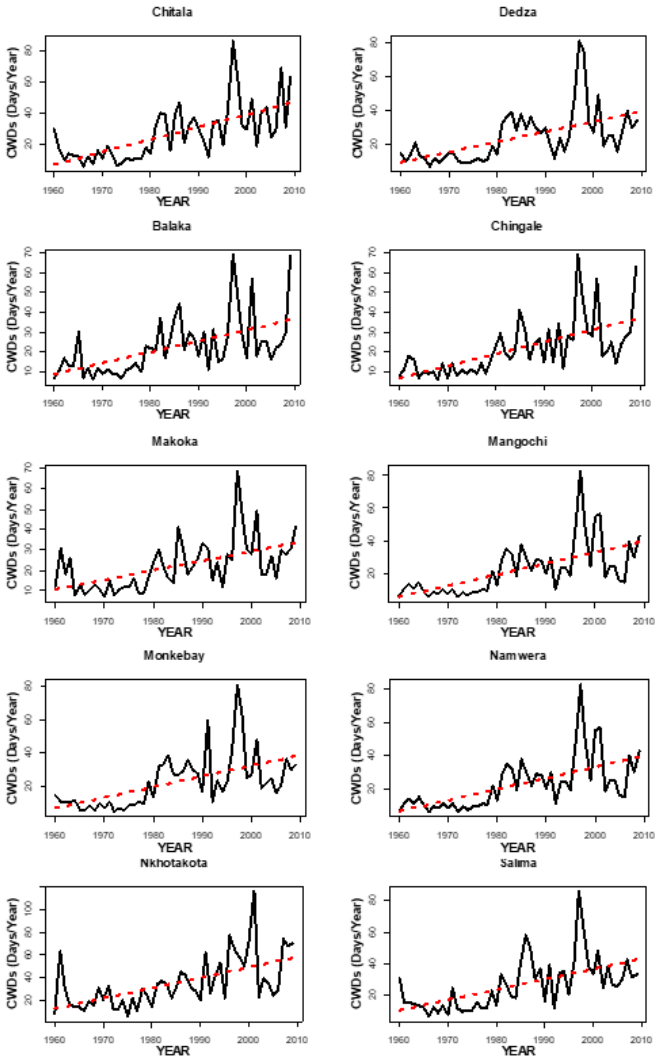

Figure 20. CWD and linear regression trends at the stations closest to the study villages (Dashed is the linear regression trendline)

[59] Table 19
[60] Figure 21
[61] Table 20

Table 18. CWD MK Trends at the stations closest to the study villages

Station	a	z	b	N
Balaka	-1.96	4.42	1.96	50
Chingale	-1.96	5.20	1.96	50
Chitala	-1.96	4.90	1.96	50
Dedza	-1.96	4.43	1.96	50
Makoka	-1.96	4.46	1.96	50
Mangochi	-1.96	4.99	1.96	50
Monkebay	-1.96	4.55	1.96	50
Namwera	-1.96	4.99	1.96	50
Nkhotakota	-1.96	4.72	1.96	50
Salima	-1.96	4.46	1.96	50

Table 19. Summary statistics for SDII at the stations closes to the study villages

Station	Mean	Stdv	CV	Skew	Kurt	Min	Max
Balaka	9.9	3.0	0.3	0.8	3.4	5.1	18.7
Chingale	10.0	3.0	0.3	0.8	3.7	5.9	19.5
Chitala	10.9	3.1	0.3	0.4	1.8	6.7	16.7
Dedza	9.8	2.9	0.3	0.5	2.1	5.2	16.1
Makoka	9.6	2.3	0.2	0.5	2.5	6.3	15.3
Mangochi	9.8	2.7	0.3	0.4	2.4	5.4	16.1
Monkebay	10.5	3.5	0.3	0.5	2.1	5.2	17.6
Namwera	9.8	2.7	0.3	0.4	2.4	5.4	16.1
Nkhotakota	12.7	2.8	0.2	0.4	3.0	7.9	20.2
Salima	10.4	2.5	0.2	0.4	1.7	7.1	15.6

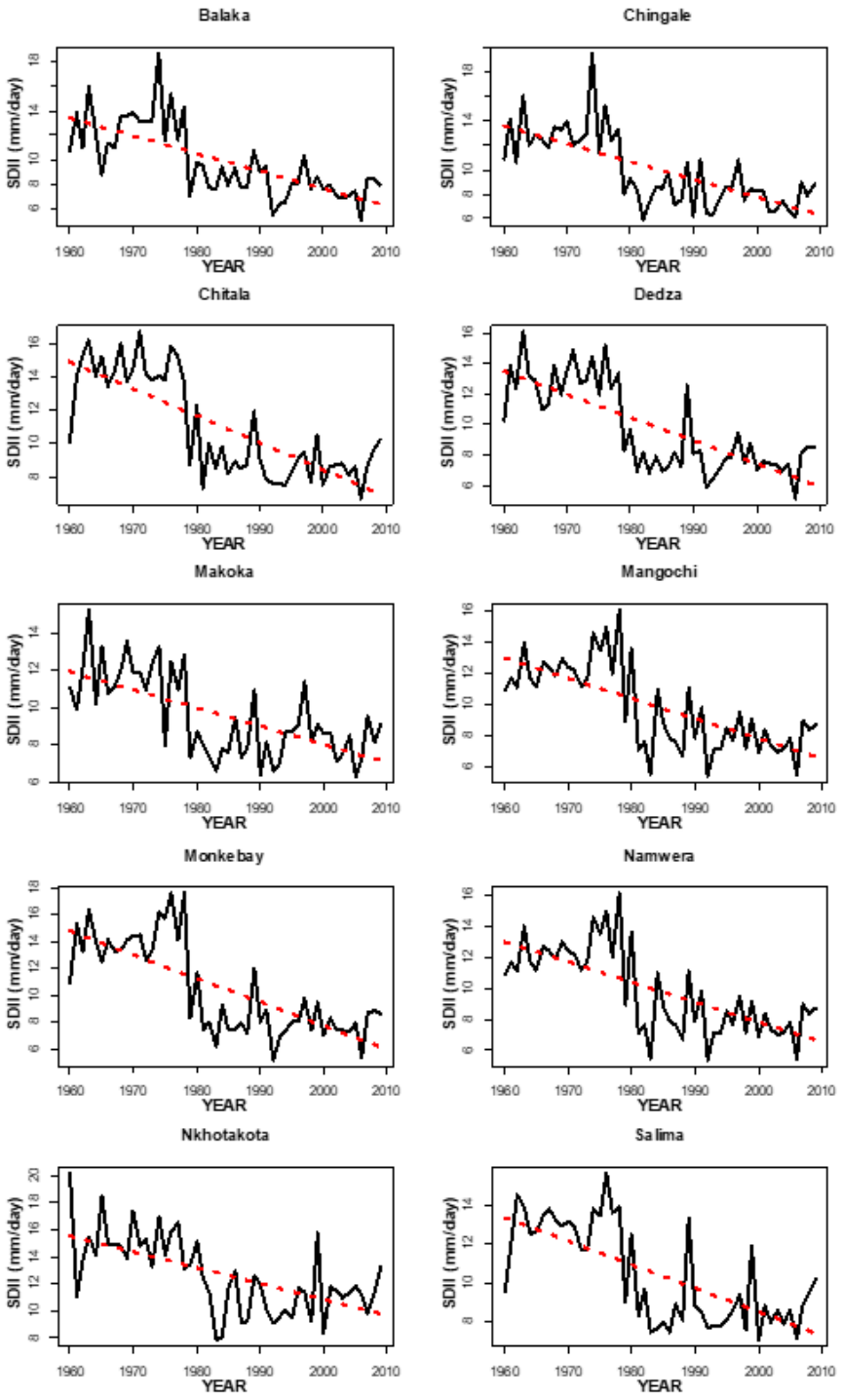

Figure 15. SDII and linear regression trends at the stations closest to the study villages (Dashed is the linear regression trendline)

Table 20. MK trends for SDII at the stations closest to the study villages

Station	a	z	b	N
Balaka	-1.96	-5.18	1.96	50
Chingale	-1.96	-4.89	1.96	50
Chitala	-1.96	-5.06	1.96	50
Dedza	-1.96	-4.70	1.96	50
Makoka	-1.96	-3.83	1.96	50
Mangochi	-1.96	-4.35	1.96	50
Monkebay	-1.96	-4.49	1.96	50
Namwera	-1.96	-4.35	1.96	50
Nkhotakota	-1.96	-4.19	1.96	50
Salima	-1.96	-4.18	1.96	50

However, the SDII has been increasing in many parts of Malawi. With the insignificant negative rainfall trend, a decreasing SDII coupled with increasing CWD can be accounted for as indication that most of the rainfall is now confined in a relatively shorter season. This aspect is actually supported by the data (figure not shown) that the contributions of the very heavy rainfall events above 25mm at the study sites are decreasing.

Temperature on the other hand increased at all stations with statistical significance at □=0.05 level, the exception being Dedza which had a positive but statistically insignificant trend at □=0.05 level. The increasing temperature trends are in agreement with the people's perceptions.

3.4. Key Actors and their Interventions

There are several categories of actors working in the 13 group village headmen (GVHs) in the 7 study districts. These actors are supporting various activities and interventions aimed at improving the socio-economic livelihoods of the communities. Some of the actors are implementing various agriculture related interventions in climate change adaptation. Some can be categorised as development partners, which are foreign governments and international institutions. These work either in partnership with government or independently in some areas with an implementing local partner. In some cases, they also financially support a local or international partner. Another category comprise of Non-Governmental Organisations which can be either local or international. Faith Based Organisations (FBOs) fall in this category, which can further be sub-categorised into Islamic and Non-Islamic including Christian NGOs. Tables 21a to 21l summarises the various organisations working in the villages and the nature of their interventions.

From Tables 21a to 21l, the nature of the interventions which can be sustainable can be grouped as those on:

- Promoting Climate Smart Agriculture **(**CSA) techniques. CSA is defined as those agricultural practices that sustainably increase productivity and system resilience while reducing greenhouse

gas emissions[62]. Such techniques include agro-forestry, mulching, low cost manure making, zero tillage, pit planting, conservation agriculture, crop variety selection and diversification, rainwater harvesting, box-ridging and swales;

- **Environmental and ecological restoration** such as re-afforestation, erosion control measures (e.g. planting vetiva glass and gulley construction) and energy saving technologies (e.g. stoves, solar).

- **Livelihood diversification** such as irrigation agriculture, apiculture, livestock, micro-finance, backyard gardening, agri-business and markets, tailoring and food for work.

In addition, there are some efforts which are purely relief in nature and sometimes done as part of spiritual obligations and do not qualify to be called interventions, although the communities perceived them as such. These include social cash transfers, farm inputs donations and food handouts (including during the holy month of Ramadan). These are not sustainable as the communities want to be assisted annually without any efforts to improving their livelihood status.

In addition, there were more Christian related FBOs and NGOs that were active than Islamic FBOs in the predominantly Muslim study villages[63]. The exception was in Salima District and specifically Mikute GVH where most of the active FBOs were Islamic. However, the focus of the Islamic FBOs was mainly relief in nature largely targeting the neediest among the Moslem community.

[62] FAO, 2010
[63] Table 19

Table 21a. Identified FBOs and Non-FBOs implementing activities in Phimbi GVH in Balaka District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Balaka	Nsamala	Phimbi	Eagles Relief	FBO-C*	USAID/OXFAM	Vulnerable groups	• Energy efficient stoves • Re-Afforestation
			Eagles Relief	FBO-C	USAID/OXFAM	Vulnerable groups	• Conservation Agriculture (CA) • Manure production and other modern farming techniques
			Eagles Relief	FBO-C	USAID/OXFAM	Vulnerable groups	• Farm Inputs e.g. seeds(OPVs) fertilizer
			Red Cross	NGO-NI*	NA	All groups	• Same as Eagles Relief • Provision of school materials
			World Vision	NGO-NI	NA	All groups	• Provision of farm inputs • Livestock(goats and pigs)
			United Purpose	NGO-NI	GIZ	All groups	• Provision of food • Sustainable energy • Livelihood and food security • Re-afforestation
			Ministry of Agriculture Irrigation & Water Development	Malawi Government	NA	The Youth	• Livestock(Goats) pass on programme

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21b. Identified FBOs and Non-FBOs implementing activities in Kuusigala GVH in Balaka District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Balaka	Nkaya	Kuusigala	Ministry of Agriculture Irrigation & Water Development (FIDP-Programme)	Development partner	European Union	All Groups	• CA • Livestock pass on • Livelihood diversification • Agri-markets • Re-afforestation
			Agriculture Irrigation & Water Development Sustainable Agricultural Production Programme (SAPP & Area Stakeholder Panel (ASP))	International Financial Institution-UN affiliated	IFAD	All groups	• CA • Irrigation • Livestock • Agri-business • Horticulture • Re-afforestation
			Project Concern International (PCI-Malawi)	NGO-I	USAID/FFP	All groups	• CA • Crop diversification • Agri-business • Health Hygiene nutrition • Livestock pass on • Safe motherhood (*Uchembere*)
			United Purpose	NGO-I	GIZ	All groups	• Provision of relief food • Sustainable energy • Livelihood and food security

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21c. Identified FBOs and Non-FBOs implementing activities in Kaboola GVH in Dedza District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Dedza	Kamenyagwaza	Kaboola	GIZ	Development partner	German Government	All groups	• Rain water harvesting • re-afforestation • Swales • filling up gullies • Agricultural cooperatives • Horticulture
			MASAF 4	Development partner	World Bank	All groups	• Rain water harvesting re-afforestation • Swales filling up gullies • Agricultural cooperatives • Horticulture

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None Islamic-NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I(Islamic related NGO)

Table 21d. Identified FBOs and Non-FBOs implementing activities in Kampotola GVH in Dedza District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Dedza	Kasumbu	Kumpotola	GIZ	Development partner	German Government	All groups	• Re-afforestaion • Swales (migula) and drains as a way of harvesting water • Tower gardening • Planting vetiva grass Manure their own manure
			CADECOM	FBO-C		All Groups	• Re-afforestation • Swales (migula) and drains as a way of harvesting water • Tower gardening planting vetiva grass Manure
			ILAAD	Government	Government	All groups	• Re-afforestation • Swales (migula) and drains as a way of harvesting water • Tower gardening • Planting vetiva grass Manure their own manure
			MASAF 4	Development Partner	World Bank	Those intereste d	• Re-afforestation • Swales (migula) and drains as a way of harvesting water • Tower gardening • Planting vetiva grass Manure their own manure

Table 21e. Identified FBOs and Non-FBOs implementing activities in Pulika GVH in Machinga District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Machinga	Mlomba	Pulika	Government through the Ministry of Agriculture Irrigation and Water Development (MoAIWD)	Government		All groups	• Climate Smart Agriculture eg Making box ridges to conserve moisture, Zero tillage to prevent soil disturbance and erosion • Agro-forestry so that the leaves decompose in the soil to improve fertility • Deep trenches used to harvest water Land clearing and burning in order to prevent multiplication of worms in the soil
			Plan Malawi (Food for Assets programme)	NGO-NI	Plan International	All groups	• Swale construction training
			UNICEF-Malawi Social Cash Transfer Programme (*Mtukula Pakhomo*)	Multi-lateral with Malawi Government	UNICEF, German Development Bank(KfW), European Union, Irish Aid and Save the Children, Government of Malawi	The elderly & the extremely poor	• Social Cash Transfer
			Emmanuel International	FBO-C	WFP	Women	Distribution of maize

Table 21f. Identified FBOs and Non-FBOs implementing activities inChipojola GVH in Machinga District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Machinga	Mlomba	Chipojola	United Nations Development Program (UNDP)- (Climate Proofing Project)	Bilateral with Malawi Government	Global Environment Fund Trust	All	• Aquaculture-fish farming in the village dam • Apiculture • Livestock management • Irrigation farming • Re-afforestation and forest reserve management • Extension services
			Malawi Government (Income Generating Public Works Project)	Bilateral with Malawi Government	World Bank	Those interested	• Cash or farm inputs in return for work • Swale construction • training • Dam constructions
			Malawi Government-MEDF	Government	Malawi Government	The poor & the Youth	• Micro-Finance
			FISD	NGO-L	MCC	All groups	• Civic education on irrigation • Environmental Management • Energy saving technologies

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I(Islamic related NGO)

Table 21g. Identified FBOs and Non-FBOs implementing activities in Koma GVH in Mangochi District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Mangochi	Nankumba	Koma	Ministry of Agriculture (Extension Services)	Government	Government	All Groups	• Climate smart agriculture
			Malawi Lake Basin Program (Farmers Union of Malawi (FUM), National Smallholder Farmers' Association of Malawi (NASFAM) and Malawi Union of Savings and Credit Co-operatives (MUSCCO))	Development partner	Norwegian Government	Women & All Groups	•Climate Smart Agriculture technologies like mulching, manure making zero tillage, pit planting •Agroforestry program •Teaching farmers the importance of crop diversification
			World Bank (Malawi Drought Recovery and Resilience Programme)	Development partner	World Bank	All	• Provide sorghum and pearl millet which are drought resistant • IITA providing Cassava to the community members
			World Bank (Malawi Flood Resilience Project)	Development partner	World Bank	All	• Increasing depth of wells in the area.
			Emmanuel International	FBO-C	USAID	All	• Promoting agroforestry • Rain water harvesting techniques. • Manure making (Chinese way and pit)
			Salvation Army	FBO-C	NA	all	• Promoting compost manure making • Teaching farmers on Conservation Agriculture (CA) technologies.

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I(Islamic related NGO)

Table 21h. Identified FBOs and Non-FBOs implementing activities in Zimbayuda GVH in Mangochi District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Mangochi	Nankumba	Zimbayuda	UNICEF-Malawi Social Cash Transfer Programme (*Mtukula Pakhomo*)	Multi-lateral with Malawi Government	UNICEF, German Development Bank(KfW), European Union, Irish Aid and Save the Children, Government of Malawi	The elderly & the extremely poor	• Social Cash Transfer
			Emmanuel International	FBO-C	USAID?	All	• Promoting agro-forestry • Rain water harvesting techniques. • Manure making (Chinese way and pit) • Food Distribution
			World Vision	FBO-C			• Food distribution
			World Food programme	UN agency	WFP	All	• Food distribution

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C(Christian related NGO), NGO-I(Islamic related NGO)

Table 21h. Identified FBOs and Non-FBOs implementing activities in Nkwakwa GVH in Nkhotakota District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Nkhotakota	Mwansambo	Nkwakwa	Total Land Care	NGO-NI	NA	All	• Planting vetiva to reduce erosion • Mulching to retain moisture and to control weeds e.g witch weed (kaufiti) • Re-afforestation • Irrigation intensification • Use of energy saving stoves (chitetezo mbaula) which require less firewood hence reducing deforestation

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

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Table 21i. Identified FBOs and Non-FBOs implementing activities in Mawale GVH in Salima District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Salima	Maganga	Mawale	Christian AID	NGO-C	NA	All	• Irrigation supported by solar panels – to deal with rain fed low crop yield since 2007 • Use of solar power reduce gas emissions

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO

Table 21j_1. Identified FBOs and Non-FBOs implementing activities in Kalichelo GVH in Salima District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Salima	Maganga	Kalichelo	Islamic International Relief Organization	FBO-I	NA	Moslem (needy) children	• Money for needy children (for school needs and upkeep), food especially during Rhamadan • Borehole construction for potable water • Building materials (iron sheets) for households affected by climate risks (e.g.. strong winds and heavy rains)

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21j_2. Identified FBOs and Non-FBOs implementing activities in Kalichelo GVH in Salima District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Salima	Maganga	Kalichelo	Muslim ALIMU	FBO-I	NA	Muslims	• Food donations - Flour, beans, rice
			HAIA	FBO-I	NA	Muslims	• Food donations - Flour, beans, rice – targeting muslims
			GUPI	FBO-I	NA	Muslims	• Maize, soya, soghum, cooking oil - targeting muslims
			SIPAPU through Agriculture office in 2016 and 2017	NGO-I	NA	All	• Cassava vines, rice seed, sweet potato vines, maize seed
			Ministry of Agriculture (Extension)	Government	NA	All	• Promote reduced ridge spacing (75cm), one-one planting and mulching • Pigeons peas and chemicals

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21_3. Identified FBOs and Non-FBOs implementing activities in Kalichelo GVH in Salima District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
			CARE Malawi	NGO-I	NA	All	• Promote backyard gardening and good nutrition (Six food groups including pumpkin leaves and amaranthus)
			KUPI	FBO-I	UNICEF	All	• Donate food-maize, soya, cooking oil. Pigeon peas
			The Malawi Project (Kuthandiza Osayenda Disability Outreach (Kodo) Programme)	NGO-NI	NA	The Disabled	• Received sewing machine

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21k_1. Identified FBOs and Non-FBOs implementing activities in Chilembwe GVH in Zomba District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Zomba	Mulumbe	Chilebwe	Government through the Ministry of Agriculture Irrigation and Water Development (MoAIWD)	Government	NA	All	• Extension services • Making box ridges to conserve moisture • Swale construction to harvest water hence conserving soil and water • Planting of vetiver grass • Making of tree nurseries- 16000 tree seedlings. • Deep trenches used to harvest water • Zero tillage to prevent soil disturbance and erosion • Making of compost manure
			World Vision- Malawi	FBO-C	NA	All groups	
			Save the Children	NGO-NI	NA		

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None-Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I (Islamic related NGO)

Table 21k_2. Identified FBOs and Non-FBOs implementing activities in Chilembwe GVH in Zomba District

District	TA	GVH	Organisations	Status	Funding	Targeted Group	Interventions(s)
Zomba	Mulumbe	Chilebwe	SAFE	FBO-C	SAFE	All Groups	• Introduced new methods of farming
			World Food Programme	UN Agency	WFP	All groups	• Distribution of food, cooking oil and relish

*FBO-I (Islamic FBO), FBO-C (Christian FBO), NGO-NI (International None Islamic NGO), NGO-L (Local NGO), NGO-C (Christian related NGO), NGO-I(Islamic related NGO)

3.5 Integration of SCP into the Interventions

According to key informant in Kusigala and Phimbi GVHs (Balaka District), the concept of SCP has been integrated into the interventions in three.

- The first is through the provision of OPV seeds which can be used in three consecutive years without the beneficiary communities needing to purchase new seeds. In so doing, this may reduce the dependency of handouts.
- In addition, the beneficiary communities are also being trained in various skills such as such as the production of a local fertiliser called *Mbeya*, which mixes a small amount of chemical fertilizer (e.g. 5kgs) with various ingredients to produce 50kgs of *Mbeya* fertiliser. In this case, the only costly ingredient is the chemical fertiliser which the farmers need to purchase or access from the FISP. The *Mbeya* fertiliser approach has proven to be very effective as most households cannot afford a 50kg bag of fertiliser.
- Furthermore, environmental management and conservation is being promoted through agro-forestry activities and the use of energy efficient fixed stoves aspects which uses less firewood. Other interventions to the communities include the distribution of manuals promoting proper nutrition.

In Mikute (Salima District), SCP has been incorporated through the use of solar powered pumps for irrigation which have replaced diesel powered engine pumps. Subsequently, the changes are contributing in the reduction of GHG emissions.

Similarly in Nkhotakota (Nkwakwa GVH), key informants and FGDs uniformly reported the integration of SCP through farmers' training on how to sustain the environment, soil and water conservation for the present and future generations. Activities include promotion of conservation agriculture (e.g. minimum tillage), afforestation and natural regeneration of trees, making and use of energy saving stoves, solar powered irrigation and good crop spacing for high crop yields.

In Zimbayuda and Koma GVHs in Mangochi, SCF according to the key informants has been incorporated into the interventions through:

- Nutritional trainings where farmers are taught about crop production. Special topics on how to prepare different food groups are also covered.
- Farmers are also sensitized about the HIV/ AIDS pandemic so that the farming activities should not be compromised with the effects of the virus;
- Every farmer is encouraged to have an herbal and green vegetable garden at the house surrounded by fruit trees.
- Farmers are taught how to prepare a nutritious meals;

However, the FGD participants indicated that they are yet to be introduced to the concept of SCP. In Chilembwe GVH in Zomba, the people indicated that they were informed that swales are part of SCP in conserving water.

3.6 Challenges faced by the interventions

The introduction of the various interventions is faced with many challenges across the study villages which in turn are impacting on their effectiveness. These are in addition to climate change and environmental degradation related challenges. The following summarises some of the challenges:

GVH Phimbi, Balaka District

- The main river (Rivirivi River) and wells dry up in the dry season which negatively impacts on interventions such as irrigation due to water unavailability;
- Increased frequency of incidences of pests and diseases attacking crops and livestock;
- Unavailability of markets and value addition opportunities for both livestock and crops and;
- Shortage of farm inputs especially fertilizer and improved crop varieties;
- Prevalence of theft;

Mpulula GVH in Balaka District

- Lack of markets for farmers to sell their produce;
- Lack of farm inputs;
- Pests and diseases.

Kumpotola GVH in Dedza District

- Lack of markets;
- Lack of arm inputs especially fertilizer;
- Prevalence of pests and diseases for both crops and livestock;
- Unavailability of markets for farmers to sell their produce.

Kaboola GVH in Dedza District

- Prevalence of pests especially full army worms;
- Shortage of farm inputs especially fertilizer;
- Unavailability of markets and;
- Prevalence of theft.

Chipojola GVH in Machinga District

- Different NGOS approaching farmers with different approaches from those of Government;
- Some NGOs giving money after learning which is a challenge as other projects are expected to give out money too.

Pulika GVH in Machinga District Machinga

- Lack of markets;
- High prices of farm inputs.

Pakamwa GVH in Mangochi District

- Low participation of men in cooking demonstrations;
- Lack of farm inputs;
- Lack of agro-forestry resources;
- Adoption of CA technologies is low.

Zimbayuda GVH in Mangochi District

- Lack of inputs;
- Late delivery of donated of subsidised farm inputs;
- Lack of transparency in selective beneficiaries of subsidised farm inputs.

Kalichelo GVH in Salima District

- Lack of farm inputs (e.g. fertilizer is quiet expensive);
- Increased incidences of pest and diseases. In addition, if fall army worm affect maize and the neighbouring field is not sprayed, the intervention fails;
- Livestock management – overstocking especially goats feed on other people's crops especially cassava and maize;

Mikute GVH in Salima District

- Access to farm inputs is a challenge due to costs and source is far at the district headquarters (16kms from the village);
- Unreliable markets for farm produce. For instance, the farmers had relatively high yield of tomato in the 2017/18 season. Due to high supply at the local markets, Tomato was selling at MK3,000 per 40litre basin (USD4.09) which in the past was normally the selling price in years with low production;
- A lot of post-harvest losses for tomatoes due to limited skills in processing/management (value addition);
- Limited extension services especially for livestock. Most respondents added that extension services respond late to address the problem. This also applies to crops because initially, an extension worker was provided by Christian Aid, a Christian NGO who to complement the government officer for the area. However, the services

stopped when the project wound up. The amount of work is therefore too much for the government officer as she has to cover a very wide area.

Nkwakwa GVH in Nkhotakota District

- Access to farm inputs is a challenge due to costs and sources are not readily available nowadays;
- Unreliable markets for farm produce. Farmers rely on vendors who buy their produce at unreasonably low prices. For instance, in 2017/18 season, farmers were selling groundnuts at MK800 (USD 1.09) or MK 1000 (USD 1.36) per 5litre bucket;
- Pests and diseases for both crops and livestock. E.g. yellowing of groundnuts due to pests like ants which suck out the juice.

Chilembwe GVH in Zomba District

- Lack of livestock such as chicken and goats to produce manure for the effective implementation of some of the interventions that are being promoted;
- Frequent outbreaks of pests and diseases attacking crops and the few available livestock;
- Farm inputs are expensive i.e. pesticides, seeds and fertilizer.

It can however be observed that lack of inputs is the commonest challenge that all communities indicated they face when implementing the interventions. The reason given is that the inputs are expensive. For communities whose livelihoods are mostly solely dependents on agriculture production, sustainability of production through donations of farm inputs cannot solve the situation. In addition, most of the communities indicated that markets for their produce are another key challenge. The farmers therefore cannot practice agriculture as a business due to this challenge. This is an addressable issue through measures such as community value addition and agri-business markets.

3.7 Prioritised interventions to address the challenges from local people's perceptions

The prioritised interventions to enhance farmers' capacity to respond to climate variability and climate change effects varied across villages though some were common to many. Table 22 summarises the prioritised interventions in each of the study villages. The commonly mentioned prioritised interventions included:

1) Improved access to reliable and profitable markets/information for agricultural produce;
2) Training on post-harvest loss crop management and value addition especially food processing (e.g. Jam from tomato for Mawale GVH, Salima District);

3) Access to livestock through pass on programme for manure production and cash;
4) Improved access to extension service for pests and disease management;
5) Improved access to agricultural loans for farm inputs and value addition;
6) Improved access to irrigation resources, specifically storage tanks and;
7) Access to new crop varieties to improve yields (e.g. new groundnut varieties for Nkwakwa GVH in Nkhotakota District) and inputs.

Table 22. Prioritised interventions in the study villages

Desired Intervention	**District/GVHArea mentioned**											
	Balaka		Dedza		Machinga		Mangochi		Nkhotakota	Salima		Zomba
	Phimbi	Mpulula	Kaboola	Kumpotola	Pulika	Chipojola	Pakamwa	Zimbayuda	Mkwala	Kalichero	Mikute	Chilembwe
Information & skills on management of new crop & livestock diseases and pests		√			√	√					√	√
Agro processing skills to reduce post-harvest loss		√									√	
Connection to reliable and profitable external markets	√	√	√		√	√	√		√	√	√	√
Access to farm inputs (including new hybrid seeds suitable for the area)on loan through clubs	√		√	√	√	√	√	√	√	√	√	√

Table 22. Prioritised interventions in the study villages (Continued)

Desired Intervention	**District/GVHArea mentioned**											
	Balaka	Dedza	Machinga	Mangochi	Nkhotakota	Salima	Zomba	Balaka	Dedza	Machinga	Mangochi	Nkhotakota
	Phimbi	Mpulula	Kaboola	Kumpotola	Pulika	Chipojola	Pakamwa	Phimbi	Mpulula	Kaboola	Kumpotola	Pulika
Access to farm implements - tractors to expand rice fields because rice production is very reliable										√		
Access to farm implements – oxen to expand land and for manure production											√	
Access to user friendly irrigation equipment	√				√	√	√					
Access to livestock through goat pass on programme for manure production and improved income				√						√		
Construction of additional tanks for irrigation (water storage tanks)									√		√	

Table 22. Prioritised interventions in the study villages (Continued)

Desired Intervention	**District/GVHArea mentioned**											
	Balaka	Dedza	Machinga	Mangochi	Nkhotakota	Salima	Zomba	Balaka	Dedza	Machinga	Mangochi	Nkhotakota
	Phimbi	Mpulula	Kaboola	Kumpotola	Pulika	Chipojola	Pakamwa	Phimbi	Mpulula	Kaboola	Kumpotola	Pulika
Improved access to extension services for both crops (e.g. tillage systems & rainwater harvesting) and livestock (management)	√	√	√	√	√	√	√	√	√		√	√
Loans for business capital			√	√					√			
Cooperatives for livestock farming									√			
Cows for milk									√			

4.0 Conclusions

This study has evaluated the effectiveness of agriculture based interventions on SCP in climate change adaptation by FBOs and non-FBOs in predominantly Islamic communities in Balaka, Dedza, Salima, Nkhotakota, Mangochi, Machinga and Zomba Districts in Malawi. Using mixed qualitative and quantitative approaches in consulting randomly chosen respondents (n=102), FGDs and key informants, the study have established that:

- Rainfall in the study districts has reduced through not significantly while temperatures have increased significantly.
- Most households in the study villages are stuck in the low income bracket, based on the nature of their livelihoods; Most of them live in considerable poverty.
- Household nutrition health status was poor based on Minimum Dietary Diversity for Women (MDD-W) tool by FAO and FHI 360 (2016). Out of the 10 food groups, the majority of the respondents consume at most 2 food groups against the recommended minimum of 5 per day.
- Various players are on the ground implementing a variety of agriculture and non-agriculture based interventions around the concept of CSA. Most of these players are non-Islamic (or Islamic related) FBOs, NGOs and development partners. The only exception was in Mikute GVH in Salima District where Islamic FBOs were found to be the more active. Their focus however was more of relief.
- Conflicting interests among the various actors were observed where the interventions have mostly been top-down with minimal participation in choice by the target communities.
- Some of the interventions have incorporated the concept of SCP such as good nutrition and environmental conservation measures such as energy saving technologies.
- However, some interventions are unsustainable and have the potential (to instill a runaway dependency syndrome (if not already instilled) among the target beneficiaries, which bring into question the concept of SCP.

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APPENDICES

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Appendix A

Evaluating the impacts of agriculture interventions by Faith Based Organisations (FBOs) and non-FBOs on Sustainable Consumption and Production of rural community livelihoods in the climate change adaptation process in Malawi

Focus group discussions checklist

Target number: 6-8 participants per group (male and female combined)

VILLAGE PROFILE

1. Short background of the village:

a) Name of the village
b) What is the meaning of the village name?
c) When was the village established?
d) Names of the sub-villages? What is the total number of households?
e) What are the available social services? Primary School in the Village, What are boundaries of the village ?

2. What are the demographic characteristics?

a) What is the current village population?
b) Major ethnic groups in the village and their origins?
c) What are the migration patterns? (Probe in- and out-migration by age groups, gender, socio-economic groups; probe reasons for migrations).

3. Assessment of the perceptions of climate change/variability

a) What do you understand by the concept climate change/variability?
b) What are the main indicators of CC in this village?
   - Onset of rains (early, late onset)?
   - Amount of rainfall?
   - Distribution/reliability of rainfall?
   - Duration of dry spells?
   - Frequency of droughts?
   - Temperatures?
   - Strong winds?
   - Humidity?
c) Have there been any major historical CC-related events in this village? (Explain)
d) Which years do you regard as bad years in relation to climate change/variability?
e) What are the local indicators for bad years?).
f) Which years do you regard as good years in relation to climate change/variability?
g) What are the local indicators for good years?)

4. Assessment of the impact of climate change on agriculture

a) What is the current status of agricultural production in the area?

b) What are the staple food crops in the village? Why?
c) What are the other food crops grown in this village? (List in order of importance)
d) What are the main cash crops grown in this village? (List in order of importance)
e) What are the major livestock kept in the village (list in order of importance)?
f) What is the crop calendar of the area?
g) Have there been any changes in crop calendar/seasonality in this village? If so, explain. (Specify the effects of – e.g. rainfall onset, amount, and distribution and relate to agricultural activities such as land preparation, planting, weeding and harvesting time, etc)
h) What are the implications of changes in temperature regimes on crop production?
i) What are the implications of changes in wind regimes on crop production?
j) Has there been any change in type of crops grown in this village for the last 10 years?
k) If so, how is this associated with climate change? What other factors influence this?
l) Have there been changes in the yield/acre (productivity) of the present crops? What are the causes to such changes?
m) What are the prevalent crop pests in this village? Probe on impacts on agricultural production.
n) Have there been any changes in crop pests' incidences for the last 10 years?
o) What are the prevalent crop diseases in this village? No diseases
p) Have there been any changes in crop diseases incidences for the last 10 years? If so, explain
q) Have there been any changes in farming practices in this village? If so, explain (Probe on crop husbandry practices e.g. ways of land preparation, use of agricultural inputs – e.g. fertilizers, pest control, weeding, agricultural mechanization). Have these changes been associated with climate change?
r) Have there been any changes in livestock production? How is this associated with climate change?
s) What are the other agricultural production constraints in the village? (Tool: Flip Charts, include pair-wise ranking)
t) How do you overcome the mentioned agricultural constraints? (Tool: Flip Charts)

5. Agriculture interventions in relation to climate change adaptation

a) Which institutions have been supporting you to address the agricultural constraints?
b) Since when did these institutions been supporting you?
c) What have been the weather conditions since the agricultural interventions started?
d) What have been your activities since the agricultural interventions started?
e) What changes in capacity have resulted from these activities (capability, motivation, opportunity)?
f) Have these changes strengthened your capacity to cope or adapt to weather conditions?
g) Are you doing anything differently as a result of change in capacity (e.g. Change in farming practices in members own fields).
    i. If Yes, what are the changes.
    ii. If No, why not
h) What have been the challenges?

i) What would you like to change?
j) How are the interventions affecting the environment? (Probe on conservation and preservation of the environment using the concept of SCP)
k) What are your future plans?

6. Access to improved and quality seeds

a) What types of seeds do you use (improved or traditional/local varieties)?
b) What is the source of your seeds?
c) Any information/knowledge regarding use/production of quality seeds?
d) How do you access quality seeds?
e) What is your opinion on the timeliness, affordability, reliability, authentic/fake quality seeds?

7. Value addition and marketing

a) Do you sell any of your produce?
b) Produce processing
    i. Do you process these produce before selling?
    ii. Which produce?
    iii. How is the produce processed (both modern and traditional methods)?
    iv. If not processing state why?
    v. If yes, which ones have a potential market?
c) Do you have access to market information? How?
d) Training on value addition and marketing
    i. Have you been trained on value addition and marketing?
    ii. When were the trainings?
    iii. By who (institutions)?
e) What are the other existing and potential stakeholders for value addition and marketing?
f) Do you have any marketing strategies/structures e.g. groups/ cooperatives?

8. Information on livestock enterprises

a) Do you keep livestock in your area/village?
b) If yes what types of livestock, and which breeds?
c) Which livestock types and breeds that fetch high market value?
d) What are the major problems related to livestock? List according to importance.
e) How are the livestock affected by climate change?
f) Which of the livestock types and breeds more resilient to climate change? Why?
g) How do livestock keepers cope with the impacts of climate change? Stall feeding
h) What are the existing and potential stakeholders for livestock management?
i) Do you have any marketing strategies/structures e.g. groups/ cooperatives for livestock?

9. Water and natural resource management issues

a) What types of water sources are there in your area?

b) What types of uses for the mentioned water sources (e.g. domestic, livestock, irrigation, etc)?
c) Are the different sources adequate for the different uses?
d) If not adequate, how do you address the shortage/deficit?
e) Are there any efforts on water harvesting, what type, type of water harvesting technology), for what purposes?
f) If you are practicing irrigation, what is the scale of coverage in terms of irrigated area, number of farm families, villages, etc.
g) What are the opportunities for scaling up irrigation activities?
h) What are the challenges related to irrigation farming?
i) Which institutions are supporting irrigation or water management and rainwater harvesting efforts?

10. What desired intervention would you like to have in your area?

a) Improved method of tillage
b) Improved crop varieties, specify
c) Irrigated farming, what crops?
d) Livestock farming? Specify and their breeds
e) Other? Specify

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Appendix B

Evaluating the impacts of agriculture interventions by Faith Based Organisations (FBOs) and non-FBOs on Sustainable Consumption and Production of rural community livelihoods in the climate change adaptation process in Malawi

Individual interviews

MODULE 1: HH IDENTIFICATION AND INTERVIEW SUMMARY

HH identification and interview summary
101 District (name):_____ 102 Region_____ Code |____| Northern region=1, Central region=2 Southern region=3 103 Traditional Authority (name): _____ 104 Group Village Headman (name) _____Code: |____|____| 105 Village name: _____Code: |____|____| 106 Questionnaire Number |____|____|____|____| D D M M Y Y Y Y 107 Date of interview |__|___||___|___||___|___|___|___| Time_____ 109 Enumerator (Name)_____
To be completed after interview has been done Peer Reviewed on D D M M Y Y Y Y |____|____||____|____||____|____|____|____| Name of supervisor_____

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Checked :_____ D D M M Y Y Y Y

|____|____||____|____||____|____|____|____|

Data entry clerk_____

MODULE 2: HH CHARACTERISTICS

201. Name of respondent |_____|

202. Age of respondent |____| Years |____| Don't know

203. Gender 1=Male 2= Female

204. Marital status |____|

1= single, 2= married, 3= separated, 4= divorced, 5= widower

205. How long have you been living at your current residential place? |_____| years

206. Highest level of education level |____|

1= Primary 2=Secondary3= Post Secondary 4= Adult literacy 5=University degree 6=None

7=Other_____

207. HH size |___| persons

208. Are you head of the HH? |____| 1= yes, 2= No

209. If No to Q208, what is your relationship to the HH head? |___|

1= parents, 2= Guardians, 3= Friend(s), 4= Other (Specify)_____

MODULE 3: HH INCOME SOURCES, EXPENDITURES & ASSESTS

Main sources of income for the HH (calculate/annum) (last year)

INCOME SOURCES							
Agricultural crops	**Income**	**Agricultural related**		**MK**	**Other sources**		**MK**
301	**302**	**303a**	**303b**	**304**	**305**	**306**	**307**
01 maize		Employed.	01		Fishing	01	
02 cassava		Dairy	02		Formal	02	
03 common beans		Poultry	03		Pension	03	
04 pigeon peas		Land rents	04		Remittances	04	
05 rice		Ganyu	05		Carpentry	05	
06 sorghum		Equipment	06		Tailoring	06	
07 groundnuts		Goats/sheep	07		IGAs	07	
08 tobacco		beef Livestock	08		Gifts	08	
09 cotton		Other (specify)	09		Aid (govt,	09	
10 millet					Businesses	10	
11-other (specify)					Other		

308. Main types of assets, number and period of use (**fill table below**)

Type of Asset		**No. of Assets**	**Source***
308a		**30bb**	
Buildings			
01	Brick house with grass thatch		
02	Brick house with iron sheets		
03	Mud house with grass thatch		
04	Mud house with iron sheets		
HH assets			
05	Chairs		
06	Tables		
07	Beds		
08	Bicycle		
09	Radio		
10	Mattresses		
96	Other (specify)		
Farm Implements			
11	Ploughs		
12	Ridgers		
13	Wheel barrows		
14	Shovels		
15	Hoes		
16	Ox-carts		

17	Sprayers		
18	Cars		
96	Other (specify)		

*Source can be e.g. from own income or donated etc.

309. Attributes of the house in which the HH members live:

House	Attributes of the house	Code
Whether the HH owns the house in which its members live	1 = Yes, 2 = No	
Floor of the house	1= Cement, 2= Floor tiles, 3 = Earth/Soil, 4 = Others (specify)	
Walls of the house	1 = Block/cement/concrete/stones, 2 = Baked/burnt bricks, 3 = Mud bricks, 4 = Mud and poles, 5 = Others *(Specify)*	
Roof of the house	1 = Galvanized iron sheets, 2 = Asbestos sheets, 3 = Roofing tiles, 4 = Grass, leaves, bamboo, 5 = Others (specify)	
Main source of light used in the house	1 = Grid electricity, 2 = Solar electricity, 3 = Gas, 4 = Paraffin, 5 = Candles, 6 = Wood fire, 7 = Others *(Specify)*	
Main source of power for cooking in the house	1 = Grid electricity, 2 = Solar electricity, 3 = Industrial gas, 4 = Biogas, 5 = Paraffin, 5 = Charcoal, 6 = Firewood, 7 = Others *(Specify)*	
Reliability of source of power	5 = Excellent. 4= Very Good. 3=Good. 2= Fair. 1=Poor.	
Source of potable water	1. Piped inside/Outside house water tap 2. Protected well/spring 3. Unprotected well/spring/river/dam/lake 4. Bottled 5. Rooftop rainwater, 6. Other (specify)	
Distance and time from home to the source	_____ km _____ min.	
Reliability of source of water	1. Reliable, 2. Seasonal, 3. Occasional problems 4. Frequent problems	
Water treatment to make it safe for drinking	1 = Boil, 2 = Let it stand and settle/sedimentation, 3 = Add water guard or chlorine, 4 = Use water filter, 5 = Solar disinfection, 6 = Drink bottled water, 7 = Nothing, 8 = Others (*Specify*)	
Does your HH have a toilet?	1. Yes 2. No	
If not what do you use?	1. Public 2. Neighbours' 3. Bush	
Kind of toilet the HH has/uses	1 = Flush toilet, 2 = Traditional pit latrine, 3 = Ventilated improved pit (VIT), 4 = Others (specify)	
Is the toilet shared with another HH	1. Yes 2. No	
If no access to toilets, what is the main reason	1. Pastoral/frequent movement 2. Lack of resources to construct 3. Does not see the need	
Distance between latrine and water source	1. 1-30 m 2. > 30m 3. NA (if using bush)	

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MODULE 4: AGRICULTRURAL PRODUCTION

401. What is your total land holding size _____ (acres)

402. Do own this land? 1= Yes, 2= No

403. Do you hire land for farming? 1= Yes 2= No

404. Do you hire out land for farming: 1= Yes, 2= No Give reasons

405. What type of agricultural activities are you engaged in?

Crop farming	(1)
Livestock farming	(2)
Aquaculture	(3)
Bee Keeping	(4)
Horticulture	(5)
Other (specify)	(96) _____
None	(99)

406. For what purposes do you grow crops? |___|

Commercial	(1)
Consumption	(2)

Both (3)

Other (specify) (99)

407. Which crops do you grow for commercial purposes?

Crop Code	Crop	Crop Code	Crop	Crop Code	Crop	Crop Code	Crop	Crop Code	Crop
01	Maize	**07**	Cow peas	**13**	Tomato	**19**	Orange	**99**	N/A
02	Rice	**08**	Pigeon peas	**14**	Onions	**20**	Bananas		
03	Sorghum	**09**	Common beans	**15**	Mustard	**:**	Pumpkins		
04	Millet	**10**	Cassava	**16**	Paprika	**22**	Tobacco		
05	Soya beans	**11**	S. potato	**17**	Cabbage	**23**	Cotton		
06	Groundnuts	**12**	Irish potato	**18**	Pine apples	**96**	Other (specify)		

408. Which crops do you grow for HH consumption purposes?

Crop Code	Crop	Crop Code	Crop	Crop Code	Crop	Crop Code	Crop	Crop Code	Crop
01	Maize	**07**	Cow peas	**13**	Tomato	**19**	Orange	**99**	N/A
02	Rice	**08**	Pigeon peas	**14**	Onions	**20**	Bananas		

03	Sorghum	**09**	Common beans	**15**	Mustard	**:**	Pumpkins		
04	Millet	**10**	Cassava	**16**	Paprika	**22**	Tobacco		
05	Soya beans	**11**	S. potato	**17**	Cabbage	**23**	Cotton		
06	Groundnuts	**12**	Irish potato	**18**	Pine apples	**96**	Other (specify)		

MODULE 5: HH FOOD SECURITY & COPPING STRATEGIES

501. Did your HH run out of food during the last five years? 1= Yes 2= No

502. Which month did/will your HH run out of enough food in 2017: (to be consumed throughout the year)?

Jan=1 Feb=2 March=3 April=4 May=5 June=6 July=7 Aug=8 Sept=9 October=10 November=11 December=12

503. In the last three years, how many months was your HH food secure? |___|

504. If your HH did not have enough food in any one of the years, what were the reasons?

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Reason **Multiple responses allowed**	2013	2014	2015	2016	2017

01. Drought 02. Oxen shortage/ absence 03. Crop damage due to pest & diseases 04. Land shortage 05. Poor soils 06. Excess rain 07. Not enough labour 08. Not enough seed 09. Lack of input/Fertilizer 10. Sold most of the harvest 96. Other Specify _____

505. What does your HH do when you run out of food?

01 purchase with own cash

02 donations from relatives/friends

03 sell of livestock

04 food for work

05 ganyu

06 aid (govt, ngos)

07 sell land

08 remittances

09 reduce number of meals

10 reduce quantity of food

11 temporary off farm work

12 borrow

13 sell farm equipment

14 sell hh assets

15 others (specify) _____

506. Does your family sometimes substitute some usual meals/food for less preferred food (e.g. porridge for nsima; gaga/maize husks for maize or sorghum flour etc)?

01. Yes **02.** No

507. If yes, how often? **01.** Rarely **02.** At least once a month **03.** At least once a week **04**. Every day

508. If you sometimes reduce quantity of food and/or frequency of meals, how does it work/how is the distribution among HH members?

01 children's share reduced **02** adult women's share reduced **3** adult men's share reduced **04** all family members share equally

509. What are the **causes** of food insecurity to your HH?

01 labor shortage |___| **02** land shortage |___| **03** Shortage of inputs |___|

04 Lack of information |__| **05** Poor soils **06** Drought |___| **07** Floods |___|

510. What interventions have been put in place to combat food insecurity?

1. _____

2. _____

3. _____

511. What interventions will you put in place to combat food insecurity in future?

1. _____

2. _____

3. _____

512. Number of meals taken during food secure months? |___|

513. Number of meals taken during lean months? |___|

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MODULE 6: CURRENT SITUATION REGARDING CLIMATE RISKS AND ENVIRONMENT

601. In the past 10 years, you think agricultural yield per acre has: (tick one)

Stayed the same		Increased	
Decreased		Don't know	

602. Are there any environmental problems that are affecting this area?

Yes		No	

603. If yes, what are they? (Don't read out – open ended question):

Deforestation		Soil Erosion	
Threat to biodiversity		Climate change	
Fisheries extinction		Land degradation	
Others (Specify)			

604. In the next ten years, do you think these resources will be the same, more degraded or less degraded?(tick one per row)

	Same	More degraded	Less degraded	Don't know
Water				

Forest and Trees				
Indigenous rangeland				
Agricultural land				
Wildlife				
Fish				
Birds				
Others(if mentioned)				

605. Do you think climatic conditions in this village have been changing?

Yes		No	

606 If yes how? (Don't read out – open ended question):

Rains do not come like they used to		Long dry spells	
Water is being fetched from far away		Flooding	
Others (specify)			

607. Which of the following climate risks have you experienced during the past 10 years?

1= Flooding

2= Drought

3= late rains

4= shorter rains

96=Others Specify_____

608. What has been the trend for the following climate risks for the past 10 years? (*1=increasing, 2=constant, 3=decreasing, 4=other, and assign level of risk:0=no risk, 1=low risk, 2=high risk, 3 medium risk*)

Category	Trend	Level of risk
1= Flooding		
2= Drought		
3= late rains		
4= shorter rains		
96=Others Specify		

609. How has this change affected your agricultural production (probe for positive and negative effects)?

Negative	**Positive**
1. _____	1 _____
2. _____	2 _____
3. _____	3 _____

610. How has this change affected your livelihood (positive and negative effects)?

	Negative	**Positive**
1.		1
2.		2
3.		3

611. Which category of people are most vulnerable to the effects identified in Questions 605 to 610?

Category	**Reason**
1= All groups	
2=Female Headed HHs	
3=Male Headed HHs	
4=Child headed HHs	
5=Women	
6=Children	

612. In which ways did the last climatic variability affect your HHs? Rank the severity (4=Most severe, 3=Severe, 2=Less severe, 1= Least severe, 0=no effect)

Activity	**Drought**	**Floods**	**Late rains**	**Short rains**
Reduced/failure of crop yields				
Long distances to fetch water for domestic use				
Crop destruction				

Low pasture production				
Loss of soil fertility/land degradation				
Pest and disease infestation				
Low demand for agricultural labour				
Long distance to fetch firewood				
Increased prices for foodstuffs				
Destruction/loss of infrastructure				
Long distances to graze livestock				
Death of livestock				
Reduced fish yields				
migration				
School dropouts/absenteeism				
Sicknesses (specify)				
Others (specify)				

MODULE 7: CLIMATE RISK IMPACTS, CURRENT EFFORTS TO ADAPT TO CURRENT CLIMATE RISKS, SUCCESSES AND CONSTRAINTS

701. Name any project activities and organisations in your area that target a particular group because it is more vulnerable than others?

Name of project	**Group targeted**	**Sponsors**	**Nature of Intervention**

702. What changes in capacity have resulted from the agricultural learning activities that have been introduced in your area to adapt to climate change and variability (prompt on capability e.g. knowledge and skills, motivation, opportunity)?

703. Are you doing anything differently as a result of change in capacity (e.g. Change in farming practice in members own fields). If Yes, what are the changes. If No, why not? (e.g. resources, cultural norms)

704. Have these changes strengthened your capacity to cope or adapt to weather conditions?
705. Have the interventions met your expectations to date?
706. What have been the strengths?
707. What have been the challenges?
708. What would you like to change?
709. What are your future plans?
710. How will you know if you are succeeding?
711. Are there any interventions needed to improve agricultural production and resilience to climate change? 1. Yes 2. No
If yes, answer the following questions

No.	Needs	Desired intervention	Yes (1) No(2)
1	Knowledge	Disease and pest management	
		Seed production	
		Enhanced extension service	
		Fish farming	
		Training in improved horticultural production	
		Fish farming	
		Fruit propagation and tree planting	
		Improved practices of producing high quality vegetables	
		Market information	
		Improved animal management	

2	Inputs	Pesticides	
		Fertilizer	
		Seeds	
3	Implements	Motorized engine pumps	
		Treadle pumps	
		Watering cans	
4	Information	Radio listening clubs	
		Climate change and link with crop production	
		Other suitable crops in the area	
5	Technology	Fish ponds	
		Appropriate tillage systems	
		Appropriate Irrigation scheduling for different crop	
6	Market	High Price	
		Demand	
		Reliability	
7	Finances	Loans to promote horticulture and other agricultural production	
8	Others specify		

MODULE 8. NUTRITIONAL STATUS ASSESSMENT

801. In the past 24 Hours, which foods have you consumed? (Tick once based on food categories mentioned)

Group	Description	Response
1	Grains, Cereals, White Roots and Tubers, and Plantains (Starchy Foods)	
2	Pulses (Beans, Peas And Lentils)	
3	Nuts And Seeds	
4	Dairy	
5	Meat, Poultry And Fish (Flesh Foods)	
6	Eggs (excludes fish Roe)	
7	Dark Green Leafy Vegetables	
8	Other Vitamin A-Rich Fruits and Vegetables (e.g. ripe mango and ripe papaya; others include red palm fruit/pulp, passion fruit, apricot and several types of melon)	
9	OTHER VEGETABLES (Including those not counted as dark green leafy vegetables or as other vitamin A-rich vegetables)	
10	Other fruits (excluding vitamin A-rich fruits- e.g. green mangoes)	

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Appendix C

Evaluating the impacts of agriculture interventions by Faith Based Organisations (FBOs) and non-FBOs on Sustainable Consumption and Production of rural community livelihoods in the climate change adaptation process in Malawi

Key informants checklist

Checklist for FBOs and non-FBOs

1. Name:
2. Organisation:
3. Role in relation to the climate change adaptation initiatives:
4. Describe the climate in your target area
5. Describe the climate risks in your target area
6. Please describe all the activities you have been involved in, in the CC project.
7. Please describe in detail the activities you have been involved with in relation to the climate change adaptation initiative in your target areas?
   (Probe on:
   i. How were the activities selected?
   ii. How were the targeted groups selected?
   iii. How were the actual participating members selected (were criteria used)?
8. Is there variation in the implementation of the approach between the targeted groups?
9. How do you integrate the concept of sustainable consumption and production in your initiatives?
10. What has gone well and why?
11. What has not gone well and why?
12. What approaches have you undertaken to respond to challenges?