

IMPACTS OF FLOODS ON SOCIO-ECONOMIC LIVELIHOODS OF PEOPLE: THE CASE STUDY OF T/A MWAMBO IN ZOMBA, SOUTHERN MALAWI

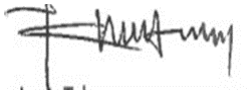
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July, 2021

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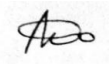
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ABSTRACT

Floods are the most devastating hazards that have significant adverse impacts on people and their livelihoods. Their impacts can be reduced by investing on: 1) improving the forecasting skills of extreme and heavy rainfall events, 2) development of Impacts Based Flood Early Warning System (IBFEWS) and 3) effective communication of impacts from anticipated extreme or heavy rainfall event. The development of IBFEWS however, requires a complete understanding of factors that relates to the formation of extreme or heavy rainfall events and their associated socio-economic impacts. This information is crucial in the development of Impacts Based Flood Forecasting Models (IBFFMs). The study assessed the socio-economic impacts of the December 2020 flood event in T/A Mwambo, Zomba district as the preliminary stage which can be used in the development of IBFFMs for the area. Data from household survey collected using systematic random sampling techniques and structured questionnaires was used. The survey was conducted to acquire respondent's views on the causes of flood impacts, adaptive capacity to extreme or heavy rainfall events and adaptation options to minimize flood impact. During the direct observations it was found that the main causes of floods are river overflow due to heavy rainfall and blocked drainage system. Poor infrastructure such as drainage and houses exacerbate the observed impacts of the December 2020 flood event in the area. Death cases analysis showed that no one was reported dead or missing. The flood event damaged properties worth of 7.5 million of kwachas. Furthermore, the Malawi Government spent a total amount of 1.83 million Kwacha to rescue and relocate vulnerable communities that lived-in low-lying areas of Mwambo to high ground areas of the district.

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Firstly, I would like to pay the deepest gratitude to God for granting me the power, wisdo m, and passion to complete this study. I would like to express my special gratitude to my Mother and Fiancé who inspired me to successfully complete this study.
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TABLE OF CONTENTS

1. INTRODUCTION 13
1.1. Background 13
1.2. Problem Statement 15
1.3. Research Hypothesis 15
1.4. Research Questions 16
1.5. Main Objectives of the Study 16
1.6. The specific objectives of the Study include: 16
1.7. Significance of the Study 17
2. LITERATURE REVIEW: 18
2.1. Chapter introduction 18
2.2. Perspective and Impacts of Floods on a Global Scale. 18
2.3. Perspective and Impacts of Floods on a National Scale. 19
2.4. Zomba flood Profile and Previous Studies. 20
2.5. Chapter Conclusion. 21
3. RESEARCH METHODOLOGY 22
3.1. Introduction. 22
3.2. Research Design. 22
3.3. The Study Area. 23
3.4. Data Collection Methods. 25
3.5. Sampling Methods. 27
3.6. Sample Size 28
3.7. Data Analysis. 28
4. PRESENTATION AND DISCUSSION OF RESULTS. 29
4.1. Introduction 29
4.2. Presentation of the Findings 29
4.3. Interpretation of the results 44
4.4. Limitations of the study 45
4.5. Implications of the results 46
5. CONCLUSION AND RECOMMENDATIONS 47

5.1. Introduction 47
5.2. Conclusion 47
5.3. Recommendations 48

ACRONYMS AND ABBREVIATIONS

City RAP	City Resilience Action Planning Tool
DFID	Department for International Development
DoDMA	Department of Disaster Management Affairs
DRR	Disaster Risk Reduction
FEMA	Federal Emergency Management Agency
GoM	Government of Malawi
HHLD	Household
IBFEW	Impacts Based Flood Early Warning System
IBFFM	Impacts Based Flood Forecasting Models
IBM	International Business Machines
NGO	Non-Governmental Organization
OCHA	Office for the Coordination of Humanitarian Affairs
PDNA	Post Disaster Needs Assessment
PHC	Population and Housing Census
SPSS	Statistical Package for Social Science
T/A	Traditional Authority
UNDHA	United Nations Department of Humanitarian Affairs
WMO	World Meteorological Organization

LIST OF FIGURES

Figure 1: Showing the location of the study area, T/A Mwambo 24
Figure 2: Comparative Analysis on the Age Groups of Household Heads 30
Figure 3: Comparative Analysis on the Livelihood Types of the Sampled Household
s..... 32
Figure 4: Livelihood Strategies by Marital Status of Heads of Households..... 33
Figure 5: Comparative Analysis on Access to Health Facilities by Age of 52..... 36
Figure 6: Most common waters sources for drinking for sampled Households 37
Figure 7: Types of sanitary facilities used by sampled households..... 38
Figure 8: Comparative Analysis on the range of coping strategies by marital status o
f HHLD Head 41
Figure 9: Underlying Causes of Vulnerability for the Sampled Households 42
Figure 10: Underlying Causes of Vulnerability in relation to sex of the Sampled Hou
sehold 43

LIST OF TABLES

Table 1: Households that Experienced Crop Damage Due to Floods 34
Table 2: Comparative Analysis of households whose houses collapsed during floods 39

1. INTRODUCTION

1.1. Background

Flooding is defined as an overflowing of large amount of water beyond its normal confines especially over what is normally dry land, (WMO, 2013). According to Fe dec & Sousa (2009), a flood is a significant rise of water level in a stream, lake, reser voir or coastal region. Based on the above definitions, in simple term, flooding is th e inundation of land by the rise and overflow of a body of water, commonly occur ring when water levels exceed the carrying capacity of a river system in which it run s. The American Federal Emergency Management Agency (FEMA), further specified that flood effects can be local, impacting a neighbourhood or community, or havin g a larger capacity, affecting entire river basins, (FEMA, 2011).

Flooding resulting from extreme hydro and meteorological events and taking place in unexpected magnitudes and frequencies can cause loss of lives, livelihoods and in frastructure. They can also damage the environment (Integrated flood management tools series flood forecasting and early warning, 2013). Grunfest (1995) argues that due to high poverty levels, people have become more vulnerable to floods because they live in hazardous areas including flood plains and steep hills. The poverty leve l affects the resilience and process of recovery from disasters. In general, it is analyze d that worldwide flood is the most destructive natural hazards causing extensive da mage to the built and natural environment, and devastation to human settlements. Economic losses due to the effects of damaging floods have increased significantly a round the world (Integrated Flood Risk Management in Asia, 2005).

Malawi has not been spared by floods which have had adverse impacts. For instanc e, between 1967-

2013, 20 incidents of severe flooding have been reported (GoM, 2015a). One of t he notable flood events in Malawi include 1991 Phalombe flooding which over 500 people were killed, a lot of infrastructure such as roads, bridges, houses were dama ged (UNDHA, 1991). In 2015, floods affected 1.1 million people, displacing 230,00 0 and leading to 170 fatalities and 172 reported missing countrywide (GoM 2015b;

Rudari, et, al., 2016). According to PDNA (2015), the 2015 floods affected 15 districts including Zomba where the study area is located. The recent flood event of 2020 a total of 641 households in T/A Mwambo, Zomba were rendered homeless, their maize fields and houses destroyed after Phalombe River swelled due to continuous rains which occurred early January.

According to media and DoDMA reports, it is indicated that the proposed study are a experienced severe floods in 2003, 2012, 2015 and 2019. For instance, Zomba experienced floods during 2002/2003 rainfall season (United Nations Office of the Resident Coordinator, 2003). The flooding was due to heavy rains caused by Cyclone Delfina, which resulted in heavy flooding in the country between then New Year and 13th January 2003. Other districts affected were Karonga, Rumphi, Chitipa, Salima, Dowa, Dedza, Ntcheu, Mchinji, Lilongwe, Balaka, Machinga, Nsanje, Phalombe, Zomba and Mwanza. Further, in 2012, Zomba was among the districts severely - affected by floods (Malawi Red Cross Society, 2012). The flash floods led to loss of lives, injuries and destruction of infrastructure, including roads, houses, school blocks and gardens. Other districts, worst hit, were Mangochi, Phalombe and Nsanje. According to DoDMA (2017), Floods are the most significant natural hazard in Malawi causing extensive damage to human life and property. The previous studies in the proposed study area did not evaluate the in-depth socio-
economic impacts of floods on the livelihoods of people. Further, reports clearly show that there have been recurrent flood events in the area but lacks in-
depth analysis of its impact on socio-
economic livelihoods of people. As it is currently, no study of the sort has been carried out in the area rather much emphasis has been on generalized impacts of floods in the district and other areas such as Chikhwawa. For instance, the study done by Pauw, et, al., (2011) used a general equilibrium model to estimate the economy wide impacts of drought- and flood-
related crop production losses hence failed to evaluate in-depth socio-
economic impacts of floods. This being the case, this study was worth undertaking as there was insufficient observational data available to support the Department of

Disaster Management Affairs (DoDMA) and local stakeholders in planning risk reduction measures such as long-term recovery plan.

1.2. Problem Statement

Malawi is vulnerable to natural hazards and it is estimated that the combined effect of floods and droughts reduces annual Gross Domestic Product by 1.7% (Pauw, et, al., 2011). Nillson, Shela & Chavula, (2010) rightly stipulated that, Flooding is the most common disaster in Malawi, accounting for ~40% of all recorded disasters. Between 1967-
2013, 20 incidents of severe flooding have been reported (GoM, 2015a). In terms of impacts, for instance, the floods of January/February 2015 affected some 1.1 million people, displacing 230,000 and leading to 170 fatalities and 172 reported missing (GoM 2015b; Rudari, et, al., (2016). According to the previous studies, in T/A Mwambo there have been recurrent floods from 2003 (Malawi Red Cross Society, 2012), 2012 (United Nations Office of the Resident Coordinator, 2003), 2015 (GoM 2015b), 2019 (PDNA, 2019) and 2020. Despite of these recurrent flood events in the proposed study area, there are scattered and insufficient observational data on socio-
economic impacts of floods which compelled this study to be undertaken. In light of the above argument, the previous studies that partly investigated socio-
economic impacts in the study area is limited to a few sources, like those of Post Disaster Needs Assessment of 2015 and 2019, and the study by Pauw, et, al., (2011) who used a general equilibrium model to estimate the economy wide impacts of drought- and flood-
related crop production. Based on the aforementioned flood profile of T/A Mwambo and the gaps existed in previous studies, the study was worth undertaking.

1.3. Research Hypothesis

The hypothesis for the proposed study was that there were insignificant flood impacts on the socio-economic livelihoods of people in the proposed study area.

1.4. Research Questions

The case study endeavours to answer the following questions:

- What is the impact of floods on the socio–economic livelihoods of people in the area?
- Who are the most vulnerable groups to floods in the study area and what are their coping strategies?
- What are the coping mechanisms employed by the community during floods?
- What are the underlying causes of vulnerability of the people in the area?

1.5. Main Objectives of the Study

The study assessed the socio-economic (i.e., Agriculture, Health, Infrastructure, Education, Water and Sanitation, and Housing and Property) impacts of flooding on households in the proposed study area in order to suggest ways in which to counteract the consequences of flooding in the area while seeking practical ways to adapt to floods and garner support at the policy level.

1.6. The specific objectives of the Study include:

- To assess how 2020 floods affected economic livelihood sources of the area, such as Agriculture, trade and fishing.

- To assess how floods impacted on social livelihoods of the area such as, Healthy, Water and Sanitation, Infrastructure, Education, Housing, and Property and Assets.

- To establish vulnerable groups that were most affected by floods including gender considerations.

- To identify coping mechanisms employed by the community during floods.

- To establish and analyse the underlying causes of vulnerability of the people in the area.

1.7. Significance of the Study

As the current situation stands, data on socio-
economic impacts of floods in the study area is of much importance to support various developmental sectors hence the study is a milestone in Disaster Risk Reduction (DRR) domain. In the same light of the above argument, the study is a useful guide to governmental and non-
governmental agencies and actors (responsible for DRR) for the formulation of long term disaster recovery plan and framework for the area. On the same note of long-
term recovery plan, the findings of the study can be used as a determinant for community's safe building and relocation where necessary. The study also endeavoured to establish the most vulnerable groups in the study area including gender considerations. The establishment of vulnerable groups pointed out to the people who needed the assistance most, that may be considered in the government's social cash transfer and other community development activities. More importantly, it is envisaged that the outputs of the study are the key inputs in the designing of sustainable mitigation measures to minimize the impact of floods and the associated risks. The sustainable mitigation measures may include zoning and land use regulation, drainage system improvement and development of Impacts Based Flood Early Warning System (IBFEWS).

2. LITERATURE REVIEW:

2.1. Chapter introduction

This chapter scientifically and empirically review past research work adding more k nowledge to the study. It further points out weaknesses and critically analyses publi shed body of knowledge by way of justification and comparison to prior research st udies. It thus comprises review of empirical data.

2.2. Perspective and Impacts of Floods on a Global Scale.

Flooding is said to be one of the most common environmental hazards on a world wide scale, after disease (Smith 2009), attributed to the widespread spatial distributi on of rivers and associated flood plains, as well as low lying coasts and the long-standing attraction for human settlement. Though flood disasters are more commo n in Asia (41%), 17% of recorded flood disasters have occurred in Africa and have a ffected people mainly through loss of shelter [and other economic and agricultural l osses] (Smith 2009).

Borrows and De Bruin (2006) indicated that among natural catastrophes, flooding has claimed more lives than any other single natural hazard. In the decade 1986 to 1 995, flooding accounted for 31% of the global economic loss from natural catastro phes and 55% of the casualties. The damaging effects of flooding are likely to beco me more frequent, more prevalent and more serious in the future. Carey (2005) ar gues that human populations worldwide are vulnerable to natural disasters. Certain conditions such as geographical location or people's income level can affect the de gree to which natural disasters impact people's homes and livelihoods. It is inevitabl e fact that Floods are the costliest and wide reaching of all natural hazards. They ar e responsible for up to 50,000 deaths and adversely affect some 75 million people on average worldwide in every year (Rahman, 2014). According to Smith and War d (1998), there is more evidence that the flood problem is getting worse in terms of the damage caused by flooding. Certainly, the frequency of events and the number of people affected have increased steadily as human related activities such as defor

estation, overgrazing and urbanization aggravate environmental conditions, making communities more vulnerable (Bank off, 2003).

Rumi (2002) argues that whilst most of the studies of flood impacts examines the fa ctors relating to economic loss, very little has been quantified on the social impacts of flooding which are often said to have an effect equivalent to 50% to 100% of th e direct financial costs of a flood. Such costs relate to ongoing medical expenses and disruptions to future productivity resulting from injury or psychosomatic illness, los s of documents, disruption to social structure, fear of heavy rain, and fatalities. Rum i further stated that factors to estimate the total social impact would probably inclu de the number of people flooded; the number of people who lost a family member or member of a team; the position or status of the person and their circle of influe nce; the number of homes destroyed or substantially damaged; jobs lost and disrup tions to productivity; education; and destruction of wealth. Which most of these ar e difficult to quantify.

2.3. Perspective and Impacts of Floods on a National Scale.

Malawi is particularly vulnerable to natural hazards (Nkomwa, et, al., 2014), and it is estimated that the combined effect of floods and droughts reduces annual Gross Domestic Product by 1.7% (Pauw, et, al., 2011). Flooding is the most common disas ter in Malawi, accounting for ~40% of all recorded disasters (Nillson, Shela & Chav ula, 2010). Between 1967-

2013, 20 incidents of severe flooding have been reported (GoM, 2015a). For insta nce, floods of January/February 2015 affected some 1.1 million people, displacing 2 30,000 and leading to 170 fatalities and 172 reported missing (GoM 2015b; Rudari, et, al., (2016). In a country where 85% of the population is rural and the economy is overwhelmingly agro-

based, the almost annual flooding occurrences significantly impact livelihoods as the y directly affect income generated from agriculture (Shela, et, al., 2008; Nillson, She la & Chavula 2010; Nkomwa et al., 2014). Recurrent floods also damage infrastruct ure, and impact local communities' social, economic, cultural and psychological val ues (Mijoni & Izadkhah, 2009; Nillson et al., 2010). The destruction of roads and ot

her infrastructure delay on-
going development initiatives and political processes. The projected future increase in the frequency and intensity of extreme weather events in the region (Chidanti-Malunga, 2011), coupled with a lack of coping capacity (Mijoni & Izadkhah, 2009), mean that this situation will worsen unless more effective flood risk management str ategies are devised.

The 2019 Post Disaster Needs Assessment conducted in Malawi indicates that the las t decade has seen an increase in the frequency and occurrence of climate-induced hazards such as floods and drought in the country. It is worth noting that st udies undertaken in the past have not looked at the impact on the socio-economic livelihoods in depth and the response therefore has remained ad-hoc, focusing on short-term measures (PDNA, 2019).

The study done by Pauw, et, al., (2011) used a general equilibrium model to estimat e the economy wide impacts of drought- and flood-
related crop production losses hence failed to evaluate in-depth socio-economic impacts of floods.

2.4. Zomba flood Profile and Previous Studies.

Zomba had no history of floods till 2002/2003 rainfall season (United Nations Offi ce of the Resident Coordinator, 2003). The flooding was due to heavy rains caused by Cyclone Delfina, which resulted in heavy flooding in the country between then New Year and 13th January 2003. Other districts affected were Karonga, Rumphi, Chitipa, Salima, Dowa, Dedza, Ntcheu, Mchinji, Lilongwe, Balaka, Machinga, Nsanj e, Phalombe and Mwanza. Further, in 2012, Zomba was among the districts severel y affected by floods (Malawi Red Cross and Red Crescent action, 2012). The 2012 fl ash floods led to loss of lives, injuries and destruction of infrastructure, including ro ads, houses, school blocks and gardens. Other districts, worst hit, were Mangochi, P halombe and Nsanje. On the same note, DoDMA report shows that Zomba was a mong the districts which were severely affected by floods in 2015 and 2019. Machi nga and Zomba districts were among the worst hit by floods in 2019, with more th

an 50,000 people affected per district, followed by Ntcheu, Phalombe, Nsanje and Blantyre City district (OCHA, 2019).

According to Njewa (2006), Zomba is among the flood prone districts in Malawi. Njewa acknowledged areas along Likangala and Domasi rivers around Lake Chirwa as the most vulnerable areas in Zomba. This is in concurrent with the findings of the research done by Evin Joyce in 2019 (Evin, 2019).

The research done by Evin (Evin, 2019), focused on how people responded to the floods and with the participatory approach, further the study aimed at building long lasting solution to the challenges of information flow during flood. In my view, this study lacked the in-depth analysis of the socio-
economic impacts of the said events which would have been used to formulate long-
term disaster recovery strategies. This is the gap which the current study addressed.

Further, there was another study in 2016 championed by the DFID which drew participants from 26 frontline staff and volunteers from 24 different Organisations in Zomba District, Southern Malawi, aimed at finding areas that people would want to change (DFID, 2016). The findings in this study showed that 18 percent wanted a change in Resilient to Flooding. For this change to come in place there is a need to analyse the root causes of floods and an in-
depth evaluation of its impact. These are the critical gaps this study failed to address. Of these critical gaps, the study critically, looked into the in-
depth evaluation of floods impacts in the study area.

2.5. Chapter Conclusion.

Flood risk poses a significant threat to many communities and, whereas measures can be taken to reduce the likelihood and important of flooding, the risk can never be eliminated altogether. This being the case, assessment of socio-
economic impacts of floods is relatively important for the flood risk management a

ctivities to be effective and efficient. These include emergency planning, awareness r aising, provision of flood warning and creation of flood storage areas as well as the construction and maintenance of both conventional and innovative flood defences .

The proposed study will adopt a quantitative and predominantly qualitative, in-depth research framework. This involves case-study research design (Bryman, 2012), which is considered effective for a detailed e xamination of impacts at the local level (Pardoe, Kloos & Assogba, 2016) and has b een successfully used for in-depth analysis of DRR at local level in many diverse situations (e.g. Mercer, 2010; Mercer, Kelman, Taranis & Suchet-Pearson, 2010; Hiwasaki, Luna, Sysamsidik & Shaw, 2014; Nkomwa et al., 2014).

3. RESEARCH METHODOLOGY

3.1. Introduction.

This chapter outlines the research sketch and methodology. It presents the study are a, design, pattern decision and size. The chapter also offers the study methodology and statistics analysis. Finally, it gives a conclusion on the lookup design and metho dology.

3.2. Research Design.

As stated by Strydom, Fouche and Delport (2005), a research design is a plan or blu e print of how you intend conducting the research. A research design focuses on the

end product, formulates a research problem as a point of departure and focuses on the logic of research.

Huysamen (1993) offers a closely related definition of design as the plan or blue pri nt according to which data is collected to investigate the research hypothesis or que stion in the most economical manner. Other scholars refer to research design as all decisions made in planning the study, including sampling, sources and procedures fo r collecting data, measurement issues and data analysis plans.

Further Strydom, Fouche and Delpot (2005) argue that the research design used diff er depending on the purpose of the study, the nature of the research questions and the skills and the resources available to the researcher. However, each of the possibl e designs has its own perspective and procedures, the research process will also refle ct the procedures of the chosen design. The qualitative research design is that it doe s not usually provide the research with a step by step plan or a fixed recipe to follo w. In quantitative research the design determines the researcher's choice and action, while a qualitative research the researcher's choices and actions will determine the design or strategy. Put more simply qualitative research will during the research pro cess create the research strategy best suited to the research or even design their who le research around the strategy selected.

In selecting the appropriate research design for this study, therefore, the above appr oaches were taken into consideration. The study employed both quantitative and q ualitative approaches. The study was conducted in T/A Mwambo located in Zomba district, Southern Malawi. The community was selected due to the fact that it has b een experiencing recurrent severe floods for the past years (2003, 2012, 2015, 2019 and 2020). Further, the study had discussions with key stakeholders at district and community levels as well as randomly sampled households at community level.

3.3. The Study Area.

According to Zomba City Council (The City RAP for Zomba City, 2020), the study area is among the most vulnerable areas in Zomba. This is the very reason the area i s chosen as a host for the study. With many studies concentrating on large rivers, ru ral research which investigates socio-

economic livelihoods in the proposed study area is limited to a few sources, like tho se of PDNA (2019). In this regard, the impact of flood on socio-economic livelihoods will be assessed and strategies and developmental options to r emedy the flood consequences will be reviewed both at national scale and the stud y area.

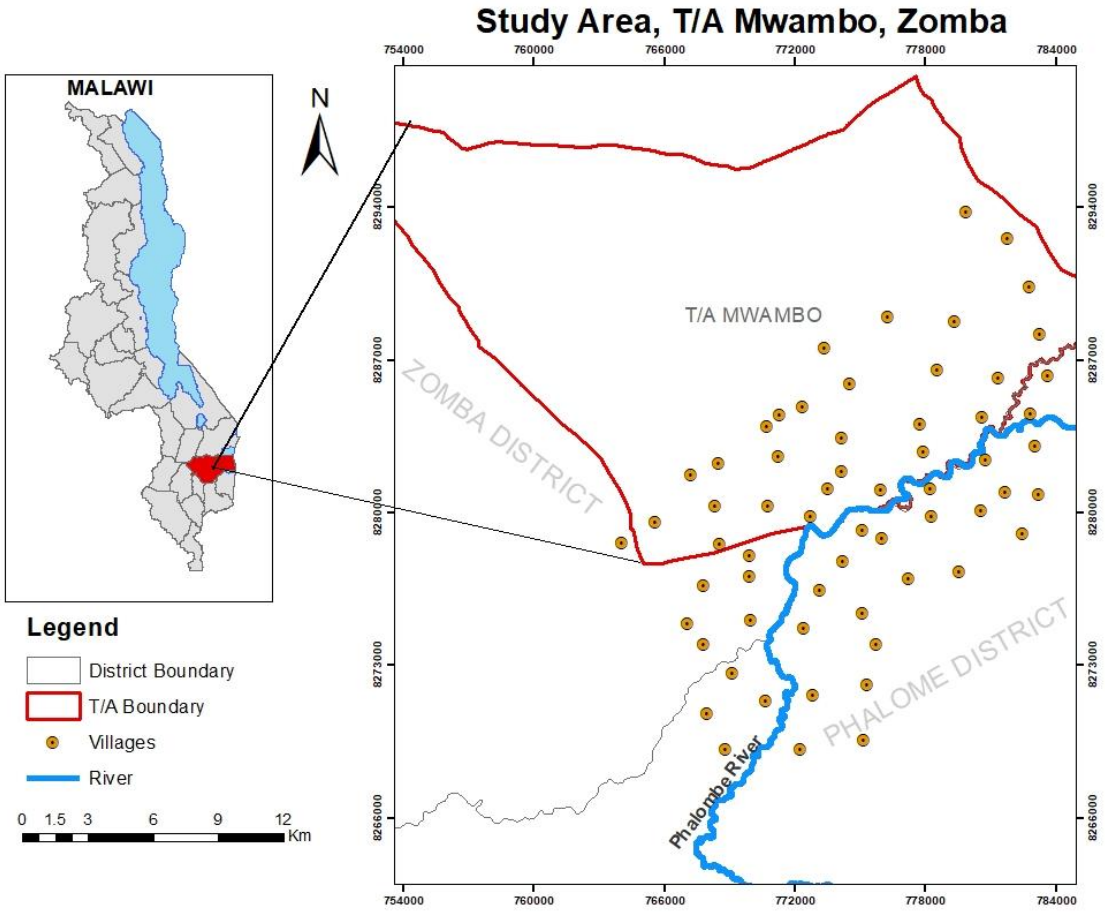


Figure 1: Showing the location of the study area, T/A Mwambo

3.4. Data Collection Methods.

Permission was taken from every volunteer participant by using the consent form (a ppendix 01). At the beginning of data collection, researcher informed every particip ant about the ethical and confidential issues of this study. It was also informed that participant had right to refuse to answer any question of the research and also had t he right to withdraw from any part of the research. All data of the research was use d only for the research purpose and it was protected safely. When information fro m interviews are used in the paper, no individual reference is provided. This is both to respect the anonymity of the interviewees and due to the fact that for most inte rviews names were not taken.

The study used both quantitative and qualitative approaches. According to the Stry dom, Fouche and Delport (2005), Quantitative data collection methods often empl oy measuring instruments. Measurements refers to the process of describing abstract concepts in terms of specific indicators by the assignment of numbers or other sym bol to the indicators while in qualitative research, the researcher's choices and actio ns will determine the design or strategy. As stated above, the study employed both quantitative and qualitative approaches for the purpose of triangulation. The conce pt of triangulation is based on the assumption that any bias inherent in a particular data source, investigator and method would be neutralized when used in conjuncti on with other data sources, investigator and methods. The following data collectio n methods were used:

3.4.1. Quantitative Household Questionnaire

According to Babbie and Mouton (2001), the basic objective of a Questionnaire is t o obtain facts and opinions about a phenomenon from people who are informed o n a particular issue. Questionnaires are probably the most generally used instrument of all. In this particular study, primary data were obtained by directly talking to the interviewees at household level so as to get very reliable and accurate information. Data therefore were collected through personal interviews from purposively sample d households in the proposed study area. The households were interviewed from t heir individual homes.

The household questionnaire covered the following topics (Appendix 2):

- Household demographics
- Livelihood Patterns
- Flood Impact on: Agriculture, Health, Infrastructure, Education, Water and Sanitati on, and Housing and Property.
- Vulnerable Groups due to floods and their underlying causes of vulnerability.
- Coping Strategies

3.4.2. Qualitative Key Informant Interviews.

The interviews were held with key informants using a checklist at both district and c ommunity levels. The composition of key informants was comprised of all critical pl ayers that have a role to play in the management of floods. Some notable organizat ions and individuals at district level include the following:

i. Desk Officer for Disaster Management in Zomba;
ii. Non-Governmental Organisations (NGOs) such as Red Cross;
iii. Department of agriculture;
iv. Faith leaders;
v. Community Leaders and Practitioners;
vi. Local Authorities;

At community level, the interviewees were the representatives of the community. It is envisaging that the representatives gave typical perceptions and perspectives on t he subject matter. The interviews were conducted at a venue organized within the c ommunity.

The key informant interviews at district and community levels covered the followin g topics (Appendix 3):

i. Main Livelihood patterns
ii. Main Sources of income
iii. Main sources of food
iv. Impact of floods on: Agriculture, Health, Infrastructure, Education, Water and Sanit ation, and Housing and Property

v. Coping Strategies

vi. Development options to deal with the problem of floods.

In addition, secondary data and information were collected from the relevant orga nization such as Department of Agriculture, DoDMA website, and Malawi Red Cros s Society (NGO). In this quantitative data, the total population of the village, educa tional level, main crops, main income source of that village were collected. With th e help of the data collection questioner, in-
depth interview and key informant interview were conducted with thirty househol ds. Cross check and perfecting the data collection, transit walk along with the study area were conducted. For a fruitful and informative data collection, this research us ed participants' own experience, view, and opinions to accomplish the objectives o f this study during the interview. The answers were recorded by a Smart phone whi ch was helpful for the analysis of the participants' view appropriately.

3.5. Sampling Methods.

According to Strydom, Fouche and Delport (2005), sampling means taking any por tion of a population or universe as representative of that population. It is generally stated that the larger the population, the smaller the percentage of that population the sample needs to be and vice versa. If the population itself is relatively small, the sample should comprise a reasonably larger percentage of the population. Large sa mples enable researchers to draw more representativeness and accurate conclusions and to make more accurate predictions than in smaller samples. The use of samples may therefore result in more accurate information than might have been obtained i f one had studied the entire population. This is so because, with a sample, time, mo ney and effort can be concentrated to produce better quality research, better instru ments and more in-depth information.

The target population, therefore, for the study that is, households, institutions and c ommunity leaders and practitioners were purposively selected at household, district and community levels respectively. Purposive sampling is entirely based on the jud gment of the researcher, in that a sample is composed of elements that contain the most characteristics, representative or typical attributes of the population. Research

er selected some inclusion criteria for collecting sample from population. That peop le who were the affected from the flood and associated factors of flood were includ ed in this study. The age level of the sample is one of the most important factors. R esearcher considered the age range from 15 to above. The people, who were not di rectly or partially affected in the flood or its secondary effects, were not included in this study. Those peoples, who were diagnosed as the dementia or any other ment al health problems, were being excluded from the study.

3.6. Sample Size.

The sampling unit for this study is a household. The study aimed at completing a to tal of 30 Households questionnaires to obtain sufficient information to draw valid c onclusions from the sample for the population of interest. Of the total sampled, we re females and males head of household. Accordingly, a sample of households selec ted was proportionate to the number of households in the area. Thus, the number of households to be interviewed/questionnaires analyzed was 30 (out of 250, from Group Village Heads Magoli and Kathebwe) which represents 11.8 per cent of the t otal population size. This percentage has been used in other studies such as the stud y done by Anande, D.M. & Luhunga, P.M. (2019) on Assessment of Socio-Economic Impacts of the December 2011 Flood Event in Dar es Salaam, Tanzania, a nd the study by Liwenga et. Al., 2012 on the topic "Where the Rains Falls".

3.7. Data Analysis.

According to Strydom, Fouche and Delport (2005), data analysis means finding ans wers by way of interpreting the data and results. To interpret is to explain and find meaning. It is difficult or impossible to explain raw data, one must first describe and analyse the data and then interpret the results of the analysis. Analysis means the ca tegorization, ordering, manipulating and summarizing data to obtain answers to res earch questions. The purpose of analysis is to reduce data to an intelligible and inter pretable form so that the relations of research problems can be studied, tested and c onclusions drawn.

Interpretation takes the results for analysis, makes inferences pertinent to the researc h relations studied and draws conclusions about these relations.

For this study, Data Entry Screens were developed in SPSS for Data Entry Version 3. This was applicable to the quantitative data collected. Moreover, the qualitative da ta obtained were coded, edited and entered in a computer and the IBM Statistical P ackage for Social Science (SPSS) software version 2.0 spread sheet was used for the a nalysis. Descriptive statistics were run to give frequencies and then cross-tabulation was undertaken. Multiple response questions were analyzed so as to give frequencies and percentages. Pie and bar charts were used to present different varia bles. Cross-tabulation allowed a comparison of different study parameters. Finally, the whole a nalysis depicted how the floods affected socio-economic livelihoods in the area.

4. PRESENTATION AND DISCUSSION OF RESULTS.

4.1. Introduction

This chapter provides a discussion on the results of the research based on the primar y and secondary data collected. It provides a discussion on the household demogra phics, livelihood patterns, impact of floods on various aspects, coping strategies, un derlying causes of vulnerability, interpretation and limitations of the study. Lastly, t he chapter presents the implications of the results.

4.2. Presentation of the Findings

4.2.1. Household Demographics

The demographic distributions are such that out of the thirty (30) households sa mpled in the survey, 71% were male headed and the remainder female headed.

Furthermore, 66% of the heads of households were married while 17% were widowed. In terms of the ages of the heads of households, the survey findings s how that most of them were aged between 30 –
34 years and 60+ years as shown in figure 2 below.

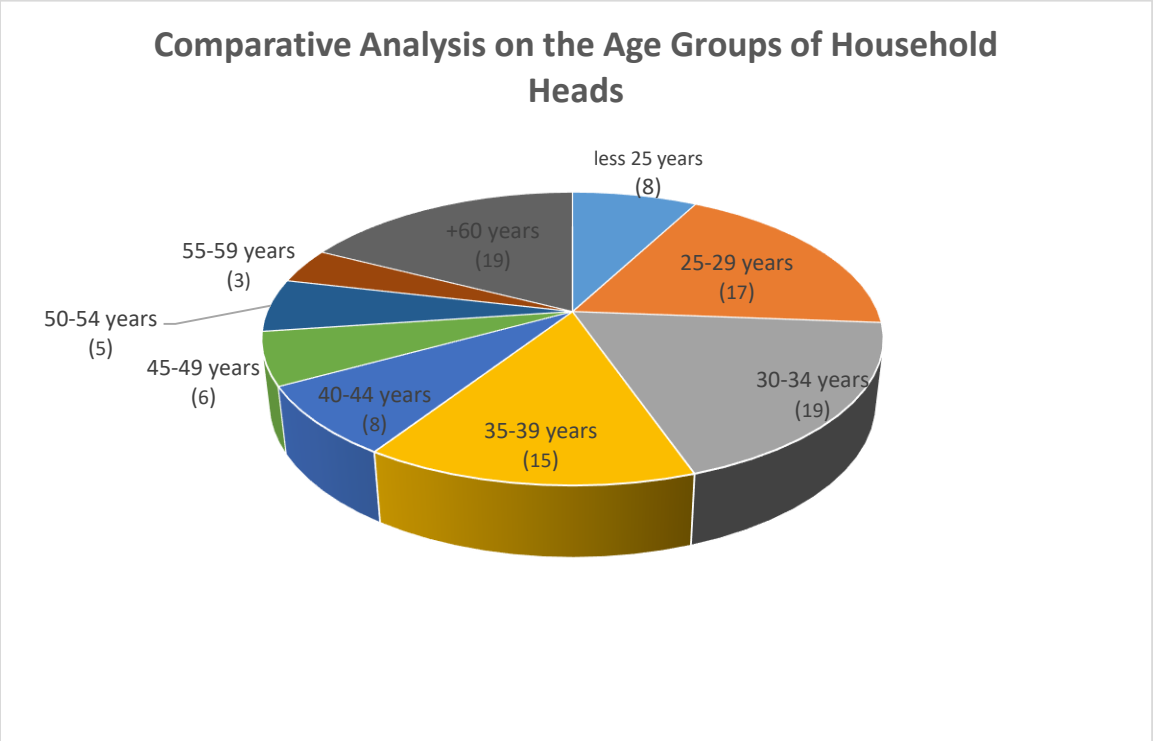


Figure 2: Comparative Analysis on the Age Groups of Household Heads

Furthermore, 54% of the heads of households whose ages are 60+ years are widowed.

4.2.2. Livelihood Patterns

The research revealed that the first most important livelihood sources for the assessed communities in T/A Mwambo were crop production (90%) followed by trading (4.7%) and fishing (3.7%) (See figure 3 below). Discussions at district and community levels established that the main source of income for most households was crop production followed by trading and charcoal burning. The main sources of food were found to be own production, followed by casual labour and fishing. The implication is such that since crop production is the main source of livelihood and food, increased exposure to floods will exacerbate their vulnerabilities by compromising their household food security.

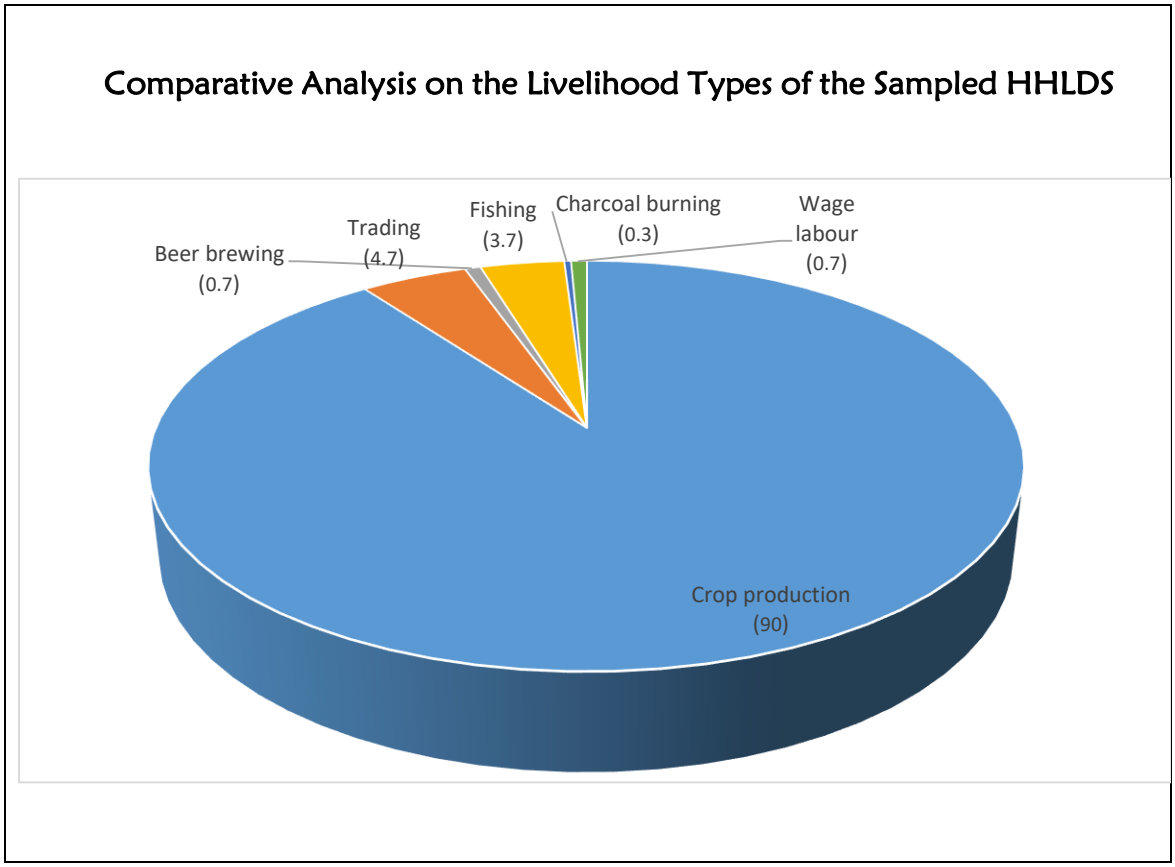


Figure 3: Comparative Analysis on the Livelihood Types of the Sampled Households

There is clear evidence that the households in Mwambo had very limited livelihood options as most of them indicated to have little or no significant secondary livelihood sources. The implications are such that the communities will have reduced resilience to floods due to lack of a wide range of livelihood options. It was observed the marital status of household head played an important role in determining the livelihood strategy. Those who were married had a diversity of livelihoods (crop production, trading, beer brewing, fishing and charcoal burning) as opposed to the single, divorced, separated and widowed household heads (see figure 4 below). Furthermore, only a small percentage of the sampled households do not depend on crop production as a livelihood source (trading at 4.7% and fishing at 3.7%.

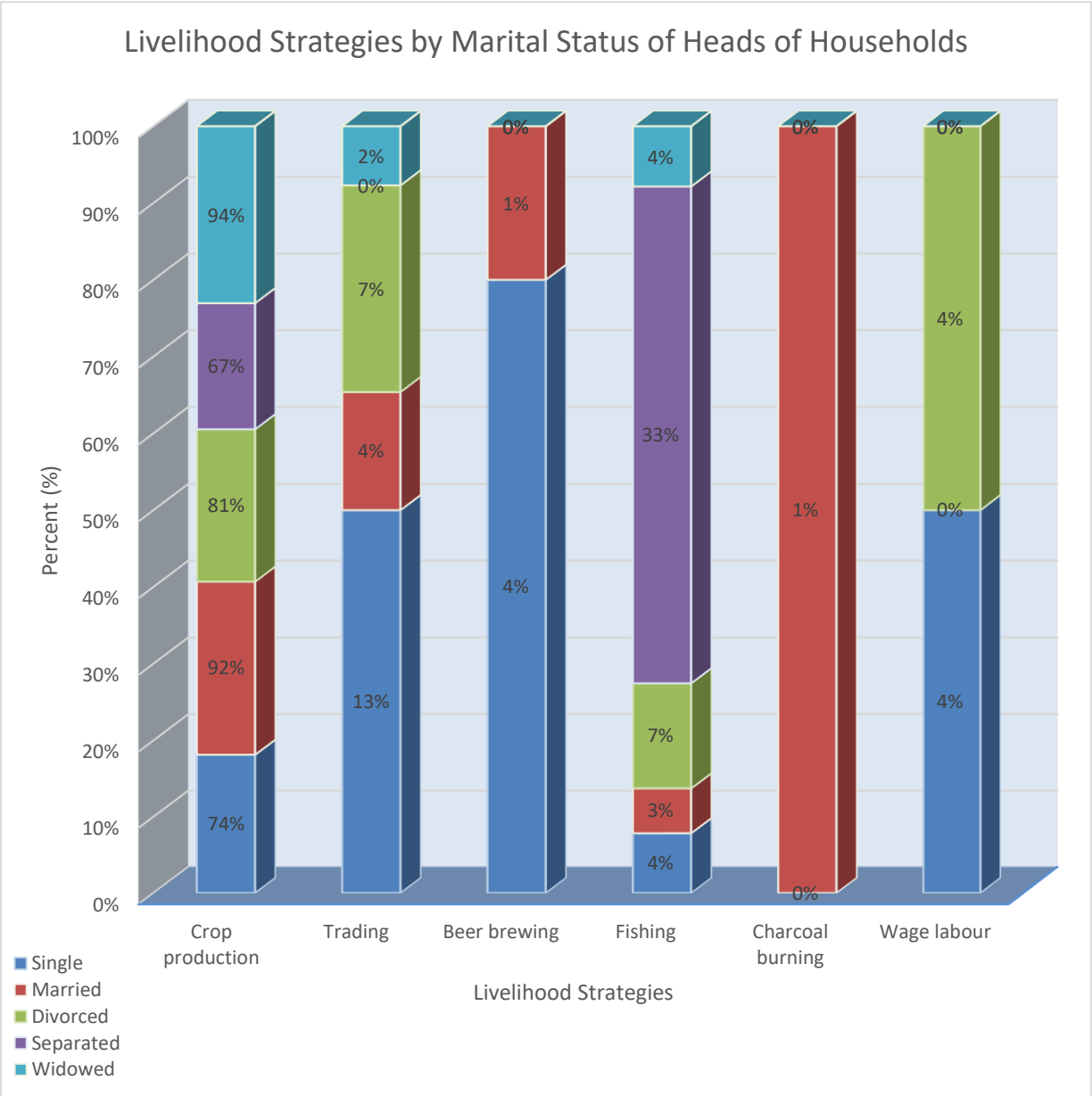


Figure 4: Livelihood Strategies by Marital Status of Heads of Households

4.2.3. Impact of floods

4.2.3.1. Agriculture

Most of the sampled households (94%) indicated that their crop fields were dama ged by floods. It was also evident that of the crops which were damaged by flood s, most of it (92%) was the main staple crop (maize). This was followed by Sorgh um at 29%. Although no data on area planted was collected, it was evident that t here was impact on agriculture which is the main source of livelihood and income as discussed under the livelihood patterns section.

Table 1: Households that Experienced Crop Damage Due to Floods

Marital Status	Yes	No
Married	68.0%	40.0%
Single	6.5%	20.0%
Divorced	8.4%	16.0%
Separated	0.7%	4.0%
Widowed	16.4%	20.0%

Furthermore, the marital status of households who experienced much of the crop d amage due to floods were found to be married (68%) and widowed (16%) (See ta ble 1 above). The Implications are such that there will be reduced staple crop produ ction which will result into reduced food availability. This finding has provided bett er understanding of the vulnerability of the households due to the over dependenc y on crop production as their main livelihood source. Furthermore, of the 16% of t he household heads whose marital status is widowed and experienced reduced pro duction due to flood damage did not have alternative livelihood options other tha n crop production to mitigate the food insecurity as can be seen in figure 5 above. Out of the 30 sampled households, 30% indicated having experienced food stock l osses due to floods. The research also revealed that within the households whose cr

ops and food stocks were damaged by the floods, 93% resided in the flood prone areas of the Mwambo community.

4.2.3.2. Health

The research revealed that most of the sampled households (96%) indicated that he alth facilities were available in their communities. Furthermore, very few household s (2%) had indicated that health facilities had been damaged by flooding in their co mmunities. The study further revealed that 32% of the sampled households experie nced disruption in access to health services due to damaged roads and bridges as a r esult of floods.

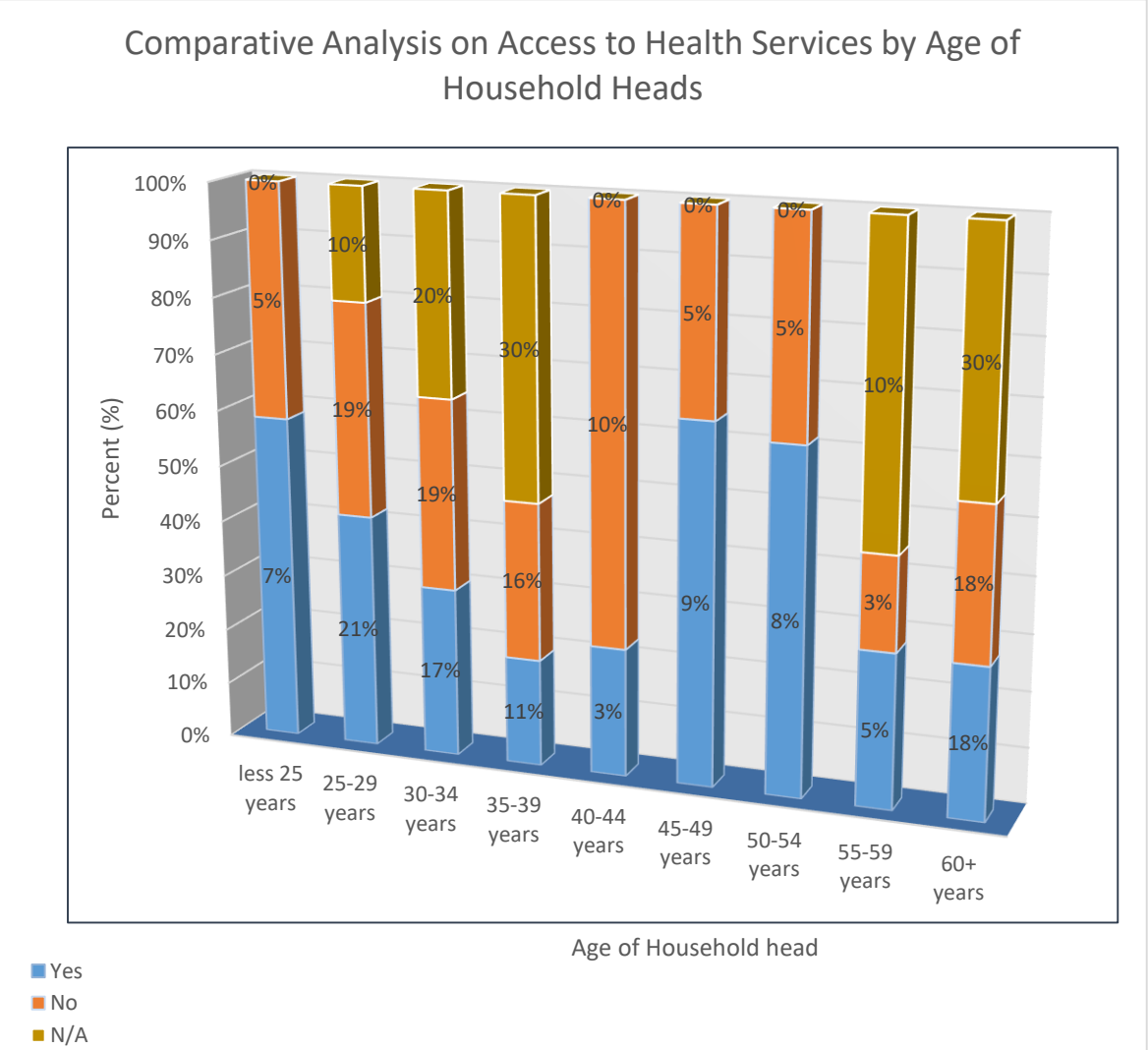


Figure 5: Comparative Analysis on Access to Health Facilities by Age of 52

The study found that household heads aged between 25 to 29, 30 to 34 and 60+ e xperienced disruption in accessing health services as a result of damaged roads and bridges (refer to figure 5 above). Disruption in accessing health services implied an i ncrease in disease incidence due to lack of access to appropriate medication.

The research also revealed that out of the 30 sampled households, 77% indicated h aving at least one member of their household getting sick during the floods. The m ost significant diseases experienced among the sampled households were, malaria/fe ver (65%), diarrhoea (21%) and cough/ARI (15%). Furthermore, 8% of the sample d households indicated that they experienced other disease outbreak such as scabies , sores and rash during the floods.

The survey further established that 74% of households whose main source of drinki ng water was the river had household members falling ill followed by 14% of hous eholds who indicated borehole as their main source of water. This means that hous eholds will continue to be vulnerable to increased disease outbreak as long as the ri ver continues to be their main source of drinking water. This is as a result of increas ed contamination that occurs during flooding. Despite borehole being the safest wa ter source for drinking, past vulnerability assessments undertaken within the district have shown that handling of the water by households due to distance to the source has led to increased disease burden such as diarrhoea.

In terms of specific diseases experienced by households due to varying water source s for drinking during the floods, 78% of households whose main source of water w as the river experienced diarrhoea. Furthermore, 14% of households whose main so urce was borehole experienced diarrhoea. In addition, 74% of households whose main source of drinking water was river suffered from malaria/fever while 14% of h ouseholds whose main source of drinking water was bore suffered from the same di sease. The study further established that 66% of households whose main source of drinking water was river suffered from cough while 20% of households whose mai n source of drinking water was bore hole experienced the same disease.

4.2.3.3. Education

All the sampled households indicated availability of education facilities in their com munities. Furthermore, 17% of the sampled households indicated that school infrast ructure was damaged due to floods in one way or another. The study showed that 38% of the sampled households indicated that school going children experienced di sruption due to floods. The disruption was attributed to various reasons such as roa d being impassable (32%) and school being submerged (9%).

4.2.3.4. Water and sanitation

The sampled households showed a lot of diversity on the type of drinking water so urces they had. It was evident that rivers, boreholes and dambos were the most co mmon water sources that communities used for drinking (see figure 6 below).

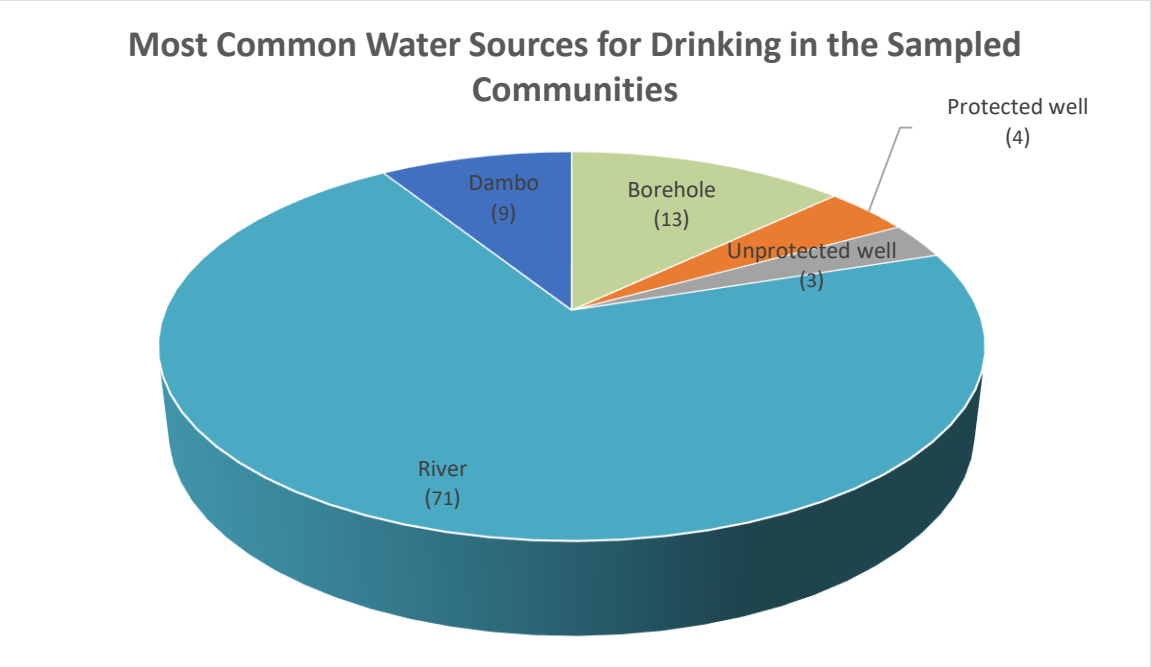


Figure 6: Most common waters sources for drinking for sampled Households

The survey established that 71% of the households indicated that their main source of drinking water was the river followed by borehole and dambo at 13% and 9% r espectively. Furthermore, among the sampled households, 73% indicated that their common water sources for drinking were affected by floods.

In terms of sanitary facilities, 16% of the sampled households had no sanitary faciliti es (i.e. using bush and rivers as alternatives). It is worth noting that bush and river i n the context of sanitation are usually regarded as no sanitary facility even though t hey are used as alternatives for excreta disposal. The correlation between water dri nking sources and health has been discussed under the health section. Furthermore, 84% of the households indicated having traditional pit latrines as their main sanitar y facilities (see figure 7 below). Within the households that indicated having sanitar y facilities, 12% had indicated that their facilities were damaged by floods. Further more, the survey established that 14% of households whose sanitary facilities were affected by the floods experienced coughing.

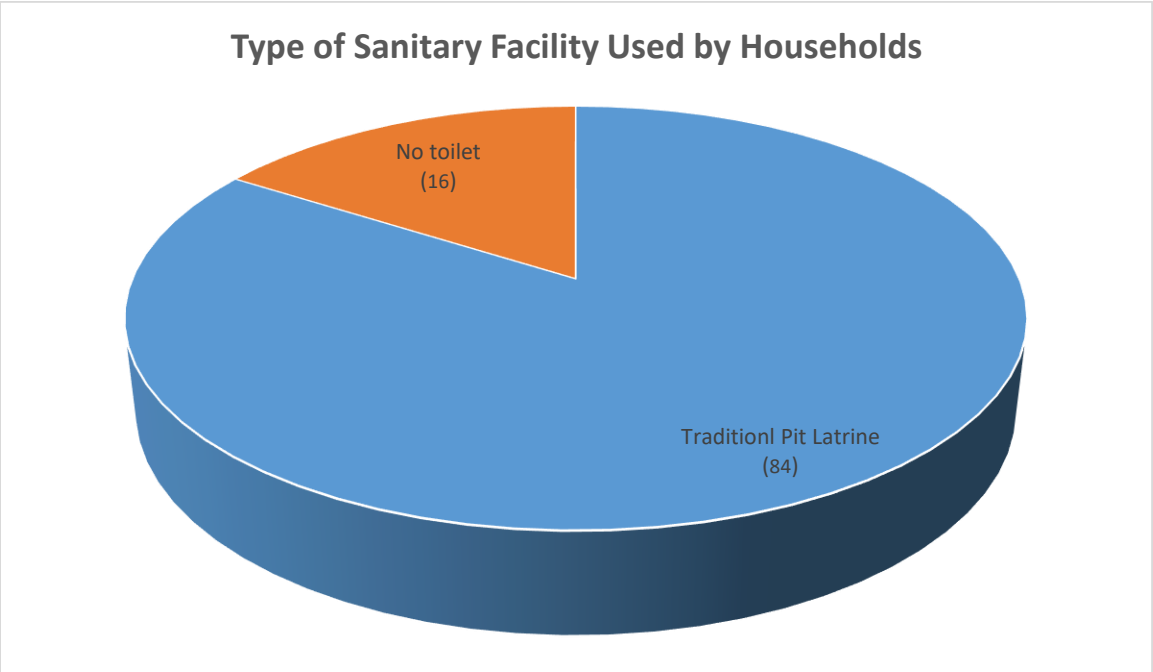


Figure 7: Types of sanitary facilities used by sampled households

4.2.3.5. Housing

Among the thirty (30) sampled households, 36% indicated that their houses collaps ed due to excessive impacts of floods while the rest had their houses intact. Further more, within the number of households who indicated having had their houses affe cted by floods, 75% were male headed households with the remainder being femal e headed households (refer to table 2 below). Of the households whose houses coll apsed due to floods, 66% were married and 16% widowed. The implication is that since the married and widowed heads of households are the majority and the famil y sizes are large, they may not be able to be integrated within unaffected household s due to size of the houses.

Table 2: Comparative Analysis of households whose houses collapsed during floods

Marital Status	Yes	No
Male	75.0%	69.8%
Female	25.0%	30.2%

About 32% of the households whose houses were impacted by floods were forced to relocate to other alternative areas while the remainder continued to stay within t heir home states. The community discussions revealed that some displaced househol ds sent their children to stay with other relatives. This in a way disrupted their patte rn of life and social networks. For those who have moved temporary to higher gro unds, they have returned to their usual residence. Discussion with these households indicated a positive will to move permanently to safer havens should alternative fer tile land be secured by relevant authorities. It is worth mentioning that some house holds have shifted to a new area altogether.

4.2.3.6. Property and Assets

The research revealed that a substantial number of productive and non-productive assets were damaged by floods. Of the productive assets which were los t, 4% were fishing nets and 3% were hoes while the majority of non-productive assets were beds (10%), chairs (9%) and radios (7%). Some households (24%) indicated that they lost other property such as clothes and blankets. Most of the losses to these assets were attributed to households' proximity to flood prone ar eas. Discussions with the communities revealed that some households indirectly lost their assets in that after their houses collapsed, some of the income sources got distu rbed. This forced them to off load some assets to raise money to meet other househ old basic requirements.

4.2.4. Coping Strategies

The survey established that sampled households employed a range of coping strateg ies due to the floods. The most important coping strategies were cultivating on smal l portions on higher grounds (75%), shifting to higher grounds (68%) and making f urrows and canals (63%). (See figure 8 below).

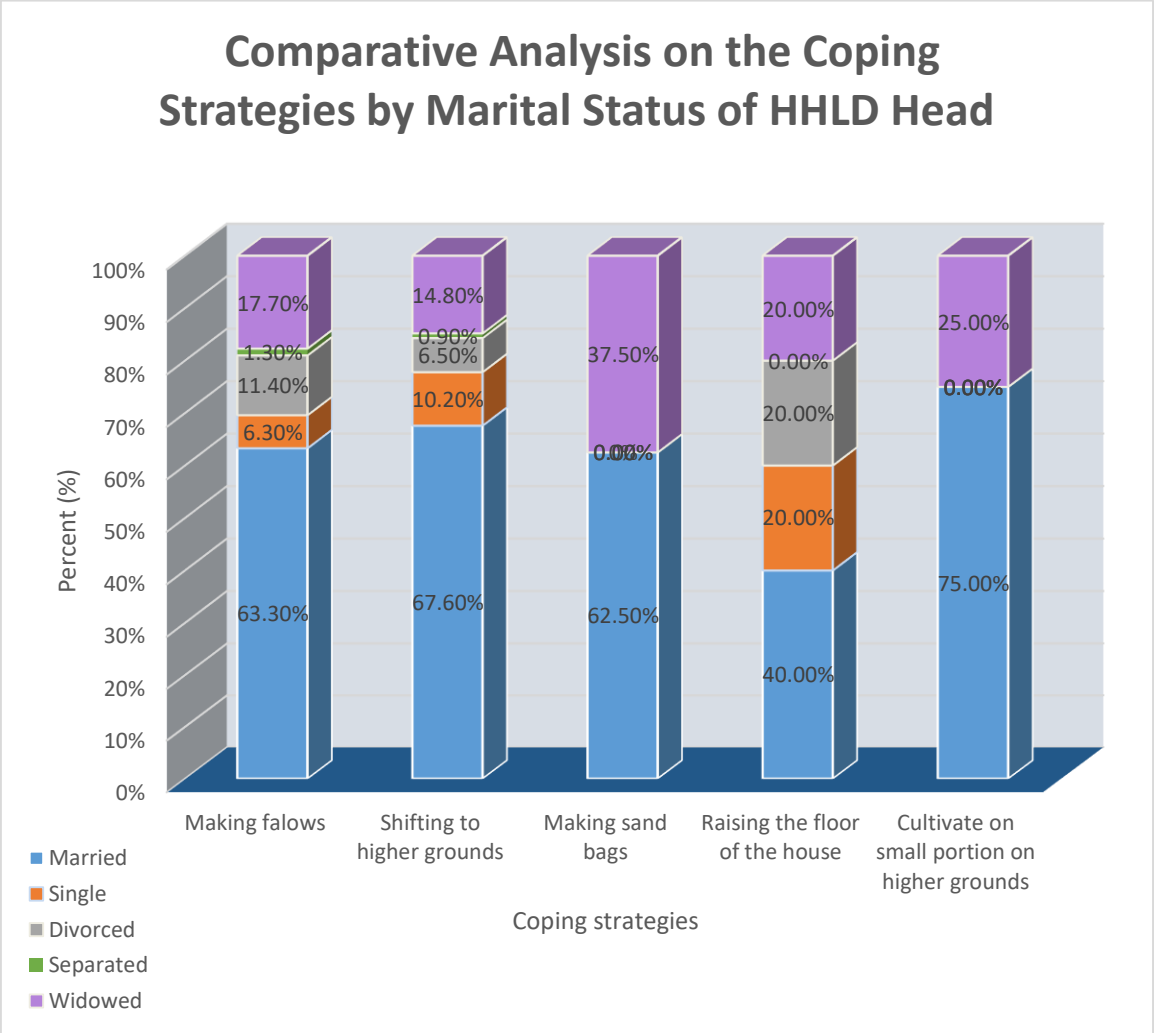


Figure 8: Comparative Analysis on the range of coping strategies by marital status o f HHLD Head

The research showed that households had diverse coping options with the exceptio n of those households whose head were separated. Of the sampled households, 21 % indicate that the coping strategies were not very effective.

The survey established that households whose coping strategies were shifting to hig her grounds and making sand banks had trading, beer brewing and fishing as their main livelihood. The implication is such that these households would employ other livelihood options to cushion the impact of the floods.

4.2.5. Underlying Causes of Vulnerability

There were varying underlying causes of vulnerability to floods for most people in T/A Mwambo. Proximity to the flood prone area (57%), residing in flood prone ar ea and poverty (18%) were identified as being the main underlying causes of vulner ability by the Mwambo community. The study revealed that the main underlying c auses of vulnerability for the sampled households were residing in flood prone area s and poverty as can be seen in figure 9 below.

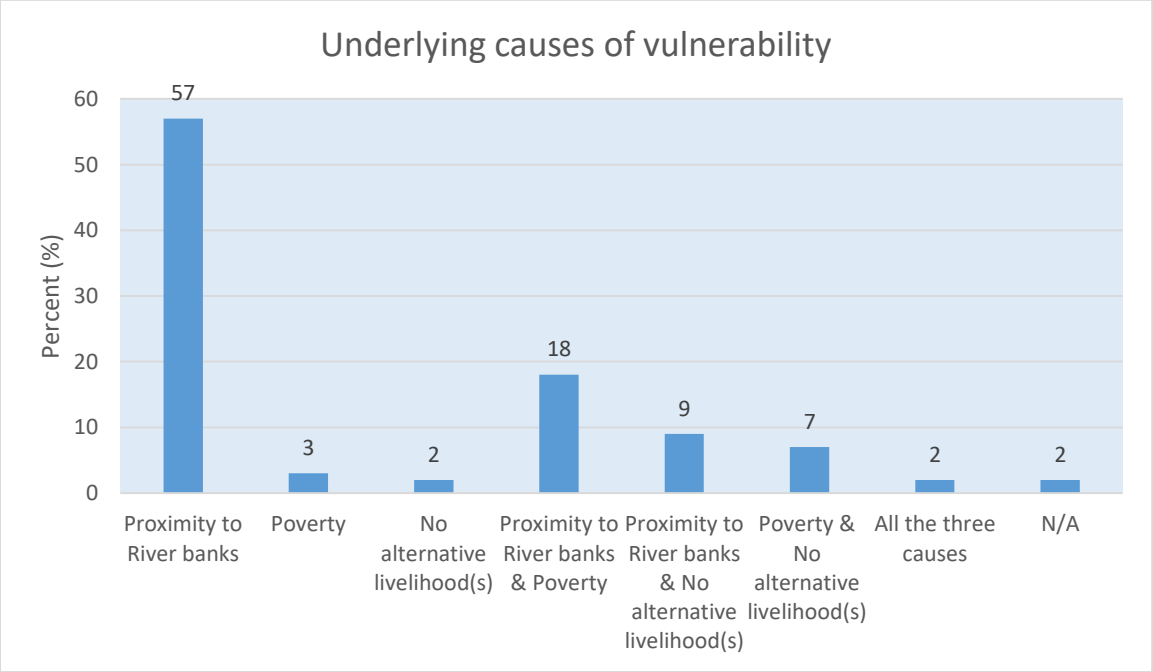


Figure 9: Underlying Causes of Vulnerability for the Sampled Households

It is very clear that most male headed households indicated proximity to flood pron e areas (76%) and lack of alternative livelihood sources (83%) as the main underlyi ng causes of vulnerability (see figure 10 below). Furthermore, the research revealed that most of the female headed households indicated poverty and no alternative liv elihood sources (41%) and the combination of all the three underlying causes (43%) as their main underlying causes of vulnerability (refer to figure 10 below which an

alyses the underlying causes of vulnerability in relation to the sex of the sampled ho usehold).

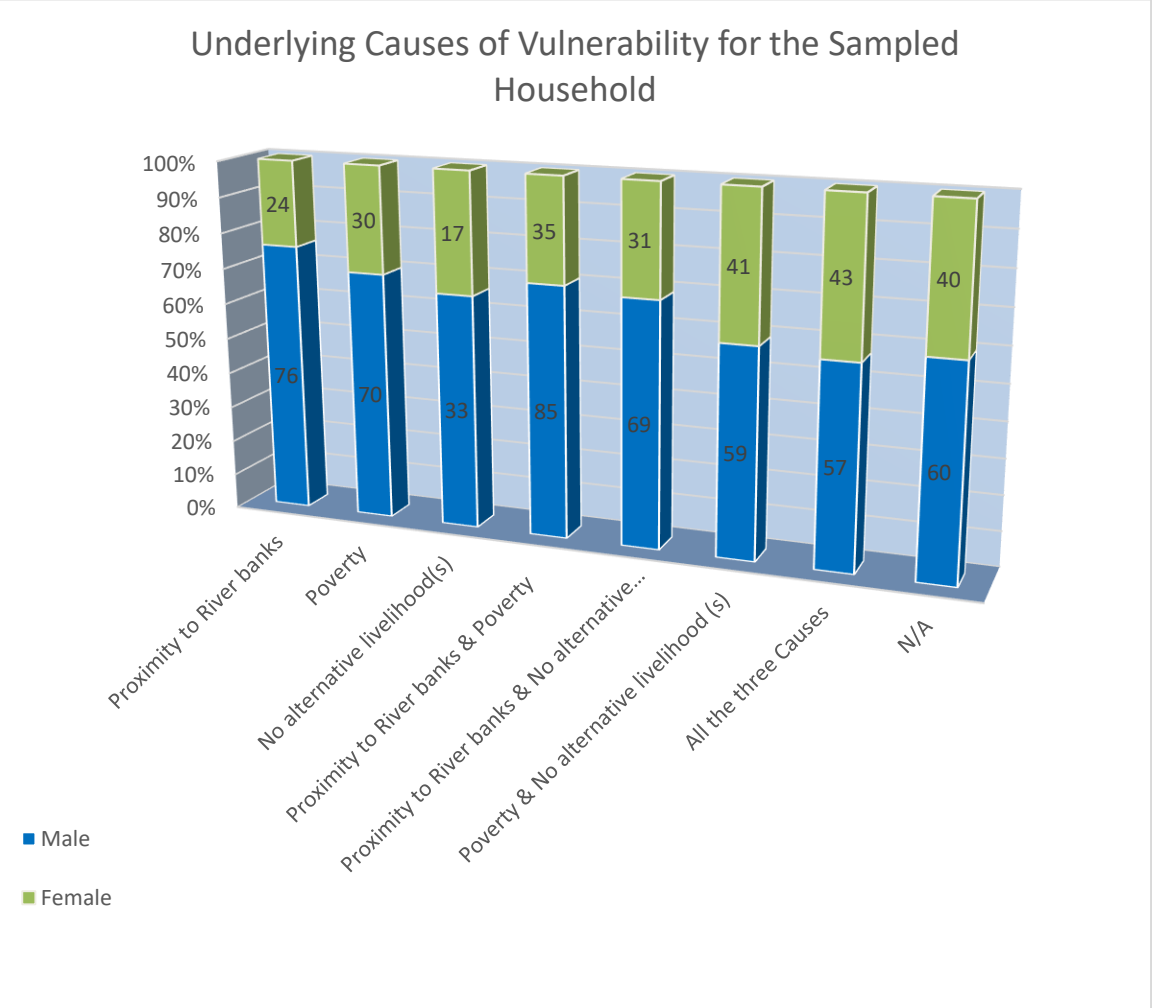


Figure 10: Underlying Causes of Vulnerability in relation to sex of the Sampled Hou sehold

Furthermore, it was also clear that all age groups for the head of households indicated proximity to flood prone areas as the main underlying cause of vulnerability. There is need to enhance household's resilience to flood impacts through poverty reduction strategies and promote diverse livelihood options which will ultimately reduce the levels of vulnerability.

4.3. Interpretation of the results

From the results of the analysis, it is clear that the floods, particularly from the 2019/20 rainfall season impacted on the livelihoods and critical aspects namely Agriculture, Health, Education, Water and Sanitation, Housing and Property and Assets of people in T/A Mwambo, Zomba district.

The main livelihood of the sampled households was crop production followed by trading and fishing.

The study established that over 90% of households had their crops damaged, mainly maize (92%) which is the staple crop and this ultimately resulted into food insecurity at household level. As discussed under the livelihood section, crop production was the main livelihood and income source. This in a way reduced people's income since income sources are embedded in livelihoods. Further, for those households who had some food stocks at the time of the floods, these were damaged and consequently compromised food security at household level.

Although health facilities were not affected by the floods, access to the health services was hampered due to damaged and/or washed away roads, bridges and culverts. This ultimately contributed to increased disease burden (mainly diarrhoea, malaria and coughing) at household level. The disease incidences were also attributed to access to unsafe water sources and flooded sanitation facilities.

Regarding water and sanitation, the river was the main source of water followed by borehole for most of the sampled households. This means that households will continue to be vulnerable to increased disease outbreak as long as the river continues to be their main source of drinking water. This is as a result of increased contaminat

ion that occurs during flooding. Despite borehole being the safest water source for drinking, past vulnerability assessments undertaken within the district have shown t hat handling of the water by households due to distance to the source has led to inc reased disease burden such as diarrhea.

The education sector was equally not spared. Learning was disrupted due to submer ged schools and damaged infrastructure.

Housing units, most of which were made of pole and mud were damaged in one w ay or the other forcing households to relocate to other alternative areas.

The results from the study established that households lost a number of both produ ctive and non-

productive assets (both directly and indirectly) making them more vulnerable.

The results further show that the main coping strategies employed by households w ere shifting to higher grounds and making furrows and canals during floods. It is cle ar from the findings that these coping strategies are not very effective. The coping st rategies employed by households depend on a number of factors, some of which in clude the type of livelihood strategy and marital status.

The results also show varying underlying causes of people's vulnerability which pos es a challenge as far as reducing levels of vulnerability is concerned. These include re siding in flood prone areas as the main one, poverty and lack of alternative liveliho ods.

Overall the objective of the study as outlined in chapter one (1) have to a large exte nt been realized. Government and key co-

parenting partners should implement the recommendations proposed in this study.

4.4. Limitations of the study

The study had a limitation as provided below;

The sample design did not take into consideration gender balance as more male headed households (72%) were sampled as compared to female headed househ olds (28%).

4.5. Implications of the results

The broad objective of the study was to assess the impact of the floods on the socio -

economic status of livelihoods of people in T/A Mwambo in Zomba district of Mala wi. Although no purely economic data was collected it is evident from the annual v ulnerability assessments done in the country referred to in the literature review that income sources are embedded in livelihoods. Any impact therefore on livelihood w ould result into reduced income and reduced purchasing power for households.

The factors that determine the underlining cause of vulnerability have been establis hed and coping strategies and development identified.

The findings from the study have implications for the development of the people in T/A Mwambo and the nation as a whole. Hazards such as floods entail that efforts should be directed at formulating sustainable mitigation measures. Appropriate miti gation measures discussed under the recommendations section should be put in plac e in order to enhance community resilience in view of climate variability. Thus the need to continuously assess the flood risk cannot be overemphasized.

The identification for mitigation measures should not only involve the vulner able communities but all stakeholders including the Private Sector and Civil S ociety.

There should be adequate funding towards risk mapping, monitoring and impleme ntation of preparedness and mitigation measures.

Investment in flood management, taking into account climate variability should be a priority. Further community awareness on the flood risk itself should be promote d.

5. CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

This chapter presents the conclusion and recommendations that arose from the stud y. The research reviewed a wide range of secondary literature and collected primar y data on which the conclusion and recommendations are based. The study was co nducted within the Disaster Risk Reduction conceptual framework which emphasize s a proactive approach to disaster management. It is imperative that communities a dopt a risk reduction approach to effects of floods. The research endeavoured to an swer the following questions:

- What is the impact of floods on the socio-
  economic livelihoods of people in T/A Mwambo?
- Who are the most vulnerable groups to floods and what are their coping strategies?
- What are the coping mechanisms employed by the community during floods?
- What are the sustainable developmental and policy options to deal with the proble m of floods?

The conclusion and recommendations are outlined below: -

5.2. Conclusion

As discussed under various sectors and across sectors, it is clear from the study that fl oods had adverse impact on the socio-
economic status of livelihoods for people in T/A Mwambo. To a large extent, the st udy has established that livelihood patterns play an important role in settlement pat terns. It is also evident that there are varying underlying causes of people's vulnerab ility and this poses a challenge for reducing or minimizing vulnerability. Proximity t o the flood prone area (57%), residing in flood prone area and poverty (18%) wer e identified as being the main underlying causes of vulnerability by the households i n the area. The study has further demonstrated that effects of floods in one sector c an affect other sectors of society. For instance, as discussed under the health section, the outbreak of disease incidences (malaria, diarrhoea and coughing) was attribute

d to the impact of floods on water sources and sanitation facilities. The issue of wat er contamination of the river at the pick of floods and the handling of water from t he borehole increases the health risk. Furthermore, although no health facility was d amaged due to floods, accessibility to health services was a problem due to infrastru cture (roads and bridges) damage as discussed under the health section. In addition, school attendance was disrupted due to impassable roads as discussed under the ed ucation section.

From the study, it was clear that households cope differently when affected by floo ds. The current coping strategies being employed by most households are not very effective. Discussions at community and district levels established that the coping str ategies were not sustainable because they had been using them and yet the situation did not seem to improve. The local communities coping capacities should not be u nderestimated but rather built upon. The focus must be on improving livelihood co nditions of the people.

The communities should be encouraged to build houses using durable materials and away from the flood prone area as a way of coping with the floods. Further the M inistry of Agriculture and Cooperatives should through the Extension Services encou rage the communities to increase the area cultivated on the upland to enhance the f ood security at household level. Input support program for the vulnerable but viabl e farmers should be considered.

Clearly, there is need to develop better and appropriate measures (as discussed und er the implications and recommendations sections) to prepare and mitigate the effe cts of the floods there-

of. Above all, the aim must be to involve all the players to enhance communities' r esilience to floods.

5.3. Recommendations

It is therefore appropriate in this chapter to highlight some policy consideration whi ch, if implemented could play an important role in flood risk management. The foll owing policy considerations are recommended: -

- Government and key stakeholders should engage communities in order for them to move permanently to higher grounds as they have expressed a willingness to reloc ate. The relocating should go with the provision of all the necessary socio amenities such as schools, hospitals, infrastructure, water and agriculture support for a period of three (3) years to enable the households to settle. Consideration should also be made to introduce alternative livelihood strategies in the new area of settlement.
- There should be a deliberate policy to compel communities especially in rural areas to build house using durable materials and away from the flood prone areas.
- The Ministry of Agriculture and Cooperatives should through Extension Services enc ourage Communities to increase area cultivated on the upland in order to enhance f ood security and household level.
- The relevant authorities should delineate both the non-
  flood areas and flood areas. The non-
  flood areas can serve as a temporary shelter for the settlements during floods.
- Construction of dams should be considered to trap the excess water. This could be used for irrigation.
- Government and key Stakeholders should engage the communities and local author ities in making them aware of the flood risk in view of the climate variability.
- Community initiated mitigation measures should be promoted so as to build comm unity resilience.
- In the long term, community based floods early warning system should be develop ed.
- Multi-
  sectoral approach to flood mitigation as opposed to single sector should be promot ed as there are inter-linkages in terms of flood impact on various aspects of society.

5.3.1. Consideration for further research

There is clearly a need for more research into the human adjustment to the flood h azard, particularly in terms of the perception and behavioural responses to floods. The aspect of early warning and how the information is utilized (what action is take n by the community when the warning is issued) should be investigated.

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APPENDICES

APPENDEX 1: THE INFORMED CONSENT FORM IN ENGLISH

My name is **Isaiah Anthony,** a final year student at the Malawi University of Science and Technology (MUST). I am conducting a study on the topic 'The Impacts of Flo ods on Socio-economic Livelihoods of People'. The study aims to assess socio-economic impacts of flooding on residents along Phalombe River in T/A Mwambo i n order to suggest ways in which to counteract the consequences of flooding in the area while seeking practical ways to adapt to floods and garner support at the polic y level.

I would like to request for your participation in providing data related to flooding and their associated socio-
economic impacts. Your participation in this study is entirely voluntary. As the resp ondent, you have the right to refuse or withdraw own self from the study at any ti me, for this reason you are not bounded to any person about explaining the causes of withdraw. Confidentially will be maintained and also all the records will be kept in security.
Kindly note that, the data provided will be used to serve the purpose of the study. During publish the study researcher will not use any types of name identification in dicator.
Any question pertaining the study is welcome. You can also contact my supervisor, Dr. Isaac Tchuwa on 0881370317 or itchuwa@must.ac.mw.

Declaration:

I, _____ (Name of Participant) I have read all the inform ation and am willing to participate in this study.

Signature;

APPENDEX 2: Household Data Collection Questionnaire

Assessing the Impact of Floods on Socio-economic Livelihood of People: A Case Study of TA Mwambo, Zomba.

Community Name:

Questionnaire ID:

Date of Interview:

1. House Demographics:

1.	Sex of Household Head	1 = Male 2 = Female	
2.	Sex of Main Respondent	1 = Male 2 = Female	
3.	Age of Head of Household	1 = Below 15 y ears 2 = 16 – 19 years	

	3 = 20 – 39 years 4 = 40 – 59 years 5 = Above 60 years	
4. Marital Status of Household Head	1 = Single 2 = Married 3 = Divorced 4 = Separated 5 = Widowed	
5. Household Size- How many people eat and stay in the House permanently?	5a; Male _____	5b; Female _____

2. Livelihood Patterns

2.1 What is the major livelihood strategy of household? (rank 4 of them)

I. Crop production
II. Permanent employment
III. Trading
IV. Wage labour
V. Livestock Production
VI. Beer brewing
VII. Fishing

VIII. Horticultural production

IX. Manufacturing

X. Other; Specify

Rank;

i._____

ii._____

iii._____

iv._____

2.2. Indicate secondary livelihood strategies of the household (more than one ans wer possible)

Livelihood Strategy	Yes	No
Crop Production		
Permanent employment		
Trading		
Wage labour		
Livestock Production		
Beer brewing		
Fishing		
Horticulture Production		
Manufacturing		

3. Flood Impact

3.1. Housing

3.1.1 Did your house collapse due to floods?

1 = Yes 2 = No

_____ _____

3.1.2 Did the collapsing of the house force you to relocate to a new area?

1 = Yes 2 = No

_____ _____

3.2. Property/Asset

3.2.1 Did the house lose any of the following property or asset?

Property/Asset	Yes	No
1. Bed		
2. Fishing net		
3. bicycle		
4. Boat/Canoe		
5. plough		
6. Chairs		
7. Radio		
8. Ox-cart		
9. Hoes		
10. Chairs		

Others; Specify _____

3.3. Agriculture

3.3.1 List three main staple crops that you grow:

1. _____
2. _____
3. _____

3.3.2 Did the household experience crop damage during the floods?

1 = Yes 2 = No

_____ _____

3.3.3 Was the main staple crop the one which was damaged?

1 = Yes 2 = No

_____ _____

3.3.4 Did the household experience any loss of food stocks during the floods?

1 = Yes 2 = No

_____ _____

3.4 Education

3.4.1 Are there any education facilities in your area?

1 = Yes 2 = No

_____ _____

3.4.2 Was there any damage to school infrastructure (classroom blocks, teacher's houses, toilets) due to the floods?

1 = Yes 2 = No

_____ _____

3.4.3 Did any of the school going children in your household experience any disrup tion in an attendance due to the floods?

1 = Yes 2 = No

_____ _____

3.4.4 If the answer to 3.4.3 above is yes, why? (Indicate main reason)

i. Road Impassable

ii. Bridge Culvert washed away or Submerged

iii. School submerged/ surrounded by water

3.5 Health

3.5.1 Are there any health facilities in your area?

1 = Yes 2 = No

_____ _____

3.5.2 Was there any damage to health facilities due to the floods?

1 = Yes 2 = No

_____ _____

3.5.3 Was there any disruption in access to health services due to the floods?

1 = Yes 2 = No

_____ _____

3.5.4 Did any of the household members get sick during the floods?

1 = Yes 2 = No

_____ _____

3.5.5 Which of the following diseases were experienced by the household members who got sick?

i. Diarrhoea
ii. Malaria/ Fever
iii. Cough
iv. Measles
v. **Others Specify**_____

3.6 Water and Sanitation

3.6.1 What is your common source of drinking water? (tick)

i. Borehole_____
ii. Tap Water_____
iii. Protected Well_____
iv. Unprotected well_____
v. River_____
vi. Spring_____
vii. Spring_____
viii. **Other (Specify)**_____

3.6.2 Was the main source of water affected by the floods?

1 = Yes 2 = No

_____ _____

3.6.3 What type of sanitary facilities do you have?

i. VIP
ii. Sanplat
iii. Reticulated Sewerage
iv. Traditional Pit latrine
v. **Others (Specify)** _____

3.6.4 Was your sanitary facility affected by the flood water?

1 = Yes 2 = No

_____ _____

4. Vulnerable Groups Due to Floods

4.1 Who are the most vulnerable households to floods?

1 = Male Headed 2 = Female Headed

_____ _____

4.2 What are the underlying causes of vulnerability?

i. Residing in a flood prone area. _____

ii. Poverty. _____

iii. Lack of alternative livelihood(s). _____

5 Coping Strategies

5.1 What are the main coping strategies that you employ during floods? (Rank t hem in order of importance).

i._____

ii._____

iii._____

iv._____

v._____

5.2 Are the above coping strategies effective?

1 = Yes 2 = No

_____ _____

5.3 In your view, what other developmental options are needed to deal with th e floods in the area?

i._____

ii._____

iii._____

iv._____

v._____

vi._____

APPENDIX 3. Key Informant Interview Question guide

District/Community Name:

Date of Interview:

1. Name of interviewee(s) (To be administered only to key district officials and community members).

Name	Organisation	Position

2. Livelihoods

2.1 What are the three main sources of livelihood for most households in the Community?

i._____
ii._____
iii._____

2.2 What are the three secondary sources of livelihood for most house holds in the Community?

i._____
ii._____
iii._____

2.3 What are the three main sources of income?

i._____
ii._____
iii._____

2.4 What are the three main sources of food?

i._____
ii._____
iii._____

2.5 How would you describe the impact of the floods on people's livelihoods?

3. Impact of Floods

3.1. How was the flood experienced different from other years (in terms of timin g, level, etc) Is there any data available (Rainfall figures for example to back-up the observations of the district/ community members) Note: Try to be as qualita tive as possible – approximate. E.g. 20% more than rain in ten years.

_____

_____

_____

_____

3.2. What was the effect of the flood on the following;

Areas	Level of Effect 1 = Severe 2 = Moderate 3 = No Effect	Comments/Reasons
Crop (Production)		
Crop (Stocks)		
Livestock		
Health		
Water (Access)		
Sanitation (Access)		
Infrastructure		
Housing		
Property		

NOTE: Probe for both negative and positive effects

3.3. Geographical Spread of Flood Affected Areas.

3.3.1. Indicate areas affected by flood, giving an estimate of the people affected (us e proportional pilling approach to estimate the % number of people affected).

Ward Name	Community Name	Total Population	Estimated Number of Flood Affected Population

3.4. Were health facilities in the flooded area(s) affected? If yes, explain to what extent they were affected.

_____

_____

_____

_____

3.5. Was there any disruption in the access to health facilities? If yes, provide details of the disruption.

_____

_____

_____

_____

3.6. Was there an increase in disease outbreak/ incidents due to the floods? (Explain giving details of major health problems and age groups affected).

_____

_____

_____

_____

_____

3.7. What are the common water sources in the community?

_____

_____

_____

_____

3.8. What percentage of the community water sources were affected by the floo ds?

_____

_____

_____

_____

3.9. Did the affected households experience any water accessibility problems?

_____

_____

_____

_____

3.10. What are the three main types of sanitary facilities used mostly in the Comm unity?

i._____

ii._____

iii._____

3.11. What percentages of the commonly used sanitary facilities were affected by t he floods? (Give estimates using proportional pilling approach)

_____

_____

_____

3.12. What type of infrastructure (road, bridges/ culverts) are available in the Community?

_____

_____

_____

_____

_____

3.13. What was the impact on the infrastructure?

_____

_____

_____

_____

_____

3.14. Was there any educational infrastructure affected by the floods in the Community? If yes, provide details;

_____

_____

_____

_____

3.15. Was there any disruption in learning due to floods?

_____

_____

_____

_____

3.16. Did the communities experience crop and livestock loss due to floods? Explain by giving details of losses and estimate population affected.

_____

_____

_____

_____

3.17. What was the impact of the floods on people's houses? (Explain in details)

4. Underlying Causes of Vulnerability to Floods

4.1. What in your view are the underlying causes of vulnerability on the Commu nity? Elaborate.

_____

_____

_____

_____

_____

4.2. Who are the most vulnerable groups?

_____

_____

_____

_____

_____

5. Coping Strategies

5.1. What is the normal pattern of flooding in the Community? Explain

_____

_____

_____

_____

_____

5.2. What are the three main coping strategies if any, that people of the Community employ during floods?

5.2.1. Positive Coping Strategies

i._____

ii._____

iii._____

5.2.2. Negative Coping Strategies

i._____

ii._____

iii._____

5.3. What are the development options that might address the flood patterns in both short and long term in the Community?

5.3.1. Long term.

i._____

ii._____

iii._____

iv._____

5.3.2. Short term.

i._____

ii._____

iii._____

iv._____