

**Assessing risk awareness and emergency preparedness among people in flood prone areas of Chibavi and Chiputula in Mzuzu city, northern Malawi**

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**ASSESSING RISK AWARENESS AND EMERGENCY PREPAREDNESS  
AMONG PEOPLE IN FLOOD PRONE AREAS OF CHIBAVI AND  
CHIPUTULA IN MZUZU CITY, NORTHERN MALAWI**

**By**

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**A Dissertation Submitted in (Partial) Fulfillment of the Requirements for the Degree  
of Master of Science (Critical Care and Trauma) of**

**Muhimbili University of Health and Allied Sciences  
October, 2018**

## **CERTIFICATION**

The undersigned certifies that she has read and hereby recommends for acceptance by Muhimbili University of Health and Allied Science a dissertation entitled; **“Assessing risk awareness and emergency preparedness among people in flood prone areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi”**, in (partial) fulfillment of the requirements for the degree of Masters of Science in Nursing Critical Care and Trauma of Muhimbili University of Health and Allied Sciences

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**Anne Outwater. PhD**

(Supervisor)

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**Date**

**DECLARATION AND COPYRIGHT**

I, **Chimwemwe Chawezi Munthali**, declare that this **dissertation** is my own original work and that it has not been presented and will not be presented at any other university for a similar or any other degree award.

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**MAY THE ALMIGHTY GOD CONTINUE BLESSING YOU!**

## **DEDICATION**

This work is dedicated to my family. A special feeling of gratitude to my mother, my sisters and my brother for support and encouragement throughout the period of my study. A special thanks to my daughter Michelle, my son Jeremy and my husband Blaise you are one of my countless blessings.

## **ABSTRACT**

### **Background**

Mzuzu City which is located in the Northern part of Malawi receives heavy rainfall which often results into floods in most low lying areas within the city. The mostly affected townships are Chibavi and Chiputula with a population of 15,805 and 6,825 respectively. Despite this problem, there is paucity of studies on individual and community emergency preparedness to mitigate natural disasters such as floods in Malawi. With this backdrop, this study assessed the risk awareness and emergency preparedness among people in the flood prone areas of Chibavi and Chiputula in Mzuzu City.

### **Aim of the study**

The aim of this study was to explore risk awareness and emergency preparedness among people in the flood prone areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi.

### **Materials and Methods**

This community-based study was a quantitative approach that followed a cross-sectional descriptive design. The study population were people in the townships of Chibavi and Chiputula. Data was collected on social demographic, flood risks awareness and avoidance measures and emergency preparedness measures. Multistage sampling technique was used to select participants in Chibavi and One-stage Cluster sampling was used to select participants in Chiputula. A structured interviewer administered questionnaire was used to collect data. SPSS version 20.0, was used to analyze data. Percentages were used to determine participants' on flood risks and risks avoidance, and participants' knowledge on emergency preparedness. Chi-square and Fishers Exact tests were used to test the association of social demographic factors with knowledge of flood risks and emergency preparedness. Chi-square test was further used to test the association between risk awareness (independent variable) and emergency preparedness (dependent variable). A P-value of less than 0.05 was considered statistically significant.

**Results**

The majority (67.6%) of study participants were females. Further, the findings showed that most (40.7%) of the study participants were of the ages ranging from 35-49 years. However, the findings showed no statistically significant association between age with risk awareness and emergency preparedness when tested using Chi-square and Fishers Exact tests.

Furthermore, the majority (62.7%) of study participants had experienced flooding and the results indicated that the majority (61.8%) of study participants had knowledge of the flood risks. The majority (71.8%) reported moving to a safer place as a means of avoiding flood risks. However, the findings of this study showed that people do not have knowledge of emergency preparedness despite having knowledge of the flood risks. This observed association of risk awareness and emergency preparedness was tested to be statistically significant by Chi-square test (p-value = 0.000).

**Conclusion**

People in Mzuzu city are not prepared for an emergency during floods. This was revealed in this study by a lack of common understanding on how to prepare for an emergency. Therefore, suggestion for Mzuzu city council to facilitate the implementation of a disaster risk management plan could help to mitigate flood effects.



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**LIST OF ABBREVIATION**

MCC	:	Mzuzu City Council
MUHAS	:	Muhimbili University of Health and Allied Sciences
NHSRC	:	National Health Sciences Research Committee
NSO	:	National Statistical Office
SPSS	:	Statistical Package for Social Sciences
USD	:	United State Dollar
WHO	:	World Health Organization

## **DEFINITION OF TERMS**

### **Risk avoidance**

Risk is defined as a possibility that something unpleasant or unwell will happen (Spans and Howker, 2008). Therefore risk avoidance in this study is defined as necessary actions likely to be taken to reduce or eliminate risks which might come as a result of floods. This was assessed in section two of the questionnaire.

### **Emergency**

An emergency is a serious unexpected and often dangerous situation requiring an immediate action (Spans and Howker, 2008). In this study an emergency was defined as the presence or absence of any serious, life threatening and dangerous situation which requires an individual to take an immediate action to save life.

### **Emergency preparedness**

Emergency preparedness is a state of readiness for the possible emergency. This can be at individual, community or national level. In this study an individual state of readiness was assessed as provided in section three of the questionnaire.

### **Community members**

A community is a group of people living in the same defined area sharing the same basic values and interest. In this study community members were people in the two townships of Chibavi and Chiputula who are exposed to the same risk of floods. These two townships are generally low lying areas with most of the land being shallow wetland.

### **Flood prone**

Prone is a likelihood of something to happen or a liability to suffer from something (Spans and Howker, 2008). In this study, flood prone was defined as the liability of floods occurring again due to past experiences. This was assessed by asking participants their past experiences with floods.

## CHAPTER ONE

### 1.0 INTRODUCTION AND BACKGROUND

#### 1.1 Background

The World Health Organization defines disaster as “An occurrence disrupting the normal conditions of existence and causing a level of suffering that exceeds the capacity of adjustment of the affected community (Alzahrani and Kyratsis, 2017). Examples of natural disasters are flood, earthquake hurricane, landslide, and volcanic eruption just to mention a few. These natural disasters are common in low, middle and high income countries (World Health Organization, 2014), disasters claim 372,000 lives around the globe each year, mostly in low and middle income countries. Children and young adults are the mostly affected. World Disaster Report (2014) report that 210 million people have been affected by the natural disasters (Xu, et al., 2014). Further, Wanjiku, et al., (2017) report that disaster-induced injuries account for more than 5 million deaths globally and 90% of all injury-related deaths occur in low and middle- income countries.

In terms of intensity, floods like other disasters, result in physical injuries, create an environment favorable for the spread of diseases and psychological trauma due to loss of life and properties (Hashim and Hashim, 2016). Many reported deaths during flooding are as a result of drowning and injuries resulting from walls, the roof of houses and trees collapsing on victims (Nyakundi *et al.*, 2010).

A study in Kenya identified the key risk factors for floods which include low level of education which is associated with lack of well-numerated employment which lead to less social power and fewer economics resources (Nyakundi *et al.*, 2010) Other well studied factors include age, occupation and length of residence which is associated with awareness and use of traditional flood knowledge (Nyakundi *et al.*, 2010).

Malawi, like any other country, is mostly affected by natural disasters. In order to manage disasters, various policies and guidelines have been put in place which mainly focuses on disaster risks management in order to mitigate the impact. Flooding is one of the frequently

occurring natural disasters, in all the three regions of Malawi: Southern, Central and Northern regions. Mzuzu City, in the Northern part of Malawi, is the mostly hit by floods due to the heavy rainfall it receives. According to Mzuzu City Disaster Report of 2015/2016, a total of 18,748 people were affected by floods and landslides in the city in 2015, of which, 10 lost their lives. The reported flooding townships in the city include Chiputula and Chibavi, with a total number of 120 and 354 households affected, respectively (Mpoola and Chanza, 2011). In order to mitigate the effects of disasters in the city which include flooding, Mzuzu City Council has come up with a Disaster Risk Management Plan (2017-2022). This plan which is yet to be launched is a tool which will guide disaster risks in the city. The plan has included important areas of disaster risks management which include: management and coordination, preparedness/prevention and mitigation initiatives, and community awareness and education initiatives. The stakeholders from various institutions including health will be involved in implementing the plan.

Against this backdrop, the study investigated knowledge of risk and risk avoidance of floods and emergency preparedness among people in the flood prone townships of Chibavi and Chiputula. The study investigated the social demographic factors, people's experience with floods, knowledge on the early warning signs of floods and knowledge on how to reduce flood effects. On emergency preparedness, the study investigated what motivate people to prepare, reasons for lack of preparedness and availability of materials for an emergency.

Further, the study looked into the existence and implementation of local and national policies for managing flood risks and hazards.



## 1.2 Statement of the problem

Mzuzu is one of the fast growing cities in Malawi with a population of 133,968 people. Mzuzu City Council aims at making the city a safe place to live, play and invest by 2030.

One of the major obstacles to the attainment of this goal is flooding due to heavy rainfall which the city experiences. According to Mzuzu City Council Disaster Report of 2015/2016, Mzuzu City received approximately 1200 milliliters of rainfall in 2015. The heavy rainfall resulted in floods in some townships of the city. Chibavi East and West and Chiputula townships which have a population of 15,805 and 6,825 respectively.

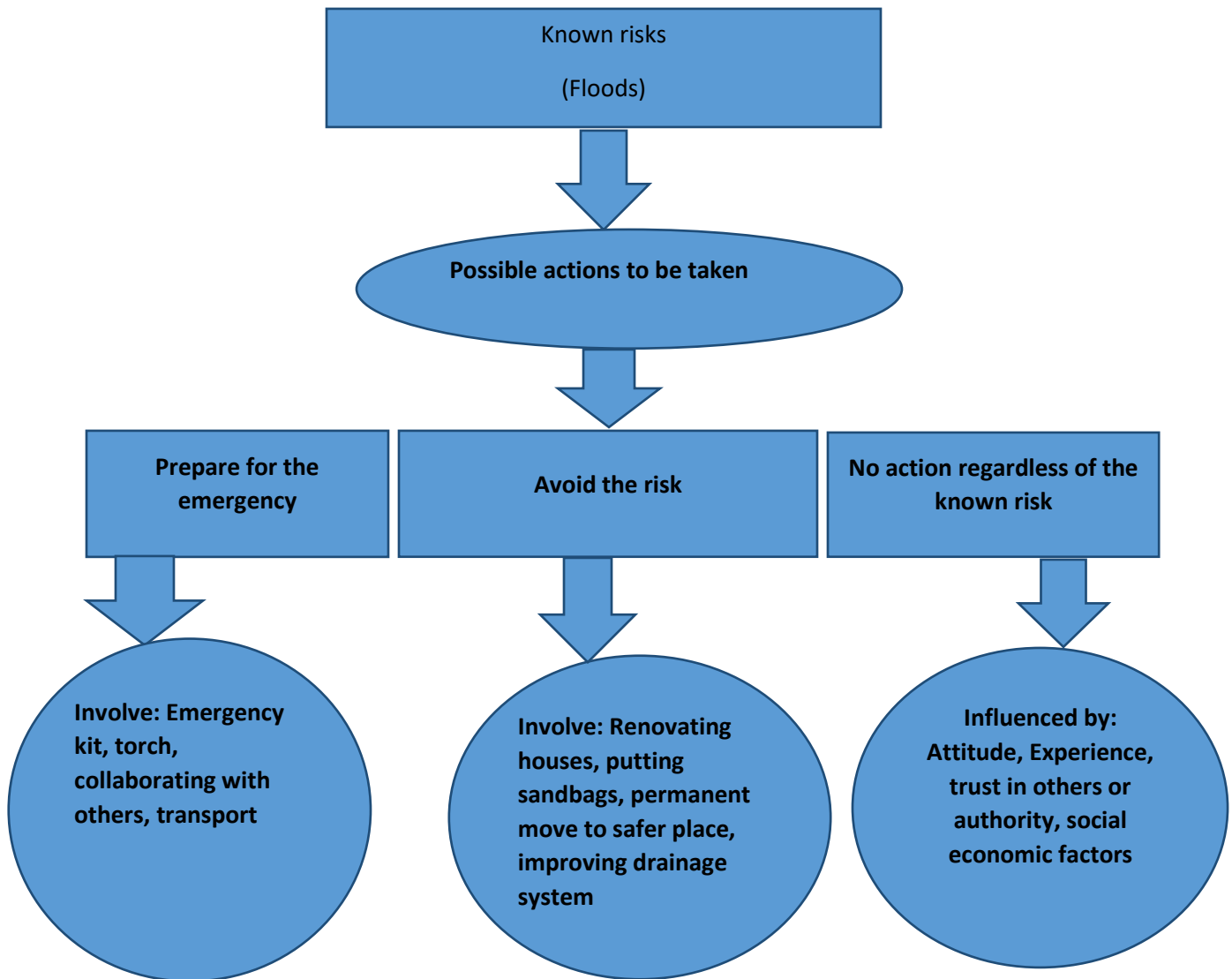
Specific measures are being taken to mitigate effects of these disasters such as the establishment of structures for water drainage in low lying areas, planting trees in some areas within the city, educating communities how to respond to floods and prohibiting building in flood prone areas. These are referred to in the literature as the professional responses to emergency events and are comprehensively studied. However, for these professional measures to bear fruits, collaboration among the government, stakeholders and the community as a whole is a prerequisite (Xu et al., 2014). Such collaboration enhances sustainability and ensures full participation of the entire community. Unfortunately, there is a paucity in the literature documenting individuals and communities preparedness for such emergencies (Xu et al., 2015).

In response to the problem, the study investigated knowledge about risks and risk avoidance and determined knowledge of emergency preparedness among people in the flood prone townships of Chibavi and Chiputula. Furthermore, the study established the association between risk awareness and emergency preparedness. This was important considering that response to natural disasters is dependent on people's attitude towards disasters, previous experience with natural disasters, risk awareness and demographic and social economic factors. A positive attitude will contribute to good response and might reduce injuries likewise, previous experience with natural disasters is advantages (Xu et al., 2015). Similarly, a community which is aware of risks and associated outcome is likely to respond positively to natural disasters.

### **1.3 Theoretical framework**

Theory of Rational Action also called Rational Choice Theory was developed by Fischbein. The key constructs in this theory are: attitude, beliefs and behavior. The theory assume that social behaviors result from behaviors' of individual actors in the community, each of whom is making individual decisions. The theory seeks to account for social outcome on the basis of both social context and individual actions (Hechter and Kanazawa, 1997). The theory maintains that a number of factors identified influence individuals' responses. These include experience, attitude, trust in authorities and social economic. According to this theory it is important to understand the values attached to each action taken by people to come up with effective interventions.

Based on the key constructs of this theory, the researcher looks at three possible actions which individuals living in flood risk areas are likely to take depending on their beliefs and attitude. An individual who has a positive attitude will likely prepare for a possible emergency and take necessary measures to avoid the risks depending on his/ her beliefs. Preparing for an emergency will include: having an emergency kit, a torch, transport and collaborating with others. Similarly, beliefs will influence an individual to prepare for an emergency and take necessary measures to avoid the risks. Actions which will help him/her to avoid the risks may include: renovating houses, putting sand bags using locally available materials, improving the drainage system and moving to safer place. Lastly, non-response attitude might also be influenced by: experience, trust in others or authority and social economic factors. The below given figure illustrates the Rational Choice Theory.



**Figure 1: Choice of action adapted from the Theory of Rational Action.**

**Source: Munthali, 2018**

#### **1.4 Rationale for the study**

The purpose of this study was to determine community members' knowledge about risks associated with floods, to determine knowledge of emergency preparedness and to establish the association between risk awareness and emergency preparedness. Findings of this study will bridge the existing gap in risk awareness and disaster preparedness at the community level. Furthermore, the findings of this study will inform the formulation of appropriate policies and procedures for disaster management and in educating the community about factors associated with floods which include; injury, psychological trauma and loss of property. This will help to prevent occurrence of serious illnesses and injuries at community level hence reducing burden of care in emergency and critical care settings. In addition to these, the findings of this study have identified areas of research in flood risk awareness, avoidance and preparedness at the community level.

#### **1.5 Research Questions**

The research questions for this study were as follows:

1. What proportion of people in Chibavi and Chiputula have knowledge about risk and risk avoidance related to floods?
2. What proportion of people in Chibavi and Chiputula have knowledge about emergency preparedness?
3. Is there an association between risk awareness and emergency preparedness?

## **1.6 Objectives**

### **1.6.1 Main objective**

The main objective of this study was to assess the risk awareness and emergency preparedness among people in the flood prone areas of Chibavi and Chiputula in Mzuzu City **by 2018**

### **1.6.2 Specific objectives**

The specific objectives of this study were:

1. To determine knowledge about risks and risks avoidance related to floods among people in Chibavi and Chiputula.
2. To determine knowledge on emergency preparedness among residents in Chibavi and Chiputula.
3. To establish the association between risk awareness and emergency preparedness among people in Chibavi and Chiputula.

## **1.7 Research hypotheses**

### **Null hypothesis**

There is no association between flood risks awareness and emergency preparedness among people in Chibavi and Chiputula in Mzuzu City.

### **Alternative hypothesis**

There is an association between flood risks awareness and emergency preparedness among people in Chibavi and Chiputula in Mzuzu City

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

This section present the context of this study. It highlights the existing evidence regarding flood risks awareness and risks avoidance, knowledge on emergency preparation and the association between risk awareness and emergency preparation. Each section presents what is known and unknown in reference to the available literature and further identifies the existing knowledge gap.

#### 2.1 Knowledge of flood risk and avoidance

Globally various strategies have been put in place to mitigate the outcomes of floods at the community level. WHO (2014) recommends the use of barriers to prevent access to water, provision of safe places and teaching children age specific basic swimming skills. These require a collaborative effort between the government and community members as a whole. WHO (2014) advocates for better and more integrated flood risk management and development of natural water safety policies.

People who are knowledgeable about flood risk are likely to take appropriate measures to mitigate floods outcomes and this is done through good risk communication which enhances an understanding that helps improve flood risk management (Lazrus,*et al.*, 2016). Among the measures which can be taken are preparing for an emergency and avoiding the risk. However, sometimes people might not take any action despite having knowledge of flood risk. Similarly, where people lack knowledge of the hazards, their risk judgments are based on the degree to which they trust the responsible manager(Kellens, Terpstra and De Maeyer, 2013).

Malawi has been traditionally vulnerable to natural disasters because of its geographical and climatic conditions. Many parts of the country are prone to floods, which put people's lives at a risk of various injuries including drowning. According to Mzuzu Urban Profile, 2011, the city is at risk for floods and landslides in its various townships.

The increasing population in the city, deforestation and poor housing standards are among the factors responsible for flooding and other possible risks affecting the city. Mzuzu City Council facilitates awareness to the communities through radio, local newspapers and the use of local structures. Among these means, the use of mass media is reported the most successful source of knowledge about flash flood risks and warning decisions (Lazrus,*et al.*, 2016). No study has far assessed knowledge on risks and risks avoidance related to floods and knowledge on emergency preparedness in the two townships of Chibavi and Chiputula in Mzuzu City.

## **2.2 Knowledge of emergency preparedness**

WHO (2007) defines emergency preparedness as actions taken in anticipation of an emergency to facilitate rapid, effective and appropriate responses to the situation. Good preparation for any type of disasters at individual, community and national level helps to mitigate the outcome and promote resilience (Kapucu, Hawkins and Rivera, 2013). According to World Disaster Report of 2016, about 40 million people are affected by disasters in different parts of the world, out of which, 23 million need emergency assistance. The amount of disasters estimated varies per continent with lower estimates in Africa compared to America while the total number of people affected by disasters is high in Africa compared to America (Metzl, 1997).

The occurrence of floods just like other natural disasters is often an emergent situation. In most of the times, people are not ready to encounter the impacts of flooding despite having knowledge of its possible occurrence. Some of the factors identified to contribute to poor or lack of preparedness for disasters include; attitude towards disasters, risk awareness, social economic factors and previous experience with floods(Xu *et al.*, 2015). In a similar study, perceived risks were also found to have an influence on the ability to prepare for risks caused by disasters (Mohammad-pajoooh and Ab. Aziz, 2014). This owes to the fact that individuals learn from previous experiences.

Further, people who believe to be safe are more likely to be unprepared for an emergency despite having adequate knowledge of the risk (Burke, Bethel and Britt, 2012). It is therefore important to know the values and beliefs of the people at risk of floods as it may have an impact on their ability to prepare.

Additionally, individual motivation has also been found to have an influence on people's ability to prepare. What motivate people varies from one individual to another and is mostly influenced by the values that people attach to their personal lives. Some of the factors which have been identified which motivate people are; keeping the family safe and keeping the home and belonging safe (Burke, Bethel and Britt, 2012). This means that knowing what motivates people will have a positive outcome when interventions are being planned and implemented before and after the occurrence of the disaster.

One of the most important parts in emergency preparation is the identification of the most reliable medium of communication. This is important because it may help to reach out to more people prior to floods and it might help in mitigating the outcome. Similar studies have identified the use of televisions, local radios, family friends and use of cell phones through texts messages (Burke, Bethel and Britt, 2012). People might prepare for an emergency by having basic knowledge on emergency care, having an emergency kit and a torch.

In the Northern part of Malawi, Mzuzu City Council in collaboration with other stakeholders helps people to prepare for floods within the city. This is done through civic education on how to respond to floods and discouraging construction of houses in flood prone areas, construction of drains in low lying areas within the city, planting trees in some of the locations within the city and identification of the evacuation centers. This study will assess the community member's knowledge on emergency preparedness, will also identify their beliefs and values attached in relation to flood preparedness and will also identify the mostly preferred and effective means of communication in the townships of Chibavi and Chiputula in Mzuzu City (Kellens, Terpstra and De Maeyer, 2013).



### **2.3 The association between risk awareness and emergency preparedness**

Studies have found that people are generally not prepared for disaster despite having knowledge of the possible disaster (Xu *et al.*, 2015). Lack of preparation for the impending disaster is often associated with devastating outcome. The community which is well prepared in terms of resources and communication prior to a disaster can mitigate its outcome. In a similar study, emergency preparations during floods were found to require a collaborative effort among the individuals, stakeholders and the government (Mohammad-pajoooh and Ab. Aziz, 2014).

Factors found to influence the ability to prepare for disaster include the lack of resources, individual beliefs and risk perception. Similarly, a variation on how risks are perceived among individuals was also found to affect people's preparedness for disasters. People may be fearful, fearless or may perceive the disaster being uncontrollable and beyond human preparation (Rufat *et al.*, 2015). An individual who perceives the risk as being uncontrollable and beyond his ability to prepare, is likely not to take any steps to prepare. However, an individual who is fearful might take a step to prepare given the right information. Other studies established that individuals who have been in denial might not prepare for the disaster, similarly with individuals who have trust in authorities.

Further, some studies found out that people might not take a step to prepare as the result of the perceived benefits due to the outcome of floods (Kellens, Terpstra and De Maeyer, 2013). Some of the benefits include; fertile land for growing crops mainly in river banks and compensations. Furthermore, studies have found an association between low flood awareness and limited adoption of flood protection and preparedness measures. Prior experience and shorter length of time since the previous event are associated with greater awareness, understanding and personal action (Rufat *et al.*, 2015).

In Malawi, studies on the association between flood risk awareness and emergency preparedness are very limited. Consequently, the current study set out to identify the association between risk awareness and emergency preparedness, and will further identify the perceived risks among the community members in flood prone areas of Chibavi and Chiputula in Mzuzu.

## **CHAPTER THREE**

### **3.0 MATERIALS AND METHODS**

#### **3.1 Study design**

This study was a community-based study using a quantitative approach and a cross-sectional descriptive design. The cross-sectional study was adopted because it is economical and practically easy to be done (Polit and Beck, 2008).

#### **3.2: Study area and setting**

This study was conducted in Mzuzu City. The city is located in the Northern part of Malawi with a current population of 133,968 people. This is one of the fast growing cities with a population growth rate of 4.2%. According to Malawi Mzuzu Urban, 2011, the main economic activities in the city include trade, manufacturing, agriculture and informal business. Tumbuka and Chewa are the mostly spoken languages in the city.

Mzuzu City has several townships. However, this study was done in the townships of Chibavi and Chiputula with a current estimated population of about 9000 and 98000 respectively. The two townships of Chibavi and Chiputula are generally low lying areas with most of the land being shallow wetland also called “Dambo land”. This predisposes these two townships to flooding during the rainy season.

#### **3.3 Study population**

The study population was people in the townships of Chibavi and Chiputula in Mzuzu, Malawi.

#### **3.4 Target population**

The target population were people in the townships of Mzuzu City who reside in flood prone areas.

### **3.5 Sampling procedure and technique**

Multistage sampling technique was used in Chibavi. Firstly, a list of 7 blocks from Chibavi East were identified to come up with a sampling frame. This was followed by simple random sampling where by 3 blocks were sampled. Similarly, in Chibavi West a list of 6 blocks were identified to come up with a sampling frame and using simple random sampling, 3 blocks were again sampled. This made a total of 6 sampled blocks in Chibavi. Data was collected from each household in the sampled blocks. This gave a total of 124 respondents in Chibavi Township.

One-stage cluster sampling was used to select participants in Chiputula Township, a total of 3 blocks were identified to come up with a sampling frame. Data were then collected from each household in all the 3 identified blocks. 39 households from each block in Chiputula participated in this study. This gave a total of 117 respondents from Chiputula. The total number of respondents corresponded to the planned sample size of 241.

### **3.6 Inclusion criteria**

Adults, male or female, who were head of the household and were residents in the townships of Chibavi and Chiputula were included in this study.

### **3.7 Exclusion criteria**

Adults, male or female, who were head of the household and were residents in the townships of Chibavi and Chiputula but have stayed in the townships for less than 1 year were excluded in this study. This was because they could not have experienced flooding.

### 3.8 Sample size calculation

To determine a sample size for this study, the formula below was used:

$$n = \frac{Z^2 P (1-P)}{E^2}$$

Where:

n=Minimum sample size required

Z= Standard normal deviation (95% confidence interval) set at 1.96

P= Estimated proportion of 83% (Nyakundi *et al.*, 2010)

E= Maximum likely error set at 5% (0.05)

Therefore;

$$n = \frac{1.96^2 \cdot 83(100-83)}{5^2}$$

$$n = \frac{3.8416 \times 83 \times 17}{25}$$

$$n = \frac{5,420.5}{25}$$

$$217$$

$$n=217$$

Adjusted sample where by non-response rate of 10% was assumed

$N' = n \times \text{Adjusted Factor}$

Where by Adjusted Factor= 100% / 100%-10%

Adjusted Sample = 217 x 100%/90%

Adjusted sample = 241.

### 3.9 Variables

In this study, the variables which were measured were risk awareness, risk avoidance and emergency preparedness. Risk awareness was defined as the individual ability to have knowledge of the possible risk. This was assessed by asking participants on the likelihood of floods, their experience with floods and knowledge on the early warning signs of floods, the source of information including the type of information received on floods and their beliefs and attitude towards floods.

Risk avoidance was assessed by asking actions to be taken to eliminate flood effects, the action to be taken if another flood occurs and the barriers that prevent them to move to a safer place during floods.

Emergency preparedness was measured by asking participants questions on the availability of materials or items for an emergency, their opinion on how to prepare for an emergency, the motivating factor for them to prepare for an emergency, reasons for lack of preparation for an emergency and their greatest concern during floods.

Independent variables :	Knowledge of emergency preparedness
	Risks awareness
	Knowledge of risks avoidance
Dependent variable	: Emergency preparedness
	Risks avoidance

### 3.10 Data collection method

A structured questionnaire which was administered by the interviewer was used to collect data on door to door visits. The questionnaire was adapted from a measurement tool called, 'Measuring Community Awareness and preparedness Model' by Jessica Enders, 2001. Items applicable to our setting were adapted. Five factors in risk perception surrounding knowledge and beliefs were adapted. The factors were: hazard knowledge, previous experience of emergency, exposure of awareness, ability to mitigate/ prepare and social demographics characteristics which included age, sex, marital status education level and source of income.

The questionnaire had Twenty-one closed and open ended questions which were divided into three sections which were: social demographic factors, knowledge on flood risks and risks avoidance and knowledge on emergency preparedness. The questionnaire was piloted before data collection. The questionnaire was translated into the commonly spoken local language of Tumbuka.

Two research assistants, (one a nursing officer with a bachelor degree in mental health nursing from St John of God College of Health Sciences and one a community health nurse with a bachelor degree in public health from Livingstonia University), assisted in data collection. The two research assistants speak Tumbuka language fluently. The research assistants were trained in data collection and probing. Data was collected from each household in sampled blocks in Chibavi and each household in all the three blocks in Chiputula. The researcher participated in data collection as well as supervision of data collection process.

### **3.11 Validity and reliability**

The questionnaire was adapted from a measurement model by Enders (2001). The original questionnaire was tested with a Cronbach's Alpha and returned 0.847. Further, the questionnaire has been adapted in several similar studies. This assured the external validity of results.

The questionnaire (9 copies) were piloted before the start of actual data collection with no significant changes made.

### **3.12 Data analysis**

The independent variables: risk awareness and risk avoidance, were treated as nominal measures. The percentages and frequencies were used to determine the proportion of people with knowledge on risk awareness and risk avoidance. The dependent variable 'emergency preparedness' was also treated as nominal measure and percentages and frequencies were used to determine the proportion of people with knowledge on emergency preparedness. The findings were presented in frequency tables and charts.

Chi-square and Fishers Exact tests were used to test the association of social demographic factor (Age) with knowledge of flood risks and emergency preparedness respectively. The results showed no statistically significant association. Further, Chi-square test was used to test the association between risk awareness and emergency preparedness among people in Chibavi and Chiputula. The results showed a statistically significant association between risk awareness and emergency preparedness. A p-value of 0.000 was found and was considered statistically significant.

### **3.13 Ethical consideration**

Ethical clearance was obtained from MUHAS Research and Ethical Review Board and National Health Services Research Ethics Committee (NHSREC) in Malawi.

In order to maintain anonymity, all respondents in the study were given a code and no names were used. To maintain confidentiality, privacy during data collection was maintained and answered questionnaire were kept in locked lockers. Further, participation in this study was voluntary. All respondents in this study were informed of their right to withdraw from the study if they wished to do so. In addition, there were no invasive procedure related to this study. Participants were also told that the study was free hence were not to be given anything in terms of money or any benefits for participating in the study.

Finally, consent was sort from all participants before administering the questionnaire.

### **3.14 Dissemination of Findings**

The obtained results will be submitted to the National Health Services Research Ethics Committee (NHSREC), Mzuzu City Council through the Executive Director and Department of Clinical Nursing Muhimbili University of Health and Allied Sciences; as part of the partial fulfillment of the requirements for the degree of masters in Critical Care and Trauma Nursing. The results will further be published in international journals and will be presented at St John of God Hospital Services Journal Club and scientific conferences.



## **CHAPTER FOUR**

### **4.0 RESULTS**

This chapter presents the findings of the study on; assessing risk awareness and emergency preparedness among people in flood prone areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi. This is based on the analysis of the data collected from 241 participants. The findings have been divided into three sections which are; social demographic factors, knowledge on flood risks and risks avoidance, and knowledge on emergency preparedness. The percentages have been used to determine participants' knowledge on flood risks and risks avoidance, and participants' knowledge on emergency preparedness. Chi-square and Fishers Exact tests have been used to test the association of social demographic factors with knowledge of flood risks and emergency preparedness. Further, Chi-square Test have been used to test the association between risk awareness and emergency preparedness and a p-value of less than 0.05 has been considered statistically significant.

#### **4.1 Sample description**

All 241 sampled study participants participated in the study. This gave a 100% response rate. There was no missing data on the measured variables.

#### **4.2 Social-demographic description of the study participants**

A total of 241 participants participated in this study. The majority were women representing 67.6%. Most (40.7%) of the participants were of the ages ranging from 35-49 and majority (73.0%) were married while fewest (6.6%) were either widows or widowers. More than half (54.4%) of the participants had attended secondary school education and in general most (41.5%) were doing business. The study also revealed that most (31.5%) of the participants had 1-2 children by the time this study was conducted. Further, the study showed that the majority (63.5%) of the participants were living in rental houses while the fewest (1.7%) were those staying in friend's houses.

**Table 1: Social demographic characteristics of the participants**

<b>Variable</b>	<b>CATEGORIES</b>	<b>Frequency</b>	<b>Percentages</b>
<b>1. Gender</b>	Male	78	32.4%
	Female	163	67.6%
<b>2. Age</b>	18-24	21	8.7%
	25-34	82	34.0%
	35-49	98	40.7%
	50-64	34	14.1%
	65 and above	6	2.5%
<b>4. Marital status</b>	Never married	30	12.4%
	Married	176	73.0%
	Divorced	19	7.9%
	Widow/widower	16	6.6%
<b>5. Educational background</b>	No formal	18	7.5%
	Primary	70	29.0%
	Secondary	131	54.4%
	Tertiary	22	9.1%
<b>6. Occupation</b>	Employed	38	15.8%
	Business	100	41.5%
	Farming	14	5.8%
	Just staying	89	36.9%
<b>7. Number of children</b>	None	37	15.4%
	1-2	76	31.5%
	3-4	69	28.6%
	5 and above	59	24.5%
<b>8. House ownership</b>	Family house	76	31.5%
	Renting	153	63.5%
	A friend's house	4	1.7%
	Just keeper of the house	8	3.3%

Generally, most (40.7%) of the participants in this study were of the ages ranging from 35-49 years followed by (34.0%) from 25-34 years. This study also revealed that 78% of participants from these two age groups had either secondary or tertiary level of education. Similarly, 84% of the participants who were either employed or doing businesses, were found to belong from these two age groups respectively. Other studies have found an association between age with emergency preparedness outcome (Xu *et al.*, 2015). Contrary to this, Fishers Exact Test revealed no statistically significant association between age with emergency preparedness (Fishers Exact test = 2.548, p-value = 0.613). See Table 2 below. Further, Chi-square Test showed no statistically significant association between age with knowledge of the flood risks (Chi-square test = 14.151<sup>a</sup>, df =12, p-value = 0.291). See Table 3 below.

**Table 2: Relationship between ages of participants with emergency preparedness**

Ages of participants	Does the participant think it is important to prepare for an emergency before flooding?				
	No	Yes	Total	Fishers Exact Test	p-value
18-24	0	21	21	2.548	0.613
25-35	3	79	82		
36-49	1	97	98		
50-64	1	33	34		
65 and above	0	6	6		
<b>TOTAL</b>	<b>5</b>	<b>236</b>	<b>241</b>		

**Table 3: Relationship between ages of participants with knowledge of the flood risks**

Ages of participants	Early warning signs of floods				Total	Chi-square Test	p-value
	I do not know	Heavy rainfall	Any type of rainfall of any duration	Continuous rainfall of more than 3 days			
18-24	0	6	2	13	21	14.151a	0.291
25-34	2	33	1	46			
35-49	1	31	2	64			
50-64	1	8	1	24			
Above 65	0	3	1	2			
<b>Total</b>	<b>4</b>	<b>81</b>	<b>7</b>	<b>149</b>			

### 4.3 Knowledge on flood risks and risk avoidance

There were seven questions which the study participants were asked on knowledge of the flood risks and risks avoidance.

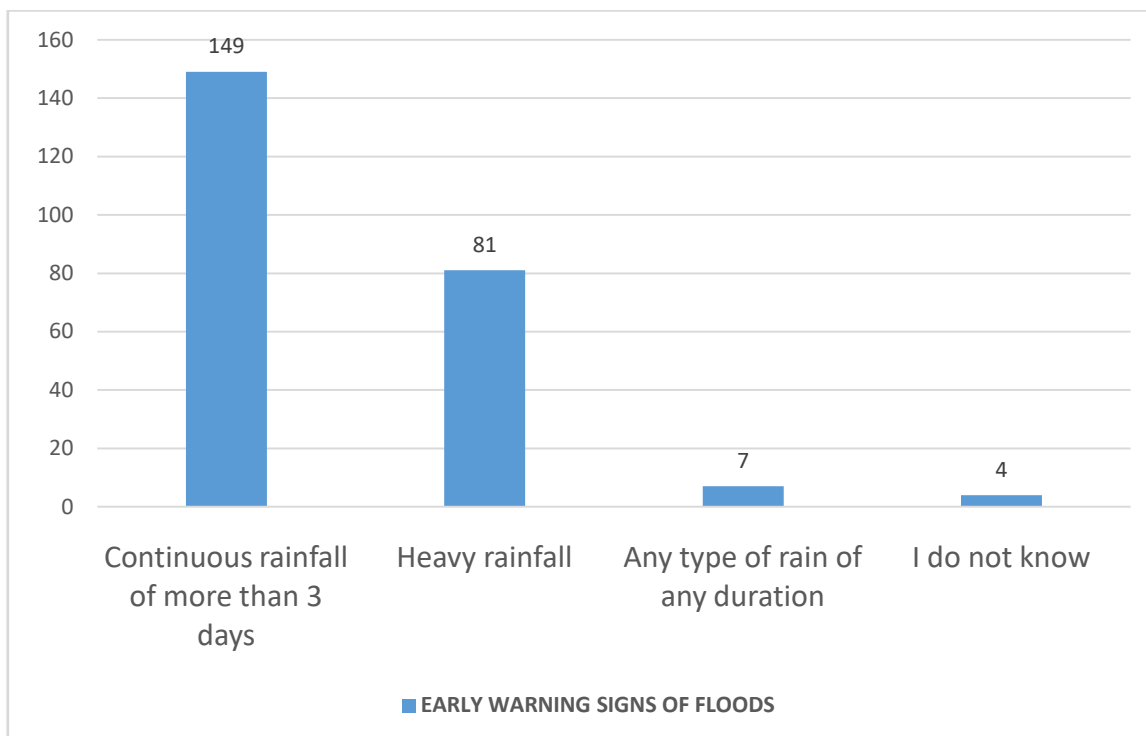
**Table 4: Knowledge on flood risks and risk avoidance among participants**

Variable	Categories	Frequency	Percentages
1. Experience with Floods	No	90	37.3%
	Yes	151	62.7%
2. Early warning signs of floods	I do not know	4	1.7%
	Heavy rainfall	81	33.6%
	Any type of rain of any duration	7	2.9%
	Continuous rainfall for more than 3 days	149	61.8%
3. Action to be taken in case of another flood	Building strong houses	4	1.7%
	I do not know	28	11.8%
	Moving to a safer place	173	71.8%
	Inform government officials	13	5.4%
	Improving drainage system	20	8.3%
	Leveling the ground	1	0.4%
	Putting sand bags	1	0.4%
	Informing landlords	1	0.4%
4. Where the participant got the information on floods	Neighbors	16	6.6%
	Newspaper	7	2.9%
	On Radio	144	59.8%
	Television	74	30.7%
5. The kind of information received	Alerts on possibility of floods	149	61.8%
	Announcing and showing affected area and flood effects	51	21.2%
	People telling us their experiences with floods	1	0.4%
	Warning to move to safer places	13	5.4%
	Giving weather updates	19	7.9%
	They tell us nothing	6	2.5%
	Telling us on safety measures	2	0.8%
6. Flood effects reduction	Nothing can be done	5	2.1%
	Renovating houses	10	4.1%
	Putting sand bags	20	8.3%
	Improving drainage system	156	64.7%
	Permanent move to safer place	50	20.7%
7. What prevents participants to move to safer place during floods	The house is not mine	10	4.1%
	Continuous and heavy rainfall	2	0.8%
	Difficult to find houses in safer places	30	12.4%
	Financial problems	44	18.3%
	I have nowhere to go	7	2.9%
	I am comfortable here	23	9.5%
	I have a lot of properties	8	3.3%
	Nothing I can do	117	48.5%

The majority (62.7%) of participants reported to have experienced floods and 61.8% of participants cited continuous rainfall of more than 3 days being the major cause of floods in the city. This indicated an association between experiencing floods with knowledge of flood risks. However, Fishers Exact Test showed that this association was not statistically significant (Fishers Exact Test 1.034, p-value 0.800). See Table 5.

**Table 5: Relationship between flood experiences with knowledge of early warning signs of floods**

Early warning signs of floods	Experience with floods				
	No	Yes	Total	Fishers Exact Test	p-value
I do not know	2	2	4	1.034	0.800
Heavy rainfall	32	49	81		
Any type of rain of any duration	3	4	7		
Continuous rainfall of more than 3 days	53	96	149		
<b>TOTAL</b>	<b>90</b>	<b>151</b>	<b>241</b>		



**Figure 2: Participants' knowledge on the early warning signs of floods**

**Table 6: Knowledge on emergency preparedness**

There were 9 questions which the study participants were asked on knowledge about emergency preparedness.

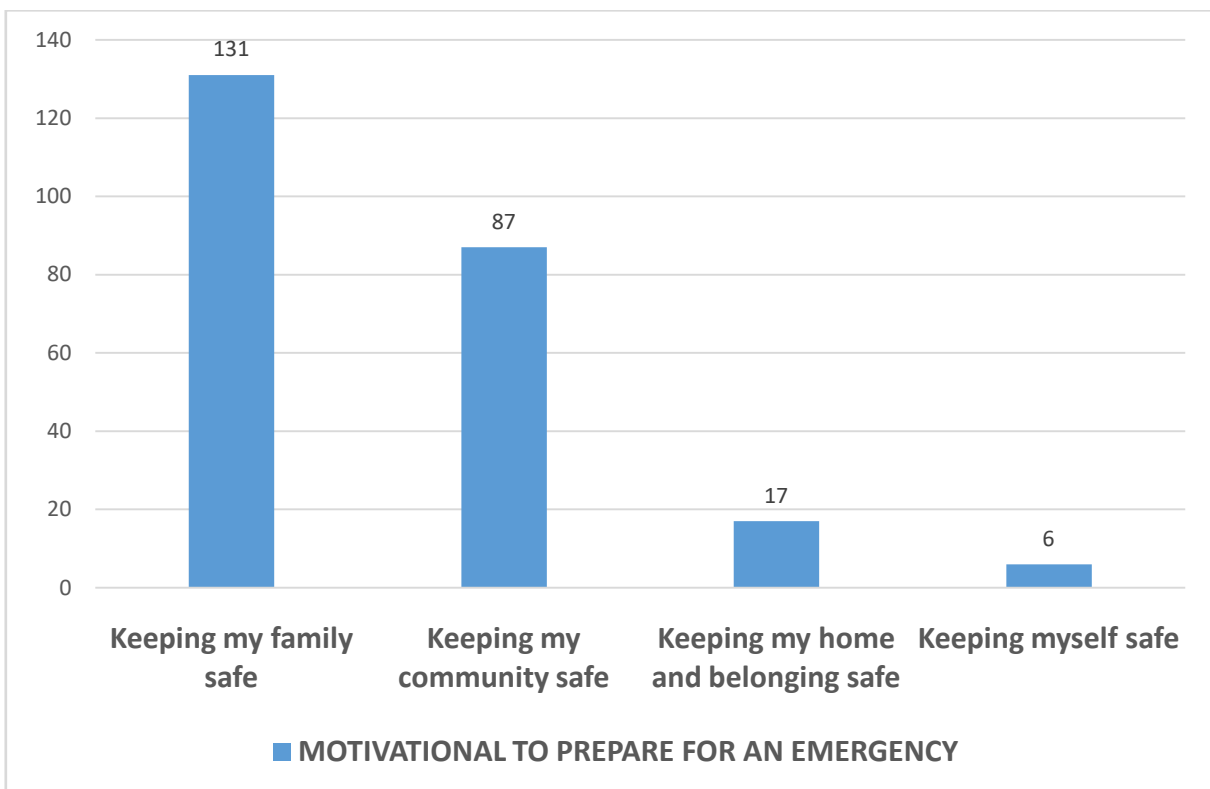
Variable	Categories	Frequency	Percentages
1. Does the participants think it is important to prepare for an emergency before flooding	No	5	2.1%
	yes	236	97.9%
2. How to prepare	Sand bags	13	5.4%
	Avoid building in affected areas	6	2.5%
	Being alert	10	4.2%
	Collaborating with government officials	5	2.1%
	I do not know	6	2.5%

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	Improving drainage system	143	59.3%
	It is not important	1	0.4%
	Moving to safer place	20	8.3%
	Planting trees	36	14.9%
	Renovating houses	1	0.4%
3. Motivational to prepare for an emergency	Keeping family safe	131	54.4%
	Keeping myself safe	6	2.5%
	Keeping my home and belonging safe	17	7.1%
	Keeping community safe	87	36.1%
4. Reason for lack of preparation for an emergency	It seems like a waste of time	12	5.0%
	Lack of knowledge about emergency plans	148	61.4%
	Lack of exposure to emergency issues	52	21.6%
	I do not have interest and time	29	12.0%
5. Available material in case of an emergency	Torch	146	60.6%
	First aid kit	9	3.7%
	Suitcase/ sealable container	68	28.2%
6. Available means of transport in case of an emergency	None	68	28.2%
	Bicycle	91	37.8%
	Personal car	27	11.2%
	Public transport e.g. bus	6	2.5%
	Private transport e.g. Tax	49	20.3%
7. Whom to collaborate with during floods	Friends	13	5.4%
	Partner	73	30.3%
	Neighbors	66	27.4%
	Government	89	36.9%
8. Greatest concern during floods	Death of family member	191	79.3%
	Losing my house	35	14.5%
	Losing my job	1	0.4%
	Losing belonging	14	5.8%
9. What can prevent the participant from leaving the house during floods	Thieves	82	34.0%
	Damage to my properties	114	47.3%
	Old people in the house	45	18.7%

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The majority (97.9%) of participants acknowledged the importance of preparing for an emergency before flooding. On how to prepare for an emergency, more than half (59.3%) of participants reported improving the drainage system being the best method of preparing for an emergency. This showed lack of knowledge on emergency preparation. Further this study revealed that the majority (60.6%) of participants had a torch as a material available at home in the case of an emergency. This study also found out that more than half (54.4%) of participants are motivated to prepare for an emergency by their desire to keep families safe.



**Figure 3: What motivates participants to prepare for an emergency**



**Table 7: Association between risk awareness and emergency preparation**

<b>Early warning signs of floods</b>	<b>Does the participant think it is important to prepare for an emergency before flooding</b>			<b>Chi-square Test</b>	<b>p-value</b>
	<b>No</b>	<b>Yes</b>	<b>Total</b>		
I do not know	2	2	4	47.088 <sup>a</sup>	0.000
Heavy rainfall	0	81	81		
Any type of rain of any duration	0	7	7		
Continuous rainfall of more than 3 days	3	46	149		
<b>Total</b>	<b>5</b>	<b>236</b>	<b>241</b>		

Interestingly, this study found out that the majority (97.9%) of participants knew the importance of preparing for an emergency and 61.8% of participants had knowledge of the early warning signs of floods. This showed an association between preparing for an emergency with knowledge of the flood risks. This association was proved to be statistically significant by Chi-square Test = 47.088<sup>a</sup>, p-value 0.000.

### **Summary of the results**

The study findings revealed that the majority (67.6%) of study participants were females. Further, the findings showed that most (40.7%) of the study participants were of the ages ranging from 35-49 years. However, the findings showed no statistically significant association between age with risk awareness and emergency preparedness when tested using Chi-square and Fishers Exact tests respectively.

Furthermore, the study findings showed that the majority (62.7%) of study participants had experienced flooding and the results indicated that the majority (61.8%) of study participants had knowledge of the flood risks. The majority (71.8%) reported moving to a safer place as a means of avoiding flood risks. However, the findings of this study showed that people do not have knowledge of emergency preparedness despite having knowledge of the flood risks. This observed association was tested to be statistically significant (Chi-square test p-value = 0.000).

## CHAPTER FIVE

### 5.0 DISCUSSION OF RESULTS

This chapter interprets and discusses the findings of the study on; assessing risks awareness and emergency preparation among people in the flood prone areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi. This is with reference to the existing knowledge as done by other studies in various places.

#### **Social demographic characteristics of the participants**

##### **Gender**

The percent distribution of households by sex of the head of house hold is 75.8% males and 24.2% females in urban areas of Malawi (NSO, 2015). In this study, there were many females participants 67.6% (n=163) compared to males. Culturally in Malawian settings, women are more often found at home as they are expected to take care of the homes including children. A study in Bangladesh found out that vulnerability and loss of life during disasters are more among women due to their status in the society (Mohammad-pajoooh and Ab. Aziz, 2014). Further, a study in China found out that gender was associated with poor emergency preparedness outcome (Xu *et al.*, 2015). However, the effects of gender on emergency preparedness cannot be generalized as there are other factors like level of education, culture and socio economic status of women which can influence their knowledge on risks and risks avoidance including their ability to prepare for an emergency.

##### **Age**

Most (40.7%) of the participants in this study were of the ages ranging from 35-49 years. This age group is the most active and has influence on the development of the area. Other studies have found out that older people are generally less prepared and more vulnerable in case of natural disaster. Contrary to this, King, 2001 found out that older people seem to be more aware of the surrounding and more experienced hence they have ability to overcome disaster outcome more effectively (Mohammad-pajoooh and Ab. Aziz, 2014). In China, age was found to be associated with good emergency preparedness outcome (Xu *et al.*, 2015). In support of

this, a study in Kenya revealed the association between age with awareness and use of traditional flood knowledge (Nyakundi *et al.*, 2010). However, this study found out that there was no statistically significant association between age with flood risk awareness ( $X^2$  14.151<sup>a</sup>, df 12, P value = .291). Further, contrary to the finding in China and Kenya, this study showed no statistically significant association between age with emergency preparedness (Fishers Exact Test = 2.548, p-value = 0.613).

### **Risks Awareness**

This study showed that 62.7% of study participants had experienced floods. Further, the study findings showed that majority (61.8%) of study participants had knowledge of flood risks. Other studies have revealed that past experience increases the preparedness for natural disasters since it influences people to gain information. However, there is a variation in level of awareness in disaster affected areas, with the extreme areas having high percentages. This variation could be due to the impact, the total number of people affected and the length of residence of people in affected areas. In USA awareness among people affected by hazardous weather was found to be 92%. (Sherman-morris, 2013). Similar to this, in Western Kenya, 83% of people were found to be aware of the possibility of floods (Nyakundi *et al.*, 2010).

### **Risk avoidance**

One of the important element in flood prone areas is to know the necessary measures people are ready to take to mitigate the outcome of floods. In this study 71.8% of study participants indicated moving to a safer place being the necessary action. Contrary to this, in Kenya it was found out that 82.8% of people were reluctant to permanently vacate flood prone areas. However, the differences in study setting between this study which was conducted in a city and a study in Kenya which was conducted in a rural area could contribute to the differences in findings. Some of the factors which could contribute to the differences in study findings include; house ownership and lengthy of residence in an area (Xu *et al.*, 2015). House ownership was found to be related to perceived risk and owing a property results in higher levels of perceived risk than renting a residence (Kellens, Terpstra and De Maeyer, 2013). This study found out that, 63.5% of the respondents were renting homes.

In addition, the study in Kenya found out that length of residence in the area is associated with awareness and use of traditional flood knowledge (Nyakundi *et al.*, 2010). However, this study did not find out on the length of residence for each participants but generally in cities and urban areas, people often move from one location to another unlike in rural areas this could contribute to high flood awareness and risks avoidance in rural areas compared to urban areas.

### **Knowledge of emergency preparedness**

In this study, 97.9% of participants reported that it was important to prepare for an emergency before flooding. However, respondents had different opinions on how best they can prepare which showed a lack of knowledge about emergency preparation. Further, none of the respondents in this study mentioned having essential emergency supplies like ‘an emergency kit’ as a means of preparing for an emergency. A study in China also revealed that people are generally not prepared for an emergency with lack of awareness and knowledge about emergency being the main reasons.(Xu *et al.*, 2015). Similarly, in Latin America it was found that people knew that it was important to prepare for an emergency but they did not know how to prepare (Burke, Bethel and Britt, 2012).

Other studies have found out that Knowledge about an emergency, was associated with emergency preparedness outcome (Xu *et al.*, 2015). In support of this, this study also found out that there was a statistically significant association between risk awareness and emergency preparedness (p-value = 0.000). This then call upon the importance of partnership and collaboration with various stakeholders in educating the community on emergency preparation to facilitate awareness and enhance knowledge on emergency preparation.

The other important factor in awareness is finding the most effective means of disseminating information. In this study 59.8% of the respondents cited radio being the mostly used media source. This means that utilizing the radio in disseminating information on emergency preparation in Mzuzu City will help to reach many people compared to televisions and newspapers. However, other studies found that perception and vulnerability- reducing behaviors, were associated with social networks which are the key information sources for

warning and evacuation than through mass media (Rufat *et al.*, 2015). Therefore a combination of different means of disseminating information might help to reach many people prior to floods and might help in mitigating the outcome.

Identifying motivational factors to emergency preparedness among people is equally important as it has an influence on people's ability to prepare. This study found out that 54.4% of study participants were motivated by keeping their families safe. In support of this, in Latin America it was found that 91% of people are motivated by keeping their homes and belonging self (Burke, Bethel and Britt, 2012). What motivate people varies depending upon values and beliefs that people have. These need to be considered in all settings. However this study did not find out on people's beliefs and values and an exploratory study can be done to explore people's beliefs and values in emergency preparation.

#### **Association between risk awareness and emergency preparation**

Chi-square test was done to test the association between risk awareness and emergency preparedness. The test revealed a statistically significant association between risk awareness with emergency preparedness. In China it was similarly found that there was significant association between preparedness outcome and individual knowledge and attitude (Xu *et al.*, 2015). However in this study the association between risk awareness and altitude was not done, but it is equally important to be extensively studied and taken in consideration for effective outcome. Knowledge and altitude are regarded as key drivers in human behavior. This was also emphasized in the behavioral theory; Theory of Rational Action where by an individual might choose not to take any action despite the known risk influenced by altitude.

In summary, generally people in Mzuzu City are not prepared for an emergency during flooding despite having knowledge of the known flood risks. Suggestion to facilitate emergency preparedness awareness among people in the city could help to enhance emergency preparedness ability among individuals in the city. This could help to mitigate the effects of floods. A follow up longitudinal study could also be conducted to measure the impact of emergency preparedness awareness.

## CHAPTER SIX

### 6.0 CONCLUSION AND RECOMMENDATIONS

#### 6.1 Conclusion

People in Mzuzu city are not prepared for an emergency during floods. This was revealed in this study by a lack of common understanding on how to prepare for an emergency. Despite 62.7% of study participants reporting experiencing flooding, 59.3.7%% reported improving drainage system being the best approach in preparing for an emergency. This showed lack of understanding on emergency preparation. Therefore, suggestion to promote emergency preparedness awareness among individuals in the city could help to mitigate flood effects.

#### 6.2 Recommendations

The findings of this study revealed some important factors which need to be reviewed and implemented in managing flood effects in Mzuzu City.

##### **Mzuzu City Council to:**

- Facilitate the implementation of a Disaster Risk Management plan. This is a comprehensive plan which is planned to address all the important areas of disaster management which include: Awareness and education initiatives, preparedness/prevention initiatives, and disaster mitigation priorities. This will help to prevent occurrence of major injuries and illnesses hence reducing mortality and morbidity.

##### **Policy**

- Mzuzu City Council to develop policies and standards from the various approaches in the disaster risk management plan. This will include: community awareness and education, preparedness/prevention and mitigation, and management and coordination. This will ensure uniformity during dissemination of information and will enhance a common understanding among people in the community.

**Research**

- To conduct an interventional study, as a follow up study to assess the impact of the implemented awareness programs.
- To conduct a similar study but on a large scale which will help to generalize the findings to other settings.

**The researcher will**

- Assists where required in community awareness and education mainly in areas health and hygiene.
- Assists in developing policies and standards in emergency preparedness. The policies and standards will ensure uniformity during awareness program and will promote a common understanding among the individuals in the community.

**6.3 Limitations and mitigation of the study**

There are several limitations to this study:

The study adopted a cross-sectional study design, hence was only able to establish the association between risk awareness and emergency preparedness through its cross-sectional design. There is need therefore for a longitudinal study which will help in establishing the causal inference between flood risk awareness and emergency preparedness.

Secondly, the findings of this study cannot be generalized to other settings since it only focused in the two townships in Mzuzu City which are located in the Northern part of Malawi. Further, in one of the township (Chiputula), sampling of the blocks was not done during data collection hence there was no representativeness of the study unit.

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**APPENDICES****Appendix I: Structured Questionnaire English Version****RISK AWARENESS AND EMERGENCY PREPAREDNESS AMONG PEOPLE IN  
THE FLOOD PRONE AREAS OF CHIBAVI AND CHIPUTULA, MZUZU, MALAWI****Section one****A. Social demographic factors**

## 1. Gender:

- a) Male
- b) Female

## 2. Age

- a) 18-24
- b) 25-34
- c) 35-49
- d) 50-64
- e) Above 65

## 3. Marital status

- a) Never married
- b) Married
- c) Divorced
- d) Widow/widower

## 4. What is your education background?

- a) No formal
- b) Primary
- c) Secondary
- d) Tertiary

5. What is your occupation?
- a) Employed
  - b) Business
  - c) Farming
  - d) Just staying
6. How many children do you have
- a. None
  - b. 1-2 children
  - c. 3-4 children
  - d. 5 and above
7. Who is the owner of the house you are staying in?
- a. Family House
  - b. Renting
  - c. A friend's house
  - d. Just keeper of the house

## Section two

### **B. Knowledge on floods risks and risks avoidance**

8. Have you had an experience with floods
- a) No
  - b) Yes
9. What are the early warning signs of floods?
- a) I do not know
  - b) Heavy rainfall
  - c) Any type of rain of any duration
  - d) Continuous rainfall for more than 3 days
10. What will you do if there is another flood?  
.....

11. Where did you get information on Floods?

- a) Neighbors
- b) Newspaper
- c) On radio
- d) Television

What information did you receive?

.....

12. What do you think should be done to reduce flood effects in your area?

- a) Nothing can be done
- b) Renovating houses
- c) Putting sand bags
- d) Improving drainage system
- e) Permanent move to a safer place

13. What prevents you from moving to a safer place during floods

.....

**Part three**

**C. Knowledge on emergency preparedness**

14. Do you think it is important to prepare for an emergency before flooding?

- a) No
- b) Yes

How would you prepare?

.....

15. If yes what can motivate you to prepare?

- a) Keeping my family safe
- b) Keeping myself safe
- c) Keeping my home and belonging safe
- d) Keeping community safe

16. What do you think is the main reason for the lack of preparation for an emergency?

- a) It seems like a waste of time
- b) Lack of knowledge about emergency plans
- c) Lack of exposure to emergency issues
- d) I do not have interest and time

Other.....

17. What do you have which can help you in case of an emergency during floods?

- a) Torch
- b) First aid kit
- c) Bicycle/ car
- d) Suitcases/ sealable containers

Others.....

18. What available means of transport do you have in case of an emergency?

- a) None
- b) Bicycle
- c) Personal car
- d) Public transport e.g. bus
- e) Private transport e.g. Tax

19. Whom do you think you can collaborate with during floods?

- a) Friends
- b) Partner
- c) Neighbor
- d) Government

20. What is your greatest concern during floods?

- a) Death of a family member
- b) Losing my house
- c) Losing my Job
- d) Losing belongings

21. What do you think can prevent you from leaving the house?

a) Thieves

b) Damage to my properties

c) Old people in the house

Other.....

**Appendix II: Research Questionnaire (Tumbuka Version)**

**KUMANYISIKIKA NA KUNOZGEKELA PANGOZI ZAKWIZA MWAZIZIZI  
PAKATI PA BANTHU BA KUMALO GHA VYOFYO VYA MAJI YAKUSEFUKIRA  
MUMALO YA CHIBAVI NA CHIPUTULA MUMUSUMBA WA MZUZU KU  
MALAWI**

**Chigaŵa chakwamba**

1. Mwanalume/Mwanakazi

- a. Mwanalume
- b. Mwanakazi

2. Vyaka

- a) 18 mpaka 24
- b) 25 mpaka 34
- c) 35 mpaka 49
- d) 50 mpaka 64
- e) Kujumpha 65

3. Muli pa nthengwa

- a) Nindatengwepo
- b) Nili panthengwa
- c) Nthengwa yili kumala
- d) Ndine chokolo

4. Kasi masambilo yinu ghali uli?

- a) Nindasambilepo
- b) Kupulaimale
- c) Kusekondale
- d) Ku sukulu ya pachanya panji koleji

## 5. Kasi mukugwirantchitouli?

- a) Nili pa ntchito m'boma panyake pa kamupani
- b) Nkhuchita malonda
- c) Nkhulima
- d) Khukhala waka

## 6. Mulinaŵanaŵalinga?

- a) Nilije
- b) Yumoza panjiŵa ŵiri
- c) Ŵatatu panji ŵanayi
- d) Ŵankhonde panjikujumpha pa ŵankhonde

## 7. Mwenechowanyumbaiyomukukhalamoninjani?

- a) Njithu panjiya banja
- b) Njakulipira
- c) Njamubwezi wane
- d) Tikusunga waka

**Chigaŵa chachiŵiri****B. Kumanyisyika za maji yakusefukila na njowa za kujithasyila**

## 8. Kasi mulikukhwasyikaponachofyo cha majiyakusefukila?

- a) Yayi
- b) Enya

## 9. Kasi vimanyikwilovyakwambavyakusefukilakwamajinivichi?

- a) Nkumanya yayi
- b) Mvula ya nkhongono
- c) Mvula yiliyose napanyengo yiliyose
- d) Mvula yamuswera ya kujumpha madazi yatatu



10. Kasi muzamuchitapochipalakwa wasokusefukilakwamaji?  
 .....

11. Mukuwutolankhuuthengawakusefukilakwamaji?

Kuwazengezani

Nyuzipepala

Wailesi

Pakanema

Kasi mukupokela uthengauli  
 .....

12. Kasi mukughanaghana kutimasuzgo agho ghakwiza na kusefukila kwa maji  
 tingayachepesauli?

a) Palije icho tingachitapo

b) Kunozgaso nyumba

c) Kuwika muchenga mu mathumba

d) Kunozga migelo ghakujumphamo maji

e) Kusamukila kumalo yambula chofyo na kukahazikakuko

13. Kasi ntchivichichikumutondesyanikusamukilakumaloyambulachofyo pa nyengo  
 Yakusefukilamaji?  
 .....

### **Chiga wa chachitatu**

#### **C. Mukumanyapo vichi pakunozgekela ngozi zazizizi**

14. Mukughanaghanakutintchakuzirwakunozgekela kusefukilakwamajikwazizizi?

a) Yayi

b) Enya

Kasi munganozgekela uli  
 .....

15. Pala nienyachingamuchiskanintchivichi?

- a) Nkhupwelera banja lane
- b) Kujipwelera
- c) Kupwelelera nyumba nakatundu
- d) Kupwelelera chigawa

16. Kasi mukughanaghanakutintchifukwaulichikumutondezganikunozgekelangoziza majiyakusefukira?.

- a) Kukuwoneka ngeti khutaya waka nyengo
- b) Kuleka kumanya
- c) Kuleka kuwa na mwaŵi wakumanya uthenga wangozi za maji
- d) Nilije khumbilo nanyengo

Vinyake.....

17. Kasi mulinavichiichochoingamuvwilanipanyengoyamajiyakusefuki

Lamwazizizi?

- a) Nyali
- b) Wovwili wakwamba pa nyengo ya ngozi
- c) Njinga panyake galimoto
- d) Vikwama panyake vipangili nyakuti maji yaleke kunjira

Vinyake.....

18. Kasi mulinanthowauliyakayendelo pa nyengoyangoziyakusefukilakwamaji

mwazizizi?

- a) Palije
- b) Njinga
- c) Galimoto yithu
- d) Matola ngeti kukwera basi
- e) Hayala ngeti taxi

19. Ninjaniuyomukughanaghanakutimungakolelaniko pa nyengoyakusefukilakwa maji?

- a) Wabwezi
- b) Mabungwe
- c) Muzgengezani
- d) Boma

20. Kasi chomenmenentchivichiichochikumuwofyani pa nyengoyakusefukilamaji?

- a) Nyifwa ya mubale
- b) Kuwa kwa nyumba
- c) Kumala kwa ntchito
- d) Kunangika kwa katundu

21. Kasi mukughanaghanakutichingamutondeskanintchivihikufumamomunyumba?

- a) Bankhungu
- b) Kunangika kwa katundu
- c) Wachekulu mu nyumba

Vinyake.....

**Appendix III: Informed Consent (English Version)****MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES****DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS CONSENT FORM**

<b>ID NO</b>	<b>HD/MUH/M.262/2016</b>
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Consent to participate in a study: **ENTITLED: ASSESSING RISK AWARENESS AND EMERGENCY PREPAREDNESS AMONG PEOPLE IN THE FLOOD PRONE AREAS OF CHIBAVI AND CHIPUTULA. MZUZU, NORTHERN MALAWI.**

Name: **Chimwemwe Chawezi Munthali**

**Purpose of the Study**

The purpose of this study is to assess the risk awareness and emergency preparedness among people in the flood prone areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi.

**What Participation Involves**

The participation in this study will require you to find time to answer questions which will be asked by the interviewer from a provided questionnaire in a face to face interview. During the interview, you are also free to ask for clarifications whenever necessary.

**Confidentiality**

The information given and records of this study will only be used for the intended purpose only. Records of this study will be safely kept and will only be available to individuals and organisations which are willing to help to fulfill the intended purpose for a period of 5 years.

**The right to anonymity**

Names of participants will not be written on the questionnaire. Each participant will have a code which will be written on the answered questionnaire. This means no one will be able to

recognize the participants of this study. The identity of the participants will also remain anonymous during report writing and publication.

**Risks**

Participants in this study will be required to spend about 15 to 20 minutes to answer the questionnaire. Some of the questions in the questionnaire might require you to give personal information which might cause some discomfort but be assured that the information given will be confidential.

**Rights to withdraw**

Participants in this study have the right to discontinue from the study at any time without penalty or loss of benefits to you, your family or the community as a whole.

**Benefits**

Findings from this study will help in identifying gaps on flood risks awareness and on emergency preparedness at the community level. Therefore the study findings will help in coming up with scientifically proven interventions which will target the whole community.

Furthermore, there will be no financial advantages or rewards for participating in this study. This means that you will not get anything in form of money or material for participating in this study.

**Compensation**

There will be no compensation of any form from the injury encountered from the study. The injury might be fatigue, fear or waste of time. However be assured that the researcher and the research assistants will try all the available means to minimize these harmful situations punctuality, respect of respondents time and privacy.

**Who to contact**

In case you might need more clarifications or any additional information concerning this study, you may contact the principal researcher on mobile: +265 888 892 378, +255 689 245 776 or email: [munthalichawezi@yahoo.com](mailto:munthalichawezi@yahoo.com). Furthermore, if you have questions related to this study, you can contact the Director of Research and Publications at: +255-22-215489 or +255-22-2150302/6 EXT: 1016 or email: drp@muhas.ac.tz.

I \_\_\_\_\_ have read and understood the contents of this form, my questions have been answered, and I consent to participate in this study.

Signature of participant \_\_\_\_\_

Signature of researcher \_\_\_\_\_

Date of signature \_\_\_\_\_

**Appendix IV: Informed Consent (Tumbuka Version)****MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES****DIRECTORATE OF RESEARCH AND PUBLICATIONS, MUHAS CONSENT FORM**

<b>ID NO</b>	<b>HD/MUH/M.262/2016</b>
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Chizgomerezgo cha kutola nawo lyande mukafukufuku: **MUTU WA KAFUKUFUKU: KUWONA VYA KUMANYISYIKA NA KUNOZGEKELA PANGOZI ZAKWIZA MWAZIZI PAKATI PA BANTHU BA KUMALO GHA VYOFYO VYA MAJI YAKUSEFUKILA MU MALO YA CHIBAVI NA CHIPUTULA MUMUSUMBA WA MZUZU KU MALAWI.**

Dzina: **Chimwemwe Chawezi Munthali**

**Chakulinga cha Kafukufuku**

Chakulinga cha kafukufuku uwu ni kuwona vya kumanyiskika na kunozgekela pangozi zakwiza mwazizi pakati pa banthu ba kumalo gha vyofyo vya maji yakusefukila mumalo ya Chibavi na Chiputula mumusumba wa Mzuzu ku Malawi.

**Kasi Kutolapolyande mu Kafukufuku uwu Kukhwasye vichi**

Kutolapolyande mu kafukufuku uwu kukhumbenge imwe kusanga nyengo na kuzgola mafumbo agho wakufufuza wamufumbaninge pamaso na pamaso. Kweneso pa nyengo iyo wamufumbaninge mafumbo, muna ufulu wakufumbisya apo mundapulikisye.

**Kusunga chinsisi**

Uthenga wose uwu upelekekenge mukafukufuku uwu na kasungilo kake, uzamugwira ntchito pakukwanilisa chakulinga cha kafukufuku pera. Uthenga wose uzamusungika pa malo ya wemi ndipo uzamupelekeka Kwa wanthu na mabungwe agho ghangakwanilisa kufisya chakulinga cha kafukufuku uwu kwa vilimika vikhonde.

### **Ufulu wambula kuphala zina**

Mazina ya wose awo watolengepo lwande mu kafukufuku aka yalembengenge yayi pa chipepala cha mafumbo. Ichi chikungánamula kuti paliye uyo wazamumanya za waliyose uyo watolapo lyande. Kuleka kusindikizga mazina kuzamupitilira na panyengo ya kupeleka ma lipoti na kusindikizga za kafukufuku.

### **Chofyo**

Wose awo watolengepo lyande pa kafukufuku uwu wanozgeke kuzakatola nyengo yakukwana mphindi 15 kufika 20 na wakufufuza kuti wazakazgole mafumbo. Mafumbo yanyake yazamukhumba imwe kupeleka vyamuchindindi vya moyo winu, ivyo vingazapangisya imwe kuleka kumaska kwene mumanye kuti uthenga wose uwo uzamupelekeka uzamusungika mwachinsisi.

### **Ufulu wakuleka kupitilizga nawo kafukufuku**

Wose awo wazamutolapo lyande pa kafukufuku uwu, wanaufulu wakuleka kupitilizga nawo kafukufuku pa nyengo yiliyose kwambula chilango panyeke kunoleka wowwiri kwa iyo, panyake banja lake panyake dela lose ilo wakukhala.

### **Uwemi wa kafukufuku uyu.**

Vyakusangika vya kafukufuku uwu vizamuwovwira kusanga chipelezgo chauthenga wa chofyo cha maji yakwiza mwazizizi na kunozgekela ngozi zakwiza mwazizizi mumadela. Vyakusangika mukafukufuku uwu vizamuvwira kusanga thowa zakuzomelezgeka na ba sayasi za kuvwirira wanthu mumadela yose.

Kweneso chakuti mumanye, mukafukufuku uwu paliye wowwiri wakukwasya ndalama panyake kalikose ako kangapelekeka kwa munthu chifukwa chakutola nawo lyande mukafukufuku.

### **Chipepesyo**

Mukafukufuku uwu, pazamuwezge chipepesyo chilichose icho chizamupelekeka Kwa munthu chifukwa cha vyakusangana navyo vyambula kunozgekela. Vyakusangana navyo ivyo awo wazamutolapo lyande mukafukufuku uwu ni ngeti; Kuvuka, mantha panyake kutaya nyengo.



Kwene mumanyisyike kuti wakufufuza mwenecho na wakuvwira kufufuza mbakunozgekela muthowa yiliyose kuchepesya vyofyo ivyi pakusunga nyengo, kweneso kumusangani imwe panyengo iyo ndimwe wambula kutagwanika kweneso malo yawemi.

**Kasi mungakumana na njani**

Panyake mungakhumba kupulikisya panyake uthenga uliwise wakusazgilapo wakukhwasya kafukufuku uwu, mungakumana na mwenecho wakafukufuku pa mafoni yake agha: +265 888 892 378, +255 689 245 776. Panyake mungamulembela melo pa adiresi iyi: [munthalichawezi@yahoo.com](mailto:munthalichawezi@yahoo.com).

Kweneso mungakhwasyana na mkulu wa kuwona vya kafukufuku na kusindikizga kwake (Director of Research and Publications) pa mafoni agha: +255-22-2152489, +255-22-2150302/6 Ext. 1016 panyake lembani melo pa adiresi iyi: [dpgs@muhas.ac.tz](mailto:dpgs@muhas.ac.tz).

Ine \_\_\_\_\_ na werenga nakupulikisya vyose ivo vyalembeka pa chipepala ichi, mafumbo yane yazgoleka, mwakuti nazomelezga kutolapo lyande pa kafukufuku uwu.

Saini ya wakutolapo lwande mukafukufuku \_\_\_\_\_

Saini ya wakufufuza \_\_\_\_\_

Dazi la Saini \_\_\_\_\_

## Appendix V: Letter for Ethical Clearance (MUHAS)

**MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES  
OFFICE OF THE DIRECTOR OF POSTGRADUATE STUDIES**

P.O. Box 65001  
DAR ES SALAAM  
TANZANIA  
Web: [www.muhas.ac.tz](http://www.muhas.ac.tz)



Tel G/Line: +255-22-2150302/6 Ext. 1015  
Direct Line: +255-22-2151378  
Telefax: +255-22-2150465  
E-mail: [dpgs@muhas.ac.tz](mailto:dpgs@muhas.ac.tz)

Ref. No. DA.287/298/01A/05

26th March, 2018

Ms. Chimwemwe Chawezi Munthali  
MSc. Critical Care and Trauma Health  
MUHAS.

**RE: APPROVAL OF ETHICAL CLEARANCE FOR A STUDY TITLED:  
"ASSESSING RISK AWARENESS AND EMERGENCY PREPAREDNESS  
AMONG PEOPLE IN THE FLOOD PRONE AREAS OF CHIBAVI AND  
CHIPUTULA IN MZUZU CITY, NORTHERN MALAWI"**

Reference is made to the above heading.

I am pleased to inform you that, the Chairman has, on behalf of the Senate, approved ethical clearance for the above-mentioned study. Hence you may proceed with the planned study.

The ethical clearance is valid for one year only, from 26th March, 2018 to 25th March, 2019. In case you do not complete data analysis and dissertation report writing by 25th March, 2019, you will have to apply for renewal of ethical clearance prior to the expiry date.

  
Dr. Emmanuel Balandya  
**ACTING: DIRECTOR OF POSTGRADUATE STUDIES**

cc: Director of Research and Publications  
cc: Dean, School of Nursing

## Appendix VI: Letter of Ethical Clearance (NHSRC)

Telephone: + 265 789 400  
Facsimile: + 265 789 431

All Communications should be addressed to:  
The Secretary for Health and Population



In reply please quote No. \_\_\_\_\_

MINISTRY OF HEALTH AND POPULATION  
P.O. BOX 30377  
LILONGWE 3  
MALAWI

3<sup>rd</sup> April, 2018

**Chimwenwe Chawezi Munthali**  
Muhumbili University  
Tanzania

Dear Sir/Madam,

**RE: Protocol 18/03/2011: Assessing Risk Awareness and Emergency Preparedness among People in the Flood-Prone Areas of Chibavi and Chiputula in Mzuzu City, Northern Malawi**

Thank you for the above titled proposal that you submitted to the National Health Sciences Research Committee (NHSRC) for review. Please be advised that the NHSRC has **reviewed** and **approved** your application to **conduct** the above titled study.

- **APPROVAL NUMBER** : 2011
- The above details should be used on all correspondences, consent forms and documents as appropriate.
- **APPROVAL DATE** : 03/04/2018
- **EXPIRATION DATE**  
This approval expires on 02/04/2019. After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the NHSRC Secretariat should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING:** All serious problems having to do with subject safety must be reported to the NHSRC within 10 working days using standard forms obtainable from the NHSRC Secretariat.
- **MODIFICATIONS:** Prior NHSRC approval using forms obtainable from the NHSRC Secretariat is required before implementing any changes in the protocol (including changes in the consent documents). You may not use any other consent documents besides those approved by the NHSRC.
- **TERMINATION OF STUDY:** On termination of a study, a report has to be submitted to the NHSRC using standard forms obtainable from the NHSRC Secretariat.
- **QUESTIONS:** Please contact the NHSRC on phone number +265 888 344 443 or by email on [mohdoccentre@gmail.com](mailto:mohdoccentre@gmail.com).
- **OTHER:** Please be reminded to send in copies of your final research results for our records (Health Research Database).

Kind regards from the NHSRC Secretariat.



For: **CHAIRPERSON, NATIONAL HEALTH SCIENCES RESEARCH COMMITTEE**  
Promoting Ethical Conduct of Research!



Executive Committee: Dr. B. Chilima (Chairperson), Dr. B. Nkhosho (Vice-Chairperson)  
Registered with the USA Office for Human Research Protections (OHRP) as an International IRBIRB  
Number IRB00003905 FWA00005976