

Maggie Ngwira

**Extreme Weather Events and the Urban-poor: Adapting to the Risk of Extreme
Weather Conditions and their Health Impacts**

A Case Study of Salima and Zomba, Malawi.



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Supervisor: Stig H. Jørgensen

Faculty of Social Sciences and Technology Management

Department of Geography



NTNU – Trondheim
**Norwegian University of
Science and Technology**

ABSTRACT

It has become more evident that the global climate is changing, and the intensity and frequency of it is on the increase. Urban areas in Malawi are vividly and increasingly vulnerable to climate change related extreme weather conditions. This study sought to explore how urban-poor communities in Salima and Zomba are adapting to the threat of extreme weather events (EWEs) and their various health impacts. It did this by 1) identifying the occurrence of EWEs and the consequent health impacts on women and children, 2) explaining the vulnerability and adaptive capacity (resilience) of the urban-poor communities to EWEs.

The basic assumption in this study was that changes in the natural, built and social environment have positive and/or negative influence on human health, however the human-environment relation is both creator and created in the process. The study employed the triangle of human ecology, risk theory and the structuration theory to frame the understanding of concepts and issues raised. With secondary quantitative data complementing the primary qualitative data, the study collected its primary data through semi-structured interviews, focus group discussions with both primary and key informants and observations.

The study concludes that in terms of type, frequency, areal extent, intensity and impact of EWEs, urban case areas in Malawi are indeed becoming the new target of EWEs like floods, strong wind and dry spells. Different relevant fatal and non-fatal bodily and psychosomatic diseases were identified to be somehow affected by the change in the environment, behaviour and population. Although the health problems identified are not exclusive to women and children, their susceptibility is heightened by the occurrence of EWEs. However, deeper structural problems of poverty, exclusion and lack of alternatives influence the level of exposure to EWEs, sensitivity to impact and capacity to absorb, cope with and adapt to the future risks. Invisible to the government and development actors and relying on ad hoc responses to disasters, urban-poor communities are least prepared and adapted. However, with proper planning, adequate investment and coordination, urban areas are capable of adapting to and reducing the risk EWEs as well as other types of risks.

Key words: *Malawi, extreme weather events, adaptive capacity, health, urban-poor*

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DEDICATION

To Jessy, Blessings and Bernard Jnr Ngwira; You make me brave.

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ABBREVIATIONS AND ACRONYMS

AFIDEP	African Institute of Development Policy
CADECOM	Catholic Development Commission in Malawi
CDC	Centers for Disease Control and Prevention
CPC	Civil Protection Committee
DHO	District Health Office
DoDMA	Department of Disaster Management Affairs
DRM	Disaster Risk Management
EWEs	Extreme Weather Events
FAO	Food and Agriculture Organisation of the United Nations
FISP	Farm Input Subsidy Programme
GoM	Government of Malawi
HSA	Health Surveillance Assistant
IPCC	Intergovernmental Panel on Climate Change
MESN	Malawi Electoral Support Network
MET	Malawi Meteorological Services Department
MGDS	Malawi Growth Development Strategy
MRCs	Malawi Red Cross Society
NAPA	National Adaptation Plan of Action
NGO	Nongovernmental Organisation
NSO	National Statistics Office
TA	Traditional Authority
PAI	Population Action International
OCHA	Office for the Coordination of Humanitarian Affairs
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UN-Habitat	United Nations Human Settlements Programme
VDC	Village Development Committee
WFP	World Food Programme

CHAPTER ONE

INTRODUCTION

1.1. Background of the study

Cities are increasingly being exposed to multiple stresses. These include; poverty, inadequate infrastructure, environmental degradation, urbanisation, poor land use planning, inadequate disaster management resources among others (Barata, Ligeti, De Simone et al. 2011; United Nations Economic Commission for Africa 2011). Along these threats Rosenzweig, Solecki, Hammer and Mehrotra (2011) and UN-Habitat (2011a) report that cities and towns are vividly and increasingly vulnerable to climate change related extreme weather conditions. Extreme weather events (EWEs) are occurrences of weather conditions that are above or below the defined observed range of the weather variable (Lavell, Oppenheimer, Diop et al. 2012). This includes intense heat, floods, increased precipitation, drought, strong cyclone and winds. The occurrence of EWEs has diverse effects on the human population; both directly and indirectly (ibid). With cities and towns being crucibles of development and of large concentration of people, the effects are rather severe (UN-Habitat 2011a). The Government of Malawi (2012) identifies the effects of EWEs being experienced in agriculture and food security, infrastructure, energy sources, livelihoods and human health. Human health, herein referring to the state of a person which allows the person to function to their fullest potential (Gatrell & Elliot 2009), is threatened by the transformations in the environment (UNECA 2011). Direct health impacts include injuries, diseases and deaths during extreme weather events. While indirect ones encompass nutritional, respiratory, conflict, water-related health problems (Barata et al. 2011; Schensul, Mkwambisi, Zhang et al. 2013).

However, GoM (2011), Rosenzweig et al. (2011) and UNECA (2011) elucidate that these health effects are not due to the changes caused by the EWEs per se, rather the changes amplify the current stresses and vulnerabilities in the affected community. That is, weather extremes combine with some or all other stresses leading to hazardous conditions. This agrees with the Intergovernmental Panel on Climate Change (2012) and Lavell et al. (2012) who state that the level and kind of impact on human and social systems depends on the degree of exposure, vulnerability to and magnitude of the extreme event.

ActionAid International (2006) reports that Malawi's experience with disasters caused by EWEs mainly traces back to the southern Africa drought of 1991/92 that caused the suffering

of over 6.1 million people. The National Adaptation Programmes of Action (NAPA) of the country recorded that the country is faced with increasing intensity, frequency and magnitude of extreme weather conditions among which are floods and droughts (GoM 2006). To which, the drought and subsequent famine of 2001/02, 2004/05 and the 2014/15 are considered as the worst devastating disasters the country has experienced (ibid; Government of Malawi 2015b). In the latter, heavy rain storms and floods caused severe damages, destroyed homes and infrastructure, displaced families, damaged crops and livestock for a total of 1, 101, 364 people in 15 districts: Chikwawa, Nsanje, Phalombe, Zomba, Rumphu, Karonga, Thyolo, Machinga, Mangochi, Ntcheu, Chiradzulu, Mulanje, Balaka, Salima and Blantyre (United Nations Disaster Assessment and Coordination 2015; World Food Programme 2015). At present, the country has declared a national state of national disaster following the El Niño induced prolonged dry spell (Department of Disaster Management Affairs 2016).

With reference to the 2009 earthquake in Karonga district and concurrent cases of stormy rains in Lilongwe city, the government of Malawi in its 2015 National Disaster Risk Management policy (2015a) declared that urban areas are at risk of hazards- weather-related ones, as are rural areas. Even though there is variation of exposure and vulnerability across spatial and social-cultural factors (IPCC 2012; Joshua, Jalloh & Hachigonta 2014), with 65% of the population living below the poverty line, and country's economy dependent on rain-fed agriculture, a majority of the country's population stands severely vulnerable to the threat of such extreme weather hazards (GoM 2012; AFIDEP-PAI 2012). However, with the least capacity to protect themselves as well as recover from both present and impending risks, the urban-poor are most poorly positioned (Barata et al. 2011; Joshua et al. 2014; UN-Habitat 2011a). Hence, are more vulnerable to EWEs and related material damages and losses, displacement and ill-health effects.

Sigh (2015) writes on India that the vulnerability of the urban-poor living in informal settlements, slums, peri-urban areas rests on the fact that they reside in high-risk areas, faulty shelters and have limited access to basic and emergency services. This resonates with WHO & UN-Habitat (2016) explanation that even though the urban-poor encompass a growing population vulnerable to climate change and related conditions, the assumed universal aggregated advantages of towns and cities obscures this fact. Furthermore, urban-poor communities stand invisible to both local and national authorities. In reviewing climate change adaptation research and policies in urban areas of Malawi, South Africa and Zimbabwe, Joshua

et al. (2014) established that there is no recognition for urban areas in climate change policy planning and interventions in most African countries; Malawi and the other two inclusive.

1.2. Statement and justification of problem

Even though Malawi is still in the early stage of urbanisation, its urban growth rate has been found to be higher than the national population growth rate (Joshua et al. 2014; Manda 2013). The growth is attributed to three factors: rural-urban migration, natural increase and reclassification of urban areas to include rural areas (Manda 2013). However, it is not uncommon for urban areas in the country to develop under no control of authorities like the local governments. Chome (2011) and Nkhoma and Jameson (2014) report that overshadowed by presumed affluent conditions, urban areas are predominant sites of stark inequalities that 75% of Malawi's urban population live in unplanned areas in appalling slum conditions. Besides this bloom of urban-poor population contributing to climate change through greenhouse gases emission, in developing countries like Malawi, it is rather the severe impacts caused by the occurrence of climate change manifested in EWEs that presents challenges (Chome 2011; UN-Habitat 2011a). While recognising the myriad of risk and vulnerability to urban-poor households and communities, Joshua et al. (2014) and AFIDEP-PAI (2012) advance that the socio-economic and political standing of women, children, the elderly and disabled renders them even more vulnerable.

Although the recent Climate Change Policy (GoM 2012; 2015b) makes mention of urban vulnerability, much of the adaptation and mitigation work by both the private and public sector still focuses on rural areas of the country. Seeing the skewed focus on rural areas over urban areas, and the lack of recognition for urban-poor areas, (Joshua et al. 2014) this study seeks to fill this gap by examining how the health of the most vulnerable: women and children, is affected, what influences their vulnerability to and how their urban-poor communities are responding to the shocks of climate eventualities. Set in Malawi the study employs two case studies from two urban areas of TA Kalonga and Sadzi ward in Salima (town) and Zomba (city) respectively. The intention to focus on women and children's health is motivated by reports from various studies: Mirza (2003) on Bangladesh, ActionAid (2006), AFIDEP-PAI (2012) and Pullanikkatil et al. (2013) on Malawi, that women and children are more vulnerable to climate change than men. The argument is that due to characteristics like age, gender and social roles, women and children are more likely to die and/or experience ill-health when EWEs strike.

1.3. Objectives and Research questions

The overall objective of this study is to examine how the health of the urban-poor (women and children) is affected by EWEs, what influences their vulnerability to EWEs and how they are adapting to the increasingly frequency, intensity and magnitude of EWEs.

The study is thus, driven by the following objectives:

1. Identifying occurrences of extreme weather events and their health effects on the urban-poor, with an intended focus on women and children' health.
2. Explaining the vulnerability of the urban-poor (women and children) to extreme weather events.
3. Assessing the adaptive capacity of urban-poor to EWEs and their health effects.

To fulfil the above objectives, the study will examine, explore and interpret its findings by responding to the following questions:

- i. What EWEs have occurred in the two study areas in past 10 years and in what manner?
- ii. How is the health of the urban-poor (women and children) affected due to the occurrence of EWEs?
- iii. In what ways are urban-poor communities vulnerable to the risk of EWEs and their impacts?
- iv. How are urban-poor communities responding to EWEs and their impacts? To what extent have the efforts contributed to building the adaptive capacity?

1.4. Organisation of the thesis

This thesis is organised in seven chapters. The first four chapters present the overview of the study background, concepts and theoretical framework, methodology and study areas. The other three are concerned with the discussion of study findings, closing with conclusions and recommendations.

Chapter One provides the introduction to the thesis; containing the study background, statement of problem, research objectives and questions and justification of the study, with the last part presenting the outline of thesis. Framed around the triangle of human ecology model, Chapter Two presents the theoretical and conceptual framework detailing the proposed basis of understanding and analysis of findings. Chapter Three gives a brief overview of the study area,

Malawi with particular focus on Salima (Traditional Authority Kalonga) and Zomba city (Sadzi ward), and the justification for the choice of the study areas. Chapter Four provides a detailed account of the methodology employed in the research including the research approach; selection and justification of research participants; sources of data, methods and techniques of collection; issues of positionality, reflexivity, data quality and ethical considerations.

Chapter Five presents analysis of the findings responding to objective one of the research. It is divided into two parts, with the first part dealing with identification of Extreme Weather Events occurring in the two study areas and discussion of the nature and pattern of the EWEs. The second part presents findings of the health impacts influenced by EWEs. Chapter Six deals with the discussion of findings relating to objective two and three. The first section presents an assessment of the vulnerability of urban areas to EWEs, while the second section examines the resilience of urban-poor communities to EWEs and their health impacts thereof. The last chapter; Chapter Seven, provides a general conclusion for the thesis by focusing on the major findings of the research, limitations faced during the study and recommendations for further research.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL FRAMEWORK

2.1. Introduction

“Without theory there is nothing to research” (Silverman in Kitchin & Tate 2000, 33). In qualitative research, theory delineates the context the study is situated (Glesne 2011). It defines the concepts to understand and explain a phenomenon; and the inter/relationships among them. Therefore, theory provides the perspective through which we see the world and the truth about the phenomenon, situation and activity in the research. Grbich (1999) further stresses that through theory, is the framework of research design, collection and interpretation of research findings. However, not one theory can and should be used to explain a phenomenon, as this is delimiting such as, it shuts down other avenues of meaning and relationships coming out in the research (Glesne 2011). This research thus employs the human ecology of disease, structuration theory, and related concepts to understand and explain how urban-poor communities-women and children, are affected by and adapting to health impacts of extreme weather events.

2.2. Extreme weather events and health

Extreme weather events (EWEs) are a manifestation of climate change i.e. an aspect of climate variability under stable or changing climate conditions. Climate change has been defined as “...alteration in the state of the climate that can be identified by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer” (IPCC 2012, 29). EWEs on the other hand are “...the occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable” (ibid, 30). These include: drought, flooding and storms. Both EWEs and climate change have been attributed to natural process and/or anthropogenic factors like land use, and lately, human-induced EWEs are seen to be on the rise (ibid; Oppong & Harold 2010). In this study, EWEs are described with reference to their frequency, intensity and magnitude, duration and areal extent of their occurrence (Adger 2006). Frequency describes how often the EWEs occurs; intensity and magnitude refers to EWE’s strength and severity; duration is how long an occurrence of EWE stays; and areal extent applies to the amount of area affected (Rodrigue 2003; United States Environmental Protection Agency 2016). When these extreme events affect elements of the human system adversely,

they become a hazard i.e. the potential occurrence of natural or human induced physical event that may cause human impact like loss of life, injury or property damage (IPCC 2012).

These changes have several direct and indirect effects causing stress on the human and natural system including; agriculture and food security, infrastructure, energy sources, livelihoods and human health among others (IPCC 2012; GoM 2012). Direct impacts include consequences incurred for being in line of exposure to the EWE; like flooding can damage infrastructure, and cause people's physical injuries and deaths. Indirect impacts like reduced food production and rise in water-borne diseases are a result of changes in a determinant and disruption of socio-economic and ecological systems (Barata et al. 2011). Regarding human health, this study recognises that changing climate is linked to increasing wide range of diseases. Therefore, the study explores both communicable and non-communicable diseases, and mortality occurring directly during the events; besides the health problems induced indirect by mental, nutritional, conflict and water pressures that are compounded by the disruptions induced by the occurrence of the events (Schensul et al. 2013; UNECA 2011).

However, the extent of the effects is dependent not only on the extreme events but also on exposure and vulnerability of the population and its environment. This thesis maintains that socio-political and economic conditions of particular community structures influence the life of people differently and play a significant role in determining who stands exposed to the events (Adger 2006; Wisner, Blaikie, Cannon & Davis 2004). United Nations Economic Commission for Africa (2011) argues that the impact of EWEs is greatest in resource-poor communities where populations are least able to defend themselves. UNECA (2011) further articulates that majority of human health problems that are linked to climate change are not essentially due to the changes per se, instead, present problems are made worse by changing climatic conditions. Also, EWEs do not lead to the development of new diseases. Rather, they modify the already existing ones. In the midst of this, people and communities do not have equal access resources and opportunities nor are they equally exposed to climate hazards (ibid; Adger 2006; Wisner et al. 2004). As such those with the least capacity to protect themselves, cope with and manage the climate hazards are ill prepared for new health impacts.

2.3. Understanding human health

The term health has had different connotations over time. On the one hand, it has been defined either as absence of disease on one extreme or a state of complete social, physical and mental wellbeing on the other (Kearns & Collins 2011). Gatrell and Elliott (2009) also present health

as a resource, both a personal and society resource with which a person uses to achieve his or her individual potential; and the state physical and mental fitness and capability to function effectively for the society's good. On the other hand, Meade and Emch (2010) adhere to Ralph Audy definition of health: that it is a continuing property that can be measured by individual's ability to rally from insults which may be chemical, physical, infectious, psychological and social. For this reason, this thesis holds that health is neither a characteristic that is present nor absent rather health exists at various levels (Meade & Earickson 2000). Even though it is recognised that health is more than the absence of disease, but "the actualisation of the creative force of human life for individuals, communities and societies" (Meade & Emch 2010, 18); it cannot be divorced from morbidity (disease) and mortality. Disease herein refers to the medically diagnosis of the pathology producing the signs and symptoms, different from illness which is the subjective unwell, uncomfortable feeling a person experiences (Gatrell & Elliott 2009). Depending on where the signs and symptoms are diagnosed and experienced, diseases are either bodily, somatic or psychosomatic, and the study explores both.

2.3.1. Triangle of human ecology

Illustrated in Meade and Earickson's triangle of human ecology (2000) health is in this study also defined as adaptability. The model posits that the state of human health is a function of the interaction of three elements: *Environment (habitat)*, *Population* and *Behaviour (culture)* (Figure 2.1. refers). The approach broadly stipulates that specific populations and their behaviour in interacting with the particular environment, create conditions that can prevent or contribute to disease. These three elements, therefore, contribute to the health of a population by influencing the risk to disease to that population, the consequences and prevention thereof (Meade & Earickson 2000; Meade & Emch 2010). In this study this model will be used as a meta-framework to understand and explain health implications brought about by extreme weather events, vulnerability and the adaptive capacity of the urban-poor population.

Habitat in the triangle denotes the environment in which people live. It stretches from natural environment- topography and climate; built environment-settlement patterns and buildings; and to the social environment-relations, communities and societies (Curtis 2004; Meade & Earickson 2000; Oppong & Harold 2010). These aspects of the environment in a particular place and time create or restrict conditions for insults and pathogens causing health problems. Oppong and Harold (2010) recognise that the environment is dynamic, and the changes can profoundly alter conditions for diseases. These changes such as climate change, geo-hazards,

urbanisation, urban sprawl and socio-economic context create place characteristics that are of advantage to some people while not to others depending their population characteristics and behaviour. Environment in the study provides the basis of assertion that settlements of the urban-poor create vulnerable conditions for them (ibid). That the occurrence of extreme weather events coupled with urbanisation in such vulnerable environments contribute to the risk of poor health of the population like women and children in these communities. Therefore, environment has a bearing on the vulnerability, susceptibility to health problem causing conditions and consequently the population’s resilience.

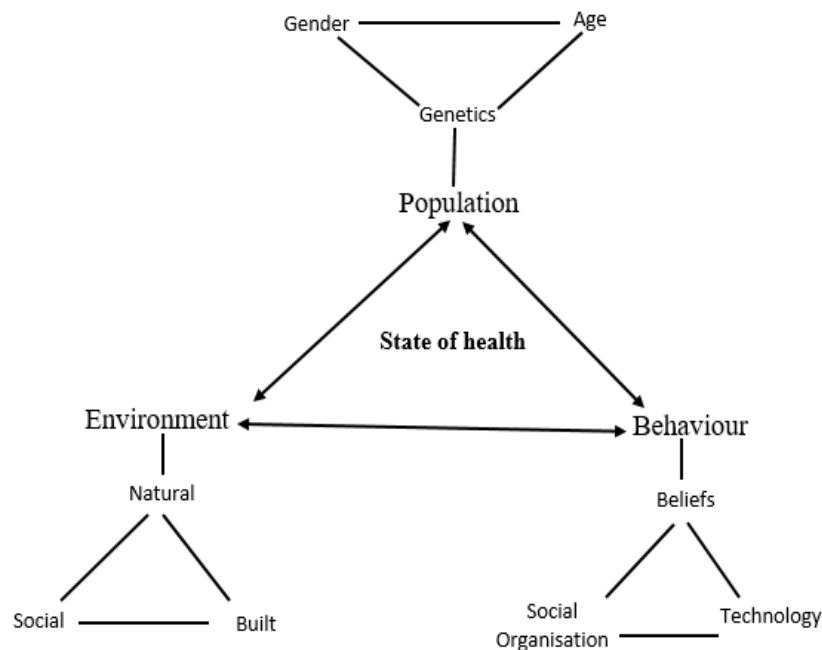


Figure 2.1 The triangle of human ecology
 (Source: Meade & Earickson 2000; Meade & Emch 2010)

The *population* vertex identifies a human being as an organism and potential host of diseases (Meade & Earickson 2000). The vertex is concerned with the characteristics, status and conditions of an individual and how the individual can determine the health consequences of insults. These range from inborn aspects of one’s immunity derived from genetic makeup, gender and age of the person as well as the physical abilities and other capabilities of resistance (ibid; Curtis 2004). Age and gender affects the susceptibility to diseases, and severity of consequences. With this understanding, health experiences are different among the different population categories; and this study targets women and children’s health. Mirza (2003) points out that with 85% of deaths from malnourishment and ill-health during disasters in Bangladesh, women and children are particularly vulnerable. As such, the study holds that women and

children due to their age, gender and social status (ibid) stand more susceptible to disease when exposed to risks like EWEs; in addition, the more severe the effects they may experience.

Behaviour in the triangle is referred to as the observable aspect of culture (Meade & Earickson 2000). Culture comprises the social organisation, structures of relationship of power and status as well as control of resources. Through culture are belief systems, social norms, values and perceptions created and partly displayed in people's mobility from place to place, practices like marriage, roles and technological interventions. The model advances that through human behaviour are created conditions, like habitat, which exposes or protects individuals or communities to health hazards. Oppong and Harold (2010) as well as Hoffman and Oliver-Smith (2002) argue that society's behaviour and choices including their system of production and reproduction have profound influence on the creation of hazardous environments. Besides, behaviour also determines the level of exposure and adaptive response. For this reason, individual and communities can create vulnerable places and/or processes which move people into vulnerable places. Further discussed in 2.7 under the structuration theory, this human-environment relationship is employed in the study to expound on the occurrence of EWEs, the vulnerability in terms of exposure and level of impact and resilience of the studied population.

While the elements (*behaviour, environment and population*) are on separate ends, they are in no way independent of each other that no one element can explain the health of a population. Therefore, emphasised in the study is the connection between the elements (Curtis 2004). However, the model fails to recognise that these elements are dynamic- that they influence and explain each other; and change, and not just interact to influence a population's health (ibid). Without taking into account the processes and dynamism which could alter the relationships between the vertexes, the model is criticised for being 'static' in its presentation of reality.

2.4. Vulnerability

Vulnerability is a function of the interplay of a population's susceptibility, exposure, preparedness; and responsiveness to stressors and effects thereof (Callahan & Sexton 2007; de Fur 2007; Hynes & Lopez 2007). Wisner and co-authors define vulnerability to mean:

“...the characteristics of a person or group and their situation that influence their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard (an extreme natural event or process)” (2004, 11).

It looks at the susceptibility to be adversely affected i.e. the extent to which climate change may cause harm or damage to a system (IPCC 2012) and it is a function of the conjecture

between human population and a potentially destructive agent natural or otherwise (Hoffman & Oliver-Smith 2002; Lavell 1999). Vulnerability is conceptualised therefore as constituted by components of *exposure* to harm, *sensitivity* to the harm and the *capacity to adapt* (Gallopín 2006; Kelly & Adger 2000). Vulnerability is *not* an outcome of confrontation with perturbation and stress, instead it is a condition or state of an individual or a community before the event or process i.e. the degree of susceptibility, potential for change or transformation when confronted with the harm (ibid; Hoffman & Oliver-Smith 2002; Wisner et al.2004).

The first component defining vulnerability is *exposure*. Kelly and Adger (2000) explain that it is intrinsic to the definition that vulnerability must always be linked to a specific hazard or set of hazards. Therefore, exposure has been referred to as:

“...the presence (location) of people, livelihoods, environmental services and resources, infrastructure, or economic, social, or cultural assets in places that could be adversely affected by physical events, which thereby, are subject to potential future harm, loss or damage” (IPCC 2012, 32).

At the same time, Gallopín refers to it as the nature and/or degree to which a system is in contact and experiences the stressful or hazardous event or process (2006). Exposure denotes the magnitude, frequency and duration of a stressful event, thus representing the relationship between the system and the harm in that the level and type of impact will be a result of the interaction between the physical event and the socially constructed conditions (IPCC 2012). The study recognises that exposure determines who stands in the risk line of the occurrence of a harmful event or not and is mediated by social structures like the economy and politics; and institutions (ibid; Wisner et al. 2004). Wisner and co-authors (2004) further point out that people’s exposure differs with regard to class. Class influences income and settlement, gender, age group, disability, immigration status and ethnicity. Furthermore, Pelling (2003) advances that exposure is a product of the physical location and the character of the surrounding built and natural environment. Accordingly, individuals in slums living in poorly maintained housing on a river bank are highly exposed to flooding compared to those located in ‘safe’ distance from previous flooding events.

Sensitivity is the next component of vulnerability; and has been defined differently by different authors. IPCC (2012) describes sensitivity as the degree to which a system is affected and impacted under the influence of a dangerous phenomenon. Adger (2006) refers to it as the degree to which the system is modified or affected by a disturbance. Sensitivity is considered

to be an inherent predisposition of the system/ society or community prior to the occurrence of the physical harm (Gallopín 2006; IPCC 2012); and as it reflects the health of individuals' and societies' economic, psychological and physical systems (Pelling 2003). Argued in this thesis is that sensitivity signifies how much impact human or natural system can absorb without suffering as it projects the consequences a system will suffer in the occurrence of a hazard and the capacity to withstand the impact (Kelly & Adger 2000). If sensitivity is high, for example, even a small hazard stress such as everyday hazards can present a nearly disastrous situation to individuals and their systems. This entails therefore that the type of and how much the effect a disturbance will bring will be different depending on the physical, socio-economic and organisational characteristics of a system prior to the disturbance.

Vulnerability is also explained in terms of *adaptive capacity* or *capacity of response*. Adger (2006) describes adaptive capacity as a system's ability to evolve in order to accommodate change and extend its range of variability to which it can cope. It is the ability to which a community can pursue longer-term and more sustained adjustment to a disturbance (IPCC 2012). Additionally, the capacity to response is the ability to moderate potential damage, take advantage of the opportunities and cope with the consequences of change that occurs and follows (Gallopín 2006). However, the study adopts Pelling (2003) definition of the concept where adaptive capacity, referred to as resilience, is identified to be the product of the level of preparation undertaken in light of impending hazard, and of spontaneous or premeditated adjustments made in response to hazard felt such as relief and rescue. Just like sensitivity, it is a system's attribute preceding a disturbance (Gallopín 2006). Pelling (2003) elaborates that the capacity to cope and adapt to hazards is influenced by livelihood, community structures, social capital, household composition, gender, age and health. These are also the very factors that influences individuals' risk perception, compensation and risk cumulative (refer to 2.5).

2.4.1. Livelihoods and vulnerability

The relationship between the components of vulnerability-exposure, sensitivity and adaptive capacity is reinforcing, though not always. Nonetheless, the three are all shaped by access to rights, resources and assets, which brings in the livelihood approach into the contextualisation of vulnerability (Pelling 2003). Ellis (2000, 10) proposes that:

“A livelihood comprises the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by the individual or household.”

This understanding of livelihoods capitalises the notion of access mediated by social relations and institutions. Institution in the concept is described as rules of the game in the society which, regulate behaviour and shape human interaction. Social relations are critical for facilitating and sustaining diverse income portfolios of individuals; and include gender, family, kin, class, caste, ethnicity, and belief system. Bull-Kamanga et al. (2003) and Pelling (2003) explain that an individual or household's asset profile act as an informal insurance against future uncertainty. For example, poor people tend to pull their resources into providing for immediate household maintenance needs instead of conserving the assets against the possibility of future hazard events. Therefore, wealthier households are protected from disasters as they can invest in safety systems, risk prevention and health promotion.

The political and socio-economic systems which control access are entrenched not only in local structures, but global structures too (Ellis 2000; Pelling 2003). Thus, Hoffman and Oliver-Smith (2002) assert that vulnerability is patterned in the society's location, infrastructure, socio-political organisation, production and distribution system, and ideology. It is closely correlated with the socio-economic and political positioning of the individual and community; and the occurrence of a climate related hazard exposes such structures (ibid; Winser et al. 2004). Vulnerability variables include class, occupation, ethnicity, gender, age, health status, disability, immigration status and the nature and extent of social networks. To this Hoffman and Oliver-Smith (2002) elaborate that vulnerability differences are revealed in structures of power distribution and allocation of resources in post-disaster reconstruction. Therefore, the study is grounded on the assertion that the vulnerability of both women and children, and urban-poor communities is both biophysical and socially constructed risk (ibid) and unequally distributed by various characteristics (Adger 2006).

2.5. Theory of risk

Risk has been defined objectively on one end or subjectively on the other, as well as using the combination of both. Objectively, risk is understood as the probability of an adverse event occurring and creating loss (Smith 2001; Wilde et al. 2002). Subjectively, the meaning of risk is derived from constructivist as the subjective perception shaped by the filters of cultures and social structures (Rosa 2003). Objective risk exists independent of an individual's knowledge and worries of the source of the risk (Sjöberg et al. 2004). Collectively, risk is defined as "a situation or an event where something of human value (including humans themselves) is at stake and the outcome is uncertain" (Rosa 2003, 56). Therefore, in this study risk is conceived

as a product of probability and loss or gain, and the degree of it is determined by the damaged to life, properties or environment (Smith 2001). Central to risk is the element of *uncertainty*; both about the events and the consequences. Besides, people will differ- by age, gender of sociocultural status, whether they focus on the probability or the consequences of the events (Oltedal et al. 2004); and the social and cultural environment in which they operate (Callahan & Sexton 2007; Sjöberg et al. 2004). To this thesis, this denotes that risk is distributed and experienced differently among populations leading to the diversity, though sometimes uniform, perception of the risk.

2.5.1. Risk perception

According to Oliver-Smith and Hoffman (1999), all people before and after a hazard, examine the nature and value of their environment and weigh the assessment against what they deem perilous or safe. Risk perception is this subjective risk judgement individuals' associate with an activity. It is about the construction of reality based on value judgement and choices conditioned by individual's beliefs and circumstances; cultural, social and physical (ibid; Smith 2001). Kusenbach and Christmann (2013) refer to risk perception as calculations of vulnerability. Such calculation involves place, and time sensitive patterns of searching for, learning, interpreting, and transforming into action convictions of one's exposure to a calamity. As such, risk perception can be a reflection of an actual risk and/or an individual's own estimation of risk depending on one's understanding and experience of adverse event like extreme weather events (Oltedal 2004).

Various variables have been identified to influence risk perception. These are either dependent on the characteristics of the hazard and/or risk perceiver traits. Risk perceiver traits includes socio-economic status, knowledge or expertise, personality like worry or degree of fear, age and gender; while risk object properties encompass frequency of occurrence and severity of consequences (Oltedal et al. 2004; Smith 2001). As for socio-economic status, Kusenbach and Christmann (2013) document that, people calculate their vulnerability depending on the resources they possess and their larger social and spatial context. However, risk judgement is more complex than just limited resources equating to high risk perception. Oltedal et al. (2004) relate it to individual knowledge of the hazardous event; with the lay person defining risks and benefit in a complex and multidimensional manner. While experts define risk based on the probability of a hazard event, the ordinary person often focuses on personal experience and

consequences; and will tend to accept the risk depending on the benefits thereof (ibid; Peacock et al. 2004).

Risk perception difference has also been found between men and women. Referring to Gustafon (1998) and Peacock et al. (2004), the study argues that men and women do not only perceive same risks somewhat differently, but also they do perceive different types of risks. This is attributed to the socially constructed gender gap between men and women's roles and activities. Females focus more on the consequences of the hazard than males because of the burden they bear to provide their families with support and care. Previous experience with a hazard-either individual or collective, also has a profound influence on perception of risk (Heijmans 2001). Paradoxically, previous experience with a hazard does not imply meaningful and heightened risk perception. Instead individuals who have experienced hazards before tend to lower their susceptibility to future harm (ibid). Oltedal et al. (2004) and Peacock et al. (2004) attribute this phenomenon to the sense of control that a risk perceiver gets from previous personal experience with hazard events. Individuals' beliefs regarding the controllability of the occurrence and consequences of an event, relates to the type of coping mechanism they put in place and in turn to the level of worry they experience (Scott et al. 2010).

Therefore, risk perception affects what people choose to fear and how much to fear it. Most importantly, it determines individuals' choices, decisions and actions. Therefore, determining one's gauging of risk and decision-making process. Adams (1993) and Heijmans (2001) argue that risk perception has profound effect on response, disaster preparedness, adaptation and mitigation. In this study, this would speak of locational choices, disaster preparedness and decision about recovery strategies of urban-poor communities. In addition, it will explore the divide in risk perception in local communities and authorities in disaster risk reduction agencies like the governments department and non-governmental organisations.

2.5.2. Risk compensation

Smith (2001) writes that risk is everyday phenomena i.e. nothing humans decide on is without probability of adverse consequences (Adams 1993). The question therefore, is not to eliminate or minimise risk rather to optimise it in order to get the most benefit of it (Wilde et al. 2002). As such risk decisions are, nonetheless, not fully value-free. Risk compensation also called homeostasis is the tendency by individuals to optimise risk levels in attempt to maximise overall benefits from the decision made or activity involved in (ibid). That is, basing on the assessment of trade-offs there are some risks and levels of risks that individuals can tolerate or

accept. Individual's level of tolerance of a risk decision or action is high if they perceive higher gains over the potential loss and vice versa. For example, for floodplain dwellers it may be an economic calculated choice to build a house in areas where natural hazards are highly probable, than other safer parts of town where it would be costly (Smith 2001). Not only do people calculate and make risk-taking or risk-avoiding decisions based on their circumstances; they also base their decisions on their experience(s) with a hazard and their opportunities-optimising risk based on gains and losses.

In discussing factors that determine the optimal level of risk that people are willing to tolerate, Wilde et al. (2002) identify four factors. These include: 1) the expected benefits of risky behaviour options; 2) the expected costs of a comparatively cautious behaviour option; 3) the expected benefits of comparatively cautious behaviour options; and 4) the expected costs of risk behaviour options. This implies that lower costs over high benefits of a risk behaviour option will make risky behaviour acceptable. Hence, rational individuals will choose to be less cautious in their choices and actions when high benefits are anticipated. In a health context, a very high risk compensation or risk aversion could occur where a population at risk evacuate to 'safe' and non-exposed areas. In this sense, the incidence of diseases or injuries in an extreme weather situation would fail to show the actual influence.

2.5.3. Cumulative risk

People are exposed to diverse and dynamic mixtures of environmental stressors through what Sexton and Hallis (2007) terms cumulative risk. Cumulative risk is defined by Callahan and Sexton (2007) as the combined threats to people and ecological resources from concurrent exposure and multiple environmental stressors i.e. biological, physical, psychosocial and chemical risks occurring by all pertinent routes, pathways and sources. This mixture of risks may be a temporal aspect-repeated occurrence of exposure to stressor (s) within a timeframe (Callahan & Sexton 2007; Oltedal et al. 2004; Sexton & Hallis 2007); spatial aspect-contact with two or more stressors within a geographical area (Sexton & Hallis 2007); and sociodemographic aspect-exposure of potentially vulnerable groups of people like children, pregnant women and the socioeconomically disadvantaged occurring in both temporal and spatial dimensions (Callahan & Sexton 2007; Sexton & Hallis 2007). Cumulative risk occurs also when catastrophic episodic hazards events collide with chronic everyday invisible hazards (Adelekan et al. 2015; Pelling 2003). Some population categories-slum dwellers, women and children for instance, are found experiencing higher than average exposure than others. This,

Callahan and Sexton (2007) argue, renders them grouped as “*at-risk population*” because exposure to cumulative risk aggravates their vulnerability.

At-risk population are those disproportionately burdened with environmental, social and yet are chronically exposed to stressors. As such, Hynes and Lopez (2007) concludes that such communities are more exposed, highly susceptible to present and future risk, less prepared to ward off health consequences of the stressors, and less able to recover from the debilitating effects. In area of extremes in levels of living conditions, like cities, the social inequality compound environmental risks resulting in greater disparities within the minority, potentially vulnerable groups and the socioeconomically disadvantaged (ibid; Callahan & Sexton 2007). Low income people have less control, or none at all, over changing or improving their environment; and are excluded from society structures. Such underlying predisposition increases health impacts of any exposure to stressor (s) (deFur 2007). This is the understanding and the knowledge that this study bases its argument on in examining the vulnerability of the urban-poor to extreme weather events. It asserts that urban communities, women and children due to the extreme disparities in socio-economic status and organisation are both directly and indirectly disproportionately exposed, and severely affected by the occurrence of EWEs.

2.6. Urban risk and vulnerability

Pelling (2003) argues that defining urban areas is difficult as different parameters can be employed from economic functions, population size or density or simply by administrative boundaries. Nevertheless, he proposes that, a city is a “focal point for wider complex of economic, social, political and environmental linkages of power, energy and information.” (ibid, 20). Lavell (1999) describes an urban area as a new natural constructed environment that combines social and natural elements under patterns of high centralism and density. This environment constitutes the concrete and dynamic expression of the physical-spatial and eco-demographic units (ibid). In Malawi, urban includes all areas designated as cities, municipalities, townships, town planning areas and growth and district centres (Joshua et al. 2014). However, the boundaries of urban and rural areas are somewhat blurred in practice (Toulmin 2010). Despite the controversy in the definition, what is agreed upon is that urban areas i.e. cities and towns, especially in low income countries, are scenario for risk and disaster (Bull-Kamanga et al. 2003; Lavell 1999; Pelling 2003). Cities are also seen as crucibles for hazards that without proper management generate situation of vulnerability and risk to large masses of people (Bull-Kamanga et al 2003; Costello et al. 2009; Toulmin 2010). The risk and

vulnerability of urban areas is attributed to both the contextual and compositional elements of the areas (Adelekan et al. 2015; Bernard et al. 2007; Hynes & Lopez 2007). Contextual and compositional elements resonate place and people vulnerability; which denote that an area's risk is due to the combined effect of the people occupying the place and place themselves (Curtis 2004).

Contextual explanations here entail the environmental properties of the urban area i.e. the physical natural, the social cultural process and the built environment (Oppong & Harlod 2010). It essentially refers to urban ways of living and organising itself. Besides climate, the physical and natural aspect of the environment also denote the landscape on which the city develops and grows. Many cities develop and grow as trade and commercial hubs thus tend to locate on or near to coasts as well as low laying areas near mouths of major rivers (Bull-Kamanga et al. 2003; De Sherbinin et al. 2007; Toulmin 2010). These are dangerous sites because they pose risk of hazards such as cyclones, high winds, flooding, sea-level rise, and coastal erosion and deposition (Huq et al. 2007). The situation is aggravated in that as the city's socio-economic processes of production and distribution increase the city also expands further into hazard prone areas like unstable hillsides or floodplains (ibid; De Sherbinin et al. 2007; Pelling 2003). For example, through housing development, over/exploitation of natural resources and erosion of ecosystem services, urban centres encroach into valuable ecosystems leading to changes of landscape and general environment around cities (Pelling 2003; Toulmin 2010). Furthermore, Bull-Kamanga et al. (2003), Douglas et al. (2008) and Toulmin (2010) argue that on the one hand the extensive build-up of urban areas with impermeable surfaces and concentrated building prevent rainfall infiltrating the soil hence encouraging run-off and erosion. On the other hand, the minimal or complete non-existent quality and standard control of housing and infrastructure also heighten the risk from and vulnerability to extreme weather events (Bull-Kamanga et al. 2003; Huq et al. 2007).

While, essentially, the human-environmental interaction in and of the city is moderated by political, socio-cultural factors present in the city; at the same time, social contextual elements of the composition (aggregate of individuals) can influence the place vulnerability. For instance, densely populated urban community with high percentage of unemployment stands vulnerable to any occurrence of a hazardous event, a common case in many low-income countries including Malawi.

Compositional elements express characteristics of the residents of the urban areas (Bernard et al. 2007). Thus include; age, sex, culture, education, income level, and power relations of and in the population. Individuals are placed into social groups according to these categories of social differentiation. Such that individuals, and the social group to which they belong will influence their interpretation and social construction of risk of a particular place (Curtis 2004). On the other end, the risk and vulnerability of a population is influenced by their attributes. Society's structures of power relations, for example, affect the entitlements and empowerments accorded to different groups in a society (ibid). Pelling (2003) advances that power makes certain social groups within a city more disaster-prone than others. Power herein refers to both material and non-material. Material power is expressed in the ability to purchase property like land and housing, while non-material power resides in the control of ideologies (ibid). Power directs and controls production and distribution of resources. Huq et al. (2007) note that wealth, allows individuals and households to have safer housing, choose safer locate to live in and insure their wealth. This not only reduces the likelihood of exposure to and adverse impact of a hazardous event, it also helps in the recovery process. However, low-income groups have less scope to reduce risk and recovery from its effects (ibid; Pelling 2003).

Curtis (2004) argues that cities are power containers within which ordering of allocative and authoritative resources takes place. Allocative resources refer to natural environmental resource, technologies and goods which are produced; while authoritative resources include administrative structures, human mutual associations and the organisations of life chances and opportunities (ibid.; Giddens 1991). Unfortunately, cities, particularly in low-income countries, are stark with grave inequalities. Cities and towns albeit their bright lights have concentration of poor populations (Barata et al. 2011; Martine et al. 2008; WHO & UN-Habitat 2016). Due to lack of power the urban-poor reside in informal settlements high-risk areas like floodplains, marshlands or up steep hillsides; faulty shelters; in addition, they have limited access to basic and emergency services. This creates urban-poor communities.

2.6.1. Urbanisation

A recognised process that combines these contextual and compositional explanations to urban risk and vulnerability is urbanisation. Due to urbanisation, developing countries' urban areas are argued to account for over half of the world's population and projected to increase to over 90 %, while the rest of the world is projected at 57 % (African Development Bank Group 2012; WHO & UN-Habitat 2016). Pelling (2003) describes urbanisation as a mode of human

organisation manifested through urban growth: both population and land-use change. The change is attributed to multi-variant of factors natural population increase, rural-urban migration and urban area administrative border expansion (ibid; Martine et al. 2008). Martine and co-editors (2008) argue that urban growth is not necessarily the problem, as no country has ever achieved economic development while retaining its population in the rural areas. Rather, the urban political economy that define and shape urban communities, and the dense pattern of urban living are what contributes to risk generation (Cohen 2005; Pelling 2003). Urbanisation, in Africa as in other low and middle income countries, has failed to bring inclusive growth, in its stead it has resulted in proliferation of slums, urban poverty and rising inequality in areas with already other unaddressed problems of social service provision (Baker 2012; Martine et al. 2008; UN-Habitat 2014). For example, Sub-Saharan Africa at 32.8 % has the lowest urban population, but at 65 % it has the highest proportion of slum dwellers (AfDB Group 2012).

Rapid urbanisation has caused urban settlements in low and middle income countries to have concentration of pockets of poverty and slum proliferation (Martine et al. 2008; UN-Habitat 2014). Urban growth has presented rising demands of social services like housing, health, water and sanitation which remain unmet (Baker 2012; WHO & UN-Habitat 2016). Combined with the invisibility of the urban-poor to urban policymakers, their needs are not a priority in urban planning, institution and regulations (Cohen 2005; Martine et al. 2008; UN-Habitat 2014). This is putting an increasing number of people exposed and vulnerable to hazards including climate-related disruption as the majority of urban population will be forced to find habitat in marginal locations, overcrowded, substandard housing and inadequate nutrition and poor health (Baker 2012; Barata et al. 2011; Tyler & Moench 2012; Wisner et al. 2002). Pelling (2003) gives examples of cities like Calcutta in India and Manila in Philippines where urban residents develop informal settlements in coastal flooding and landslide prone steep slopes because, due to economic disadvantage and restricting financial legislations, are excluded from the formal housing market.

2.7. Structuration theory

To situate women and children's health in urban-poor communities in the face of EWEs and understand how institutions like government policies of resource distribution, NGOs working mandate create vulnerabilities in social system and how they respond to them when meet with climate extremes, the study employs the structuration theory. The theory is also employed to

understand how the women and their communities use their knowledge and capabilities to transform their vulnerability to health impacts brought about by climate hazards.

Structuration theory, most closely identified with the British social theorist Anthony Giddens, examines human-environment relations through the duality of *structure* and *agency* (Gatrell & Elliott 2009). It makes an argument that society's structures are both constructed by human agency and yet at the same time are the very medium of this constitution (Bryant & Jary 1991). *Structure* in the theory refers to a system of generative rules and resources that members draw upon in their daily life (Bryant & Jary 1991). For Giddens (1995) the rules and resources are constraints and opportunities that restrict and enable human action/agency social interaction. On these, human behaviour, practice and belief is established. These structures are both formally established like laws, regulations and policies governing institutions; and informally constructed, unwritten social norms and codes of conduct that communities form through and drive their interactions (Bryant & Jary 1991). *Human agency*, on the other hand, refer to the capabilities, behaviour and action of the people. Giddens (1991) in the theory posits that social actor are creators of and created by their social systems. The agency of individual actors' shape and are shaped by social structures they belong to, Curtis (2004) further elaborates. This social action however, is both intentional and knowledgeable and not "free action" (Giddens 1991). The theory esteems that all social agents are aware of the conditions and the processes which produce and maintains the social structures of the society they are members of.

However, the study takes Curtis (2004) view that everyday practices of the actors (urban-poor residents) as they interact with their surrounding social structures is in ways which are not always obvious to all the actors. Some activities and behaviours like fuelwood collection are so mundane to the actors to presume any influence to their surrounding structures. Despite the lack of knowledge and/or critical analysis, their actions maintain and shape the social structures and at the same time the social structures of access to resources also frame the action of the individuals (ibid). The theory demonstrates that how agency or action of individuals interact with the power structures of the space and time in which they live, contributes to processes that differentiate social groups in term of their empowerments and generate inequalities in risk and disaster experiences (Curtis 2004). For instance, due to urbanisation process as a structure, rural areas are transformed into urban areas as such natives in the areas cannot 'exit' when disaster strikes.

Structuration's view to society's problem is that they are a result of both the society's structures and actions of its agents. Gatrell and Elliot (2009) acknowledge that structures shape social practices and actions, and in turn, such practices and actions create and recreate social structures. Regarding health, structuration theory brings together transcending structures of social, cultural, economic and political that mould and determine health and health care provision, and impacts of human agency/ action thereof. For example, urban-poor communities in Malawi for being invisible to local governments are without provision of social services like safe water or functional sewage system; and thus those who settle in such locations, risk sanitation related health problems. In this way, the study sees human health as that of humans making, but not in the conditions of their choosing (ibid).

2.7.1. Urban resilience

With the understanding that humans are not only recipients but importantly active shapers of the natural, built and social environments presented in the theory of structuration, Baker (2012) advances it would be a mistake to conclude that in the face of EWEs, urban-poor communities are helpless victims who are unable to fend for themselves. As such the study finds relevance in the extension of duality of agency and structures present in the urban resilience theory to assess the resilience (here understood as adaptive capacity (Pelling 2003)) of the studied communities. There are many variation of the theory of resilience, but the one adopted in this study is the one developed by the Asian Cities Climate Change Resilience Network (Tyler & Moench 2012). Resilience in this theory and study takes after IPCC's definition (cited in ibid 2012: 312):

“the ability of a social or ecological system to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity of self-organization, and the capacity to adapt to stress and change.”

It explains that resilience denotes flexibility, ability to learn and change with regard to shock and stress. The framework identifies three elements when explaining urban resilience: Systems, Institutions and Agents.

Systems are structures operating in an area: ecosystems, and infrastructures that support the high density of human occupation and economic activity in cities, and are essential to create the productive opportunities central to urban life. These underline the functionality of an area i.e. fundamental support systems that enable networks of provisioning and exchange of resource, goods and services for urban populations are therefore an essential element of urban

resilience. Some systems like water, electricity and food supply are considered core or critical as they are essential for the urban function and their failure jeopardies human well-being. In exploring resilience, the characteristics looked at are flexibility and diversity; redundancy and modularity; and safe failure of a system. The characteristics however, should not be considered as mutually exclusive categories (Tyler & Moench 2012).

The second element is that of agents. Agents are the actors in the systems which includes: organisations, individuals and social groups. Agents interact with systems and are capable of making deliberate, independent analysis and decision in the face of new information. They behave in ways that reflect their location and structure and position within society, their preferences and, opportunities and constraints they perceive. Agents' behaviour can change depending on the circumstances though not always predictable. With regard to resilience the framework recognises agents to have the following capacities: the capacity to manage, resourcefulness to acquire materials for action and the ability to learn (Tyler & Moench 2012).

The last element is that of institutions; which are like in structuration theory (Giddens 1995), the social-cultural rules that govern human interaction, social pattern, order and exchange in economic transaction. Institutions maybe formal or informal and are created to reduce uncertainty, maintain continuity of social patterns and social order, and to stabilise forms of human interaction. It also advances that institutions may both be enabler and inhibitors to capacities of vulnerable urban groups. Institution condition how agents and systems interact and these include: rights and entitlements, decision making and information flow (Tyler & Moench 2012).

Elements in this theory are both treated separately while the linkages between them are not overlooked. This framework will provide basis for analysing the capacity to adapt to EWEs of the urban communities and the target communities studied in particular. It will be used to assess and propose how to enhance their capacity of response and adaptive capacity.

CHAPTER THREE

DESCRIPTION OF THE STUDY AREA

3.1. Introduction

This section presents an overview of the study area for the research; Traditional Authority (TA) Kalonga in Salima and Sadzi ward in Zomba, Malawi. Salima is a district in the central region of Malawi while Zomba is a city in the south; the actual study sites are urban areas in the districts. These two districts have been chosen for having experienced extreme weather events in the past 5 years and being among the worst affected in the country. Before concentrating on Salima and Zomba; and the particular study sites, the section gives the geographical location of Malawi in Africa, with regard to its neighbouring countries. However, only information relevant to the study will be presented in this section including the geography, administrative divisions, climate, economy, and employment. From there, focus will be on Salima and Zomba and the actual study sites.

3.2. Malawi

3.2.1. Geography

Malawi is a sub-Saharan country laying in the southern of Africa between the latitudes 9–17 °S and longitudes 32–36 °E. Land locked, Malawi is bordered by Mozambique on the east, south and southwest; Zambia on the west and northwest; and Tanzania on the north and northeast (Figure 3.1). The country is estimated to have a total area of 118, 484 Km², out of which 94,276 Km² is land while the rest is water; Lake Malawi covers two-thirds the length of the country to the east. Malawi's topography is varied (GoM 2010). The most striking feature however is the Great East African rift valley which stretches from north to south of the country and contains Lake Malawi. The country also has mountain ranges with peaks as high as 3000 meters above sea level, plateaus and plains (National Statistics Office 2011).

3.2.2. Administrative divisions

Government wise, Malawi is a democratic country with both national and local government levels (Commonwealth Local Government Forum 2013); even though there have been no local government councillors elected since 2005 (Cammack et al. 2009) until 2014's elections. The country is divided into three administrative regions: the Northern, Central and Southern regions

with 28 districts in total. Six districts are in the Northern region, 9 are in the Central region, and 13 are in the Southern region respectively (Figure 3.1).

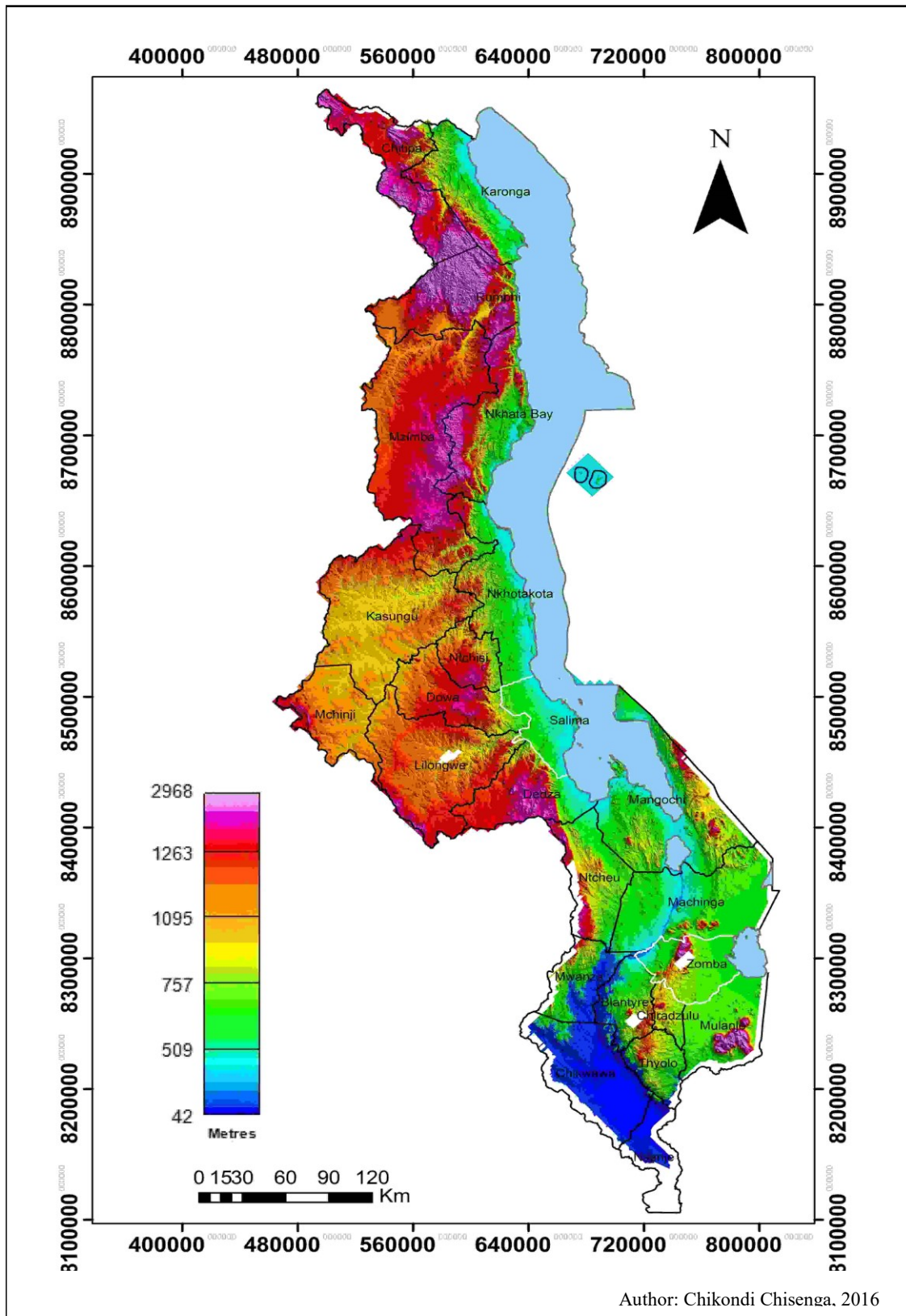


Figure 3.1 Map of Malawi highlighting Salima and Zomba

The local government has 35 single-tier local authorities called councils comprising of 4 cities, 28 district councils, 2 municipality councils and one town council. Blantyre, Lilongwe, Mzuzu and Zomba are the four cities in the country (NSO 2011). Cities have two councils: city council for the urban section of the district and district assemblies for the rural section respectively. Each council has autonomy within its designated local government area; one of which is to make policy and decisions on local governance and the assembly development for the local government area. The councils comprise smaller administrative units called Traditional Authorities presided over by chiefs (Cammack, Kanyogolo & O'Neil 2009). The country 's provisions like the Town and Country Planning Act considers all areas that are designated as cities, municipalities, townships, town planning areas and growth and district centres under the urban areas (Joshua et al. 2014).

3.2.3. Climate

Malawi has mild tropical continental climate, which is relatively dry and strongly seasonal. The climate of Malawi is strongly influenced by its position within the sub-continent in relation to the pressure and wind systems of the Southern Hemisphere called the Inter-Tropical Convergence Zone (ITCZ). Weather conditions like rainfall and temperature however, vary depending on the attitude and proximity to the lake, with higher elevation being relatively cool. The climate is characterised by three main seasons: cool-dry, warm-dry, and warm-wet. The cool-dry season is from May to August with average temperatures varying between 17-27 °C, and June-July as the coldest months. The warm-dry season stretches from September to November with mean temperatures of 25-37°C. The warm and wet, from October/November until April, during which 95% of the annual precipitation takes place. Annual rainfall ranges from 600mm in the valleys and plains, and over 2500mm in high elevation areas (Malawi Meteorological Services Department 2010; National Statistics Office 2011).

However, over the past three decades, several climate variations have been observed, with increased incidence, frequency, intensity and spatial spread of extreme weather events such as floods and droughts as well as changes in seasons like delayed onset of rains (Mphepo et al. 2013). Major extreme conditions include 1991/92 drought, floods of 1988/89 and floods of 2014/2015 seasons (ibid; ActionAid 2006; GoM 2015a), thus droughts/ dry spells, floods and storms are main EWEs in the country. Action Aid (2006) illustrates (Figure 3.2), the increase in the occurrence of the two main EWEs in Malawi. To this Menon (2007) in *Famine in Malawi: causes and consequences* advances further that since 1990 the number of people

affected by drought and floods in Malawi has increased substantially. On the same note, the increase is also noted in the area of extent; in that before 2001 only 9 districts in the country were flood-prone areas but by the end of 2003, flooding occurrences have been localised to 22 districts (ibid). Therefore, not only low-laying areas such as Lower Shire Valley and some lakeshore localities in Salima and Karonga are vulnerable to floods instead even higher grounds like Lilongwe, Blantyre and Zomba are too. It is argued that increased droughts and floods in the country is compounded by environmental degradation encouraged by the population's poverty levels, increasing population and overexploitation of natural resources (GoM 2010; Pullanikkatil et al. 2013). For example, severe forestry loss in Ndirande and Soche hills in Blantyre; as well as Zomba Mountain in Zomba presented origins for the flash floods that wreaked havoc the areas surrounding in 2015 (Sanje & Rowling 2015).

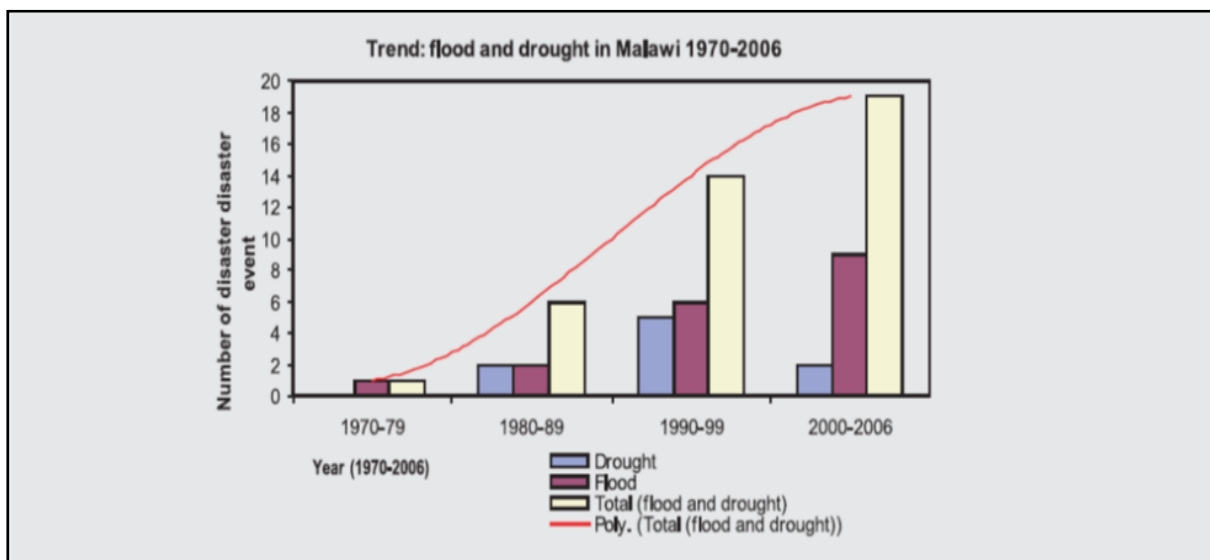


Figure 2.2. Trend of floods and droughts in Malawi (1970-2006)
(Source: ActionAid International 2006, 3)

3.2.4. Demography

The Commonwealth Local Government Forum (2013) estimates Malawi's total population to be at 15, 400 000. However, as of the 2008 national Population and Housing Census, Malawi's population is 13, 077 160. With a population density of 139 persons per km², this makes Malawi one of the most densely populated countries in Africa. Of this, 51.4 % are females and 48.3% are males. The population's age distribution shows that Malawi is a young population, with young people under 25 years of age making up 65% of the total population (NSO 2011). Only 15.7% of Malawi population is classified as urban, making the country one of the least urbanised countries in Africa. Yet, research shows that at the urbanisation rate of 6.3% per

annum-three times the global rate and nearly twice the Africa rate of 3.5%, Malawi is one of the fastest urbanising country in the world with (Nkhoma & Jameson 2014). At a rate of 4.7 % annually, Malawi cities and towns are growing at unprecedented rate. However, 75% of Malawi's urban residents are in the four cities of Blantyre, Lilongwe, Mzuzu, and Zomba (UN-Habitat 2011b). The UN-Habitat (ibid) projects that one in three Malawians will live in urban areas by 2030; and by 2050, that will be nearly half of all Malawians. Aside urban population growth through natural increase and migration, increased urbanisation is accounted for by urban sprawl- the extension of urban area boundaries to incorporate surrounding villages and rated properties developed in the urban fringe (Mtafu 2013). Presently, it is estimated that 75% of the country's urban dwellers are in slum characterised locations (Nkhoma & Jameson 2014).

3.2.5. Economic conditions

The economy of Malawi is natural resource dependent, with agriculture as the driving force. Agriculture contributes approximately 35% of the gross domestic product (GDP), 93% of export earnings, and more than 80% of employment (KPMG 2015; NSO 2011). The number of people employed in agriculture is greatly different between rural areas and urban areas; 90% in rural areas at 62%, while on 13% in urban areas (ibid). Other sectors are also making significant contributions to the economy. In 2014, the 5.7% of real GDP growth was from manufacturing, wholesale and retail trade, and service like tourism besides agriculture (Mwanakatwe & Kebedew 2014). A natural resource based economy is highly dependent on the state of the environment. Agriculture, for example, is vulnerable to weather patterns that growth in 2015 was projected to slow to 5.5% resulting from the late arrival of rains and the severe floods experienced in January 2015, which damaged crops and infrastructure (ibid; KPMG 2015). It should also be mentioned that, contributing to 40% of the national budget, donor aid is also a main driver of the economy and income in the Malawi (KPMG 2015).

3.3. Study sites

3.3.1. Justification for the study areas

The study focuses on two urban areas in the districts of Salima and Zomba, both which have experienced climate hazards among other districts in the country, yet are with distinct characteristics. The choice is based on Yin's (2012) reasoning that even though multiple-case studies have implementation challenges, they provide findings with high confidence levels. Salima and TA Kalonga in particular has annually experienced either floods or dry spells on alternating years, in the past 5 years and was also one of the worst hit by the January-February

2015 floods (OCHA 2015). Zomba, and especially Zomba urban/city, on the other hand has not experienced any climate hazards in the recent past except the dry spells and drought of 2011 that affected the whole district (AFIDEP-PAI 2012) and the country wide drought in 2005. But, like Salima, Zomba urban was also worst hit by the January-February 2015 flood (OCHA 2015). This distinction is what motivated the choice of the study areas for this study. Salima (a small town) represents ordinary conditions therefore representing a *typical case* while Zomba (a city) is a *unique case* (Yin 2012). The idea is to contribute to a variety in experience in understanding how urban-poor communities in these two areas are affected by EWEs, and how they are dealing with the situation with the hope of learning from each other.

3.3.2. Salima

Salima is one of the ten districts and township in the central region of Malawi. It is located on the central east of the country bordered by Lake Malawi on the east, and five districts on the other sides (refer to Figure 3.1 & 3.3). There are variations in the landform and altitude for the district. The landform ranges from the rift valley floor covering the areas along the lake and the Lake and the central part of the district. This valley floor is of altitude ranging from 200 to 500m above sea level. The northwest part of the district is hilly with altitude of 500 to 1000m above sea level (Salima District Council 2011). The district has, according to 2008 National Census, 337, 895 people, with a 2011 projected population of 342,236, with a population density of 154 over an area of 2, 196 km² with 2.6% of the population living in the urban setting of the district. Of this, Traditional Authority (TA) Kalonga has the second highest population at 55,553 after TA Khombedza.

Source of livelihood for the majority population in the district is subsistence agriculture practiced on about 107,400 hectares of customary farm land. Fishing is also a main income generating activity to people along the lakeshore like Senga-bay (Salima District Council 2013). Additionally, Salima boasts of being a tourist's haven for the country, with Lake Malawi on the eastern boundary providing almost 100 kilometers of fresh water with numerous exquisite beaches and colorful sand (Mpeniuwawa 2013). Lastly, small scale business like bicycle taxi especially provides livelihoods to households in the urban parts of the district (Salima District Council 2013).

TA Kalonga covers Salima Township and rural areas as well. The study was conducted in one urban section of the area overseen by senior Chief Semaiwa. The area is bordered by Linthipe river to the east, which is one of the main rivers in the district (Figure 3.3 refers).

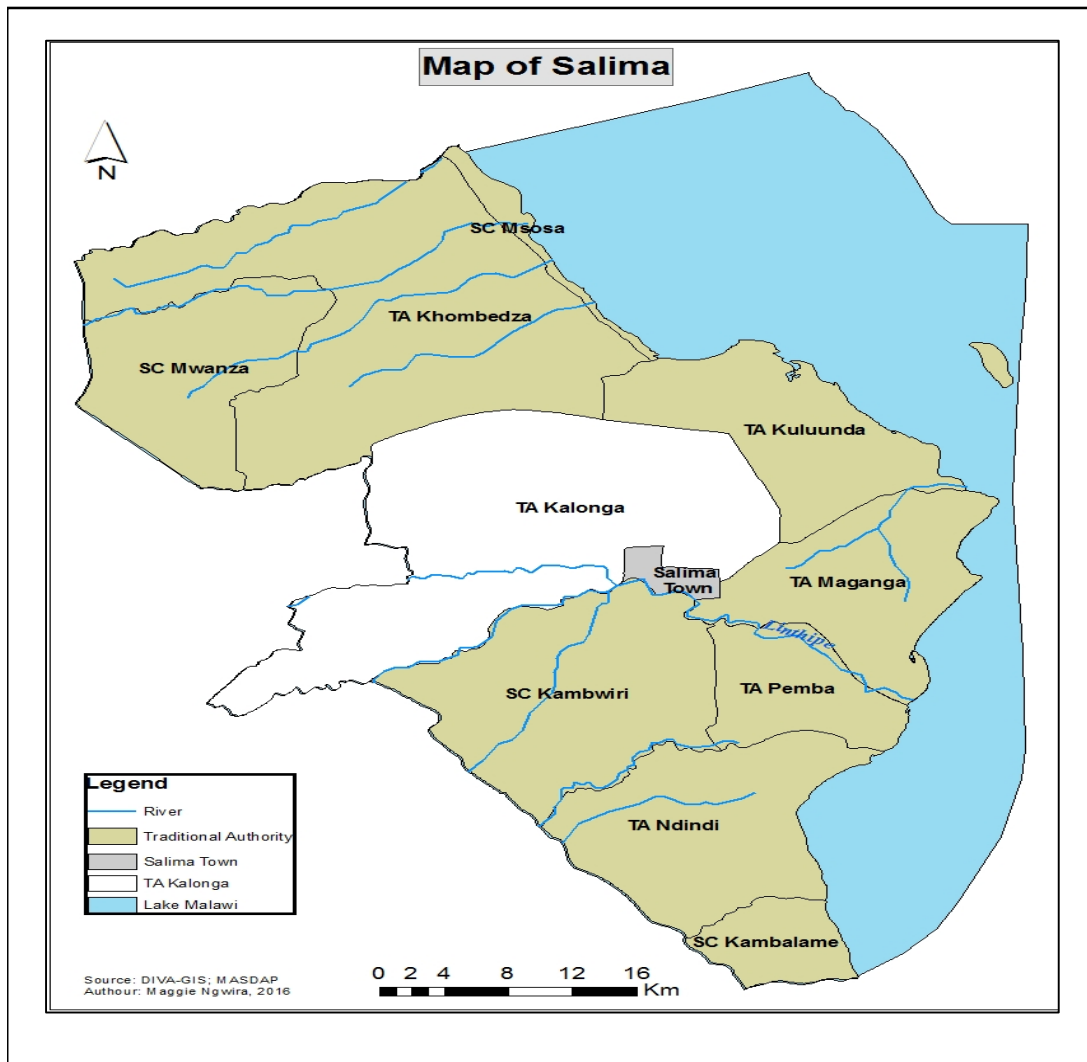


Figure 3.3 Map of Salima showing TA Kalonga and Salima Town

3.3.3. Zomba

Zomba is the fourth largest urban area in Malawi after Blantyre, Lilongwe and Mzuzu. In the South-east of the country the city is situated in a mountainous and hilly area whose ground elevations vary between 790m and 1265m above sea level. The city sits at the foot of Zomba plateau and is flanked by a number of hills including Sadzi, Chinamwali, Naisi, Mtiya and Chidalanje hills. Due to the dissections made by numerous streams that flow through the city, its terrain is varied and undulating (Zomba City Council *unpublished a*). According to National Population Census of 2008, Zomba City has a population of 88,314 with an annual growth rate of 3.0%. With about 65% of the population living in unplanned settlements, the city's

population density is at 2,264 persons per km², though it is not evenly distributed (NSO 2009; UN-Habitat 2011b). A common character with these densely populated areas is that they are the unplanned squatter housing areas, which have developed due to their proximity to the city centre and the main M3 road respectively (Zomba City Council *unpublished* b). Sadzi ward, is one of the 10 political constituents in Zomba city and the third densely populated wards after Likangala and Chinamwali (Figure 3.4).

Being a university town and a centre of learning and public service delivery Zomba functions as administrative city. This is reflected in the high share of employment in the government and related sectors. However, the city's economy is largely dependent on the informal sector for employment and businesses than on the formal sector employment and trade (UN-Habitat 2011b).

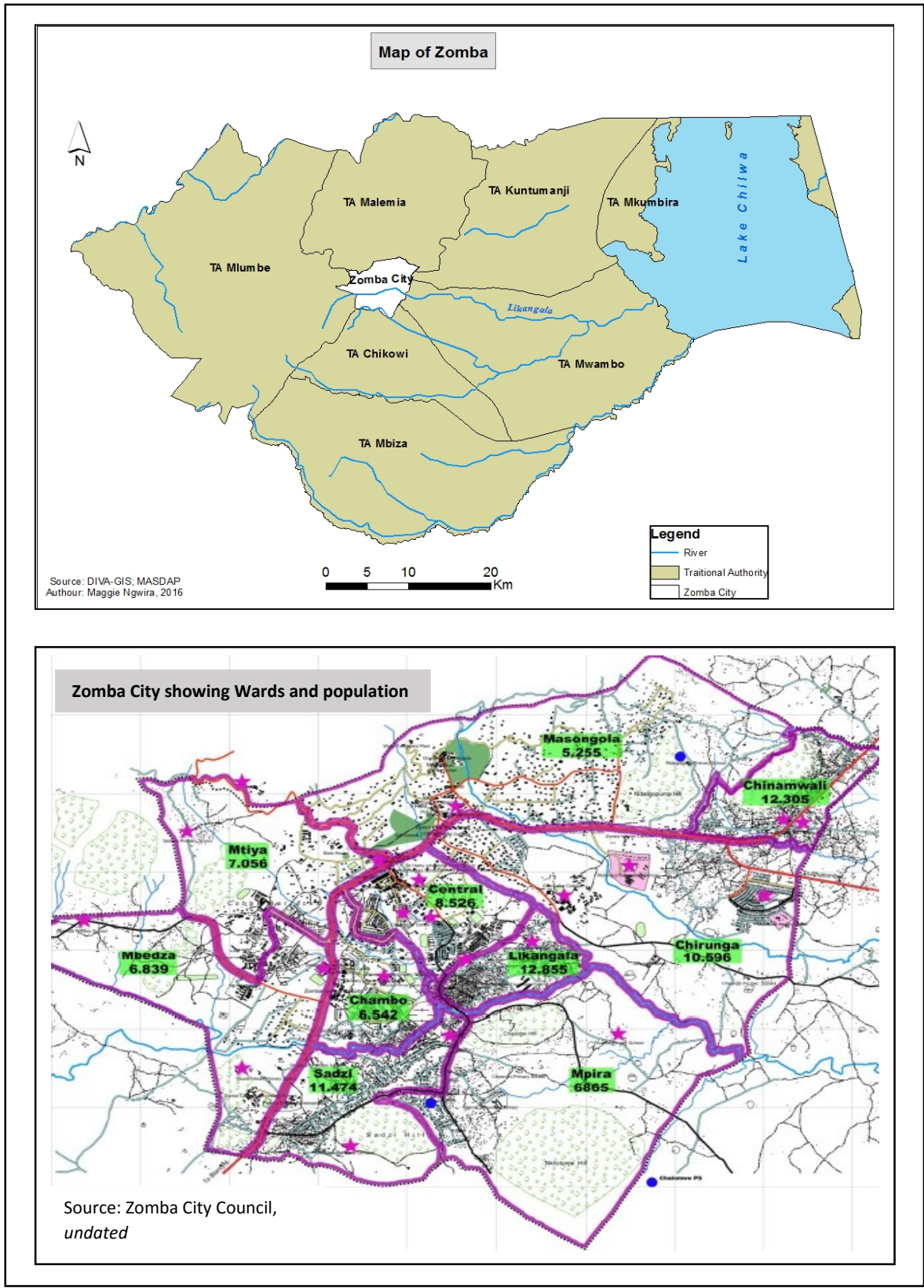


Figure 3.4 Map of Zomba showing Zomba City

CHAPTER FOUR

RESEARCH METHODOLOGY

4.1. Introduction

Doing research requires that procedures of how a phenomenon will be studied is well defined. Referred to as methodology, this procedure denotes the systematic process of doing research including the methods, ways and tools used to collect information, and to make meaning of it (Kathori 2004). Thus encompassing the choice about cases to study, methods of collecting data, and forms of data analysis, planning and executing a research study (Silverman 2006). Kitchin and Tate (2000), propose three categories of research methodology: Qualitative, Quantitative and Mixed research methodology. Qualitative methodologies focuses on words and expressions while quantitative methodologies are about numbers and the quantifiable.

Each methodology sets out its own assumptions about the nature of reality, how it can be investigated and the role of the researcher (Clifford et al. 2010). Creswell (2014) cautions against considering these approaches as distinct categories, since they represent different ends on a continuum. Even so, making a choice of a particular methodology depends on the nature of the subject being investigated; questions asked and the type of information sought for.

4.2. Qualitative approach

This study sought to examine how the urban-poor communities are adapting to extreme weather events and the health impacts. It is hinged on the questions of "how" and/or "why" hence focusing on subjective assessment of attitudes, experiences, behaviours and opinions expressed in words, pictures and sound (Kitchin & Tate 2000). It pursues to understand and describe situations, events experiences and phenomena unlike where the research question is of "what", where data derived consist of numbers which can be quantified and used to determine relationship in the variables under study (Glesne 2011). In this regard, the study is based in the natural setting of the urban-poor's community; engaging them to find out how they do things, their experiences, and interaction within their social, physical and built environment. This focus on expressions, attitudes, meanings and understanding of processes and practices of a social world determined that this research takes on a qualitative approach (Limb & Dwyer 2001). Qualitative methodology is employed when the goal is to understand human beliefs, values and actions Gatrell and Elliott (2009) further elaborates. Silverman (2006) also recommends employing a qualitative approach for capturing and making meaning of the world from the eyes of the study population.

Not only does the type of data sought prescribe the qualitative nature of this research, but the data collection procedure too. The research attempts to understand how urban-poor communities affected by extreme weather events in Salima and Zomba in Malawi live, function and are organised as a community. It is therefore established upon social interactions and relations; within the researched and between the researcher and the research (Crang & Cook 2007). This is because in trying to gather empirical evidence, the researcher interacts i.e. makes conversations and observations- with the study population in their local environment. As such qualitative research is done from the standpoint of a balanced relationship between the researcher and the research (Gatrell & Elliott 2009); which results in the co-construction of knowledge.

The research acknowledges that qualitative approach comes under numerous criticism, one of which being the subjective nature of the research findings (Limb & Dwyer 2001). This criticism is because qualitative research is considered to be influenced by the relationship built between the researcher, the researched and the context producing what Kitchin and Tate calls *situated knowledge* (2000). The situated knowledge co-constructed herein renders the reliability of its findings questionable as it cannot be recreated to the exact nature. Secondly, qualitative research falls short on that fact that it fails to capture levels, patterns and trends of inequalities in the study population, which for this study is important to achieve objective one of the research. Even though a descriptive analysis of the statistics presents a certain level of meaning, it does not unveil the full potential of the data.

However, quantitative secondary data is used to supplement the qualitative data. This is used in two ways: (1) to lay the background of the socio-economic status of the study communities. In this way, the quantitative data provides the basis to levels, patterns and trends of inequalities to and establish vulnerability in the study population. (2) Quantitative data in form of health surveillance reports from the hospitals in the two study communities reinforces arguments raised in the study of the health impacts of the occurrence of extreme weather events.

4.2.1. A Case study: Salima and Zomba

Yin defines a case study as "an empirical inquiry about a contemporary phenomenon...set within its real-world context" (cited in Yin 2012, 4). The aim is to get an in-depth, up-close examination of single or small number of "cases" in their natural setting to derive detailed understanding of the behaviours thereof (ibid). Consequently, a case study is useful for collecting together information on a particular phenomenon to understand it. In this study I

chose to focus on two urban-poor areas in the Salima town and Zomba city, which have both experienced climate hazards among other districts in the country (GoM 2015a; OCHA 2015). As such the study is a *multiple case study* (see 3.3.1 in Chapter 3). Deciding on this kind of selection of object to study rests on the Yin (2012) argument that despite the implementation challenges, multiple-case studies provide a wider viewpoint of reality affording findings with high confidence levels. The study aims to explore the possibility of the two study communities complementing on each other to gain a deeper and wider understanding of the situation in urban-poor communities of the country in face of EWEs.

Yin furthers on to state that "relevant case study data are likely to come from multiple and singular sources of evidence"(2012, 4), for that reason the several methods of data collection are used in this study.

4.3. Methods of primary data collection

Data collection methods include the actual techniques used to gather empirical evidence from the field. Clifford and colleague (2010) point out that the methods are not only different but that they possess distinct strengths and collect different kinds of empirical material. Choosing which method to use in a study is dependent on the research itself; in the research questions asked and the information the study seeks to unveil (ibid; Creswell 2014; Yin 2012). In attempting to make meaning of the everyday lived experiences of people, an in-depth engagement with the lives and experiences of the study community is required (Limb & Dwyer 2001). Such in-depth analysis is only possible through methods like interviews, observations and textual analysis, and audio and video recording; which Silverman (2006) states are the main methods of qualitative. This research employed semi-structured interviews, partial participant observations and focus group discussion in gathering the needed data. The use of the different methods was meant to produce a triangulation effect, by establishing convergence in the facts, and interpretations (Yin 2012).

4.3.1. Interviews

Interviews are verbal exchange where the interviewer (researcher) attempts to elicit information from the interviewee (Clifford et al. 2010, 105). The use of this method is founded on the understanding that research participants are individuals who actively construct their own social worlds and can communicate insights into it verbally (Lewis & Nicholls 2013). Therefore, according to Valentine (2001), providing the research with the apprehension of

participants' lives; their experiences, worldview and meaning ascribed to their world. For this reason, interviews allow the research to be qualitative in that it explores a phenomenon from the participants' point of view.

Two kinds of interviews were employed in this study: focus groups and one-on-one semi structured interviews.

4.3.1.1. Focus group discussions

According to Gatrell and Elliott, "a focus group is a small number of people (usually between 4 and 12) that meet to discuss a topic of mutual, interest with assistance from a facilitator..." (2009, 80). The idea is to create a close-to-natural setting where dialogue can flourish and the group can discuss their experiences and thought about the topic at hand. The positive aspect of this, Crang and Cook explain, is that it enables participants to clarify contradictory views and/or to produce community's collective knowledge (2007). In this study, a total of two focus group discussions were conducted with one category of key informants; development committee members in each of the study areas. Village Development Committees (VDCs) represent the lowest level of an administrative structure for local level participation within the decentralisation framework (Manda 2004). VDCs are responsible for planning and implementing development projects in the two communities hence their inclusion in the study to speak on behalf of the community.

In both Salima and Zomba, the discussions were carried out before the semi-structured interviews, with the purpose of exploring relevant issues to be followed up in the interviews with the affected women in the communities. The participants of the discussions in Salima included 2 females and 3 males who represented the leaders (Chairperson and Secretary) and members of the Village Civil Protection Committee (VCPC). Also present at the discussion was the Chief (traditional leader acting as link between the people and government) of the area. Grbich (1999) argues that placing senior members of an institution with their juniors may result in minimal response or total silence all together. I acknowledge that the presence of the Chief of the area during the discussion may have presented restrictions on the liberty of the group to provide criticism or suggestions or countermeasures. However, I learnt, the Chief is not new to such discussions as he is a member of the committee. The team intentionally includes him in every event they hold, as such I am convinced that his presence did not stand as a barrier to effective discussions. Considering that this was during the season when people in the community work in their gardens, the discussion was held during the afternoon in the

community's early childhood centre, which serves as a meeting place for the committee. The committee works hand in hand with the District Council, which is how I gained access to them.

In Zomba on the other hand, the discussions were done with 1 female and 2 males. These represented the development committee of Sadzi ward including the chairperson of the committee; and the chair and treasurer of a sub-committee called Sadzi Hill protection committee. My entry point into the study area was the Ward Councillor; a democratically elected person who represents local government subdivisions to the Council (Malawi Electoral Support Network 2010). Just as were other community gatherings and meetings, the discussion was held in the councillor's compound as it provided a central point. The discussion was also held in the afternoon, and in both sessions, in Salima and Zomba, lasted for an hour.

The discussions begun by asking the committee to explain their roles and duties, from which the predefined and elaborative questions followed. Notes were taken during the discussions, so too was audio recording of the proceedings. A number of issues were raised during the discussions which provided a good overview of the situation in the communities. Discussed were community leadership, history of weather related disasters like floods and droughts, narrations of events during and after the disasters, how the community and the committee was affected, and community coping and recovery efforts (see appendix v). Glesne (2011) writes that conducting focus groups earlier on in the study can provide the platform to learn about aspects of the research site, besides helping in reframing research questions. In this research, focus groups were the first to be conducted before personal interviews to explore and determine issues that further informed the line of questions incorporated in the interview guides for both primary and key informants. Through the same focus groups, I was also able to find locations ideal for observation. If focus groups were held subsequent to personal interviews, they would have provided the means to confirm, reaffirm and clarify my understanding of issues that developed in the research (ibid; Yin 2012). However, the research achieved the same through the one-on-one interviews with key informants which were conducted after interviews with primary informants.

4.3.1.2. Semi-structured interviews

Depending on how they are structured, interviews can either be structured; where the interview is fixed to predetermined set of questions and on the extreme opposite end, it can be unstructured; with no defined direction but that set by informants (Clifford et al. 2010). In the middle of the continuum is semi-structured interviews; where there are predefined questions,

but the researcher has room to revisit and revise the questions along the research process (Fontana & Frey 2005). This gives the researcher the flexibility to follow the leads of the participants' response, while still maintaining control over the direction of the proceeding. In this study, the interviews were organised based on the interview guides formulated beforehand (appendix i-iv). The interview guides were structured to consist of four sections: one for each research objective plus a preliminary questions section. Main issues covered were: the history of extreme weather events in the study areas i.e. type and time; effects experienced; socio-economic status of the population and their adaptive capacity. The open-ended nature of the questions allowed further discussions and provided "rich sources of data on people's experiences, opinions, aspirations and feelings" (Kitchin & Tate 2000, 213).

On the other hand, in asking how the participants were affected and their recovery and adaptive efforts and practices, the research seeks to indulge into personal, emotional and reflective aspects for the informant's lives. This called for care to be taken in arranging questions on the interview guide so that the discussions developed smoothly and comfortably. In this regard, the guide started with questions that participants felt comfortable with like their demographic data and area's history of EWEs- to establish the basis for discussion, then difficult, sensitive or thought provoking ones like effects and system of response followed on (Clifford et al. 2010). Setting the interview guide in this way not only made the interview to take on a more natural conversational way, but it also enabled participants to expound on their own health and life experiences widely and detailed. Criticized for its likelihood to sway off track, it also stands as its strength as it allows the researcher to dig into new and surprising or unexpected leads that arise in the course of the interview but would never have occurred to the researcher (Glesne 2011).

The interviews in this study were two-fold. The first were with the primary informants, who are women who had been affected by the extreme weather events in the chosen communities. They ranged from the ages of 23-69 years old and were purposely selected for having been victims of the EWEs as stated by the development committees (discussed further under Informants in 4.4.). In Salima, the interviews were held in the participants' individual homes, while in Zomba we meet at the Ward Councillor's compound. As much as having one meeting point in Zomba was convenient, it did not provide such a comfortable setting as did the visits to individual homes. With other meetings taking place at the same location and constant greetings and chats with passer-by's, the discussion and interviews had to be frequently paused

which affected the focus in the process' progress. Besides, meeting the participants' in their homes helped to observe their housing standard and supplemented judgements of their socioeconomic standing. However, frequent interruptions were also encountered from other inhabitants of the homes, mostly young children who were dependents of the women being interviewed. Interviewed one-on-one, each interview started with a brief introduction of myself and the study and its objectives. Even though agreeing to meet me was in itself a sign of consent, participants were again asked for permission to take part in the interview, while assuring them of their utmost anonymity and confidentiality. Conducted in the Chichewa, each interview lasted 30-45 minutes and were held upon prior notification.

A second set of interview was carried out with key informants; those in authority to speak not only on their behalf but for a larger community (Crang & Cook 2007). Interviews with these *elites* including council, health and NGO officials except for those with the Development Committees, came after interviews with primary informants in both study sites. This was done so that I could be acquainted with the situation on the ground so as to be prepared enough to ask the right questions, probe better and make the most of the limited time (ibid. 2007; Yin 2012). Elite interviews can be intimidating and officers tend to stick to institutions/ project descriptions, or rather brush some details aside. When I asked them questions on specific issues that arose in the field, it allowed me to get more than echoes of institution mantras.

However, realising how packed elites' schedules can be, contact was made before hand to book for appointment in advance (Crang & Cook 2007). Albeit the appointments, one interview with the District Risk Management Officer in Salima did not come through; instead a written response was given. One limitation with this was that, it did not offer me the possibility to probe further on the responses and there was no detailed explanation given as a face to face interview would have offered. All the interviews were conducted in the officials' offices; which in some was a little inconveniencing as they would be interrupted by their colleagues and with other staff being present in the offices, they did not fully express their opinion compared to where they were alone in the office. Lasting for an hour to an hour and half, all except for two who opted not, were audio recorded, this allowed me to focus and not miss out on any details that arose in the discussions. Whether recorded or not, the interviews were not completely different only those that were not recorded somehow proved to be a bit more engaging with more information flowing by that at times could not be captured exactly.

4.3.2. Field observations

Observations provide an opportunity to note and record first-hand information of social processes like behaviour, events and situations as well as the physical environment (Silverman, 2006). Classified as participant and non-participant observations, the former is described to involve full-scale immersion in the events of the research while the latter entails the researcher embedding into the research situation in an unobtrusive manner that does not affect the interaction being observed (Gatrell & Elliott 2009). I employed observations after the focus group discussions in both Salima and Zomba. These were done in form of transact walks around the community accompanied by members of the committees in Salima and by myself in Zomba. Lasting for an hour and a half in both locations, the idea was to observe the social and physical setting of the communities.

Through the observations I was able to take note of the variations in the housings standards, economic activities, health facilities, hygiene and sanitation amenities, water sources, and the landscape on which sits the study sites. This helped me to familiarise myself with the risk of exposure and vulnerability of the communities and the people. It also came in handy during the interviews; both with the primary and key informants, by providing good probing questions. I admit that if left to my own perceptions, interpretation of the observations may be biased. However, since in Salima I was accompanied by the two gentlemen from the committee, it allowed me to ask questions and get clarifications. Also in both study sites, raising up the issues observed with the interviews that followed assisted in shedding light and making proper meaning of the observations.

Additionally, in Salima I was also able to attend a weekly meeting of a sub-committee of the Civil Protection Committee responsible for tree planting (refer to Figure 4.1). This occurred in their recently created woodlot during the afternoon on the designated meeting day. During the meeting, I introduced myself and the study objective. Some of the women present were the ones I had interviews with prior to the meeting.

4.4. Informant sampling

The study engaged both primary and key informants to generate its primary data. These were chosen purposively, based on the assumed relevance of knowledge and experience they possess on their position (Clifford et al. 2010). Collectively, the study sought views from 24 informants (14 primary, and 10 key: 8 individuals and 2 groups). The sample size is because, the focus is

not to get statistical representation, rather the depth and richness of the information sourced (Crang & Cook 2007). The study investigates health impacts brought about by extreme weather events and the practices or interventions that have been put in place to recover from and adapt to both EWEs and the effects. Therefore, *primary informants* included women who have been victims of extreme weather events that have occurred in the study sites.



Figure 4.1 Attending a tree-planting committee weekly meeting
(Source: Fieldwork, Salima 2015)

African Institute of Development Policy and Population Action International (2012) argues that climate change and EWEs decreases the availability of natural resources like water, food and firewood which women in Malawi are responsible for collecting. Therefore, women and the children they are responsible for providing basics like food, bear the most burden of adverse impact of EWEs. Prior to that, Mirza (2003) wrote on Bangladesh's 1998 floods that women and children were particularly predisposed to death and ill-health. For this reason, the study intended to focus on women and children's health; with women as the primary informants.

Women of ages ranging from 23 to 69 both natives and settlers (Table 4.1) were systematically pre-selected with the help of the local leaders from the Development Committees I was working with. These were selected from the population of women whose households were registered by the committees to have suffered the impact of the extreme events. As much as this provided easy access to the informants, the sample was in some way biased as committee

leaders were drawn to select only those they found worst affected. However, this benefited the study in that it illuminated into the actual lived experiences of the target population rather than hearsay from those not affected. Oliver-Smith (2002) argues that disasters are experienced differently by different groups and individuals, thus generating multiple interpretations of the situation. The research focused only on women who were victims of the extreme weather events because it did not seek to unveil speculations about the situation rather richer and grounded information as the involved women spoke from their first-hand experience. Women were of different ages, marital status and length of stay in the study communities to present diversity of experiences.

Table 4.1 Primary informants (female) by age and study area

Age group	Salima	Zomba	Total
18-29	1	2	3
30-39	1	1	2
40-49	2	2	4
50-59	1	1	2
60-69	2	1	3
Total	7	7	14

Just as primary informants, a total of 10 *key informants* (Table 4.2 refers) were purposely selected for the study. These included all those in position of authority and vested with special knowledge hence possessing the mandate to speak on behalf of the community (Crang & Cook 2007). Key informant were sought for so as to provide a community and institutional perspective on the research subject. They included leaders at the local level; officials from government Health and Disaster Planning department, Non-governmental organisations (NGOs) both at district and national level. My first point of entry was an inquiry with the Department of Disaster Management Affairs (DoDMA) national head office in Lilongwe, where I acquired contacts of District Disaster Risk Management Officials. From district officials I was referred to project officers in NGOs, Environmental health officers at the district hospitals and Area Development Committees of the study sites. These referrals and

recommendations were influential in opening up doors, and enabling easy reach these *elites* (Darbi & Hall 2014).

Table 4.2 Key informants, by position and location

Position	Salima		Zomba		Total
	Female	Male	Female	Male	
Area Development Committee	2	3	1	2	8 (2 groups)
Project Officer (NGO)	0	1	1	0	2
Disaster Risk Management Official	0	1	0	1	2
Environmental Health Officer	0	1	1	0	2
Health Surveillance Assistant	1	0	0	0	1
Programme Manager-UNHabitat	1				1
Total	10		6		16 (8 nested into 2 FGDs)

4.5. Secondary data

Secondary data consists of information that has already been collected for another purpose, and are an indispensable element in research (Clifford et al. 2010). Kitchin and Tate (2000) further argue that secondary data provides the basis for claims of trustworthiness of research findings. Sources of secondary data ranges from government's records, project reports, media publication and policies. Yin (2012) together with Clifford et al. (2010) enlighten that secondary data are prepared and manipulated to serve a particular purpose by the developer, which might not necessarily match with the present research. Therefore, caution has to be taken in the use of the data. The research finds relevance in the disaster policies and action plans, survey reports, humanitarian reports and statements, national disaster profile, hospital disease surveillance records and project reports from the concerned NGOs. The disease surveillance in both Salima and Zomba were records from the nearest health centres which the population attended in the study sites. These were the district hospital and Lifeline private clinic in Salima,

and City dispensary and Sadzi health centre in Zomba. Both the national disaster profile and disease surveillance were collected over a 14-year period from 2000-2014, with 2015 being referred to, to have a good reflection of established trends thus far.

Secondary data was sought for two reasons. Firstly, was that it would provide a description of the characteristics of the study communities and population, and secondly, was that it would provide support for arguments raised in the study. Getting secondary data was not exactly easy. For example, after several attempts, I failed to access a project report by Malawi Red Cross Society which was very relevant to the study; an online abstract was used instead. Meanwhile, Zomba district disease surveillance reports could only be provided four months later after the fieldwork, hence affecting the progress of the analysis in a way.

4.6. Data process and analysis

In the process of making sense and order of the material gathered during the fieldwork, the audio recordings of interviews were transcribed verbatim to ensure that the views and expressions of the informants are captured exactly as they were given. Following that, the data was subjected to qualitatively analysis to gain understanding of the issues raised in the study. This involved Kitchin and Tate's “, description, classification and connection” (2003, 31). Hence, entailed “identifying themes, deciding upon their relationship and selecting important ones that lead to theoretical ideas” (Crang & Cook 2007, 133). The information from the fieldwork was correlated into themes responding to the objectives that were set out for this research, and from the discussions conclusion and recommendation were drawn. Even though, quantitative secondary data was employed to supplement qualitative data, it was also qualitatively analysed using a sort of enumerative to establish the how and/or why of EWEs and weather related diseases over the study period. The purpose was not to focus on the numerical strength of the figures rather to make contextual interpretation (Grbich 1999).

4.7. Positionality and reflexivity

One special element of qualitative research is the cognisance of the role and perspective of the researcher in the process (Ritchie & Lewis 2013). This is attributed to the fact that data collection rests on social relations and interaction between the researcher and the researched. Ritchie and Lewis (2013) explain that gathering high quality data depends on the researcher building up effective relationships. Therefore, researcher's age, sex, education status, behaviour, social skills, among other characters must be recognized. Realising the influence of

my position and personality, I had to be in constant check of myself-*reflexivity* and make amends in the research process where necessary throughout the process (Moser 2008).

In this research, it would be naive to ignore the influence my position: age, education status, sex, culture, language had during the research. Firstly, doing the research in my home country in some way made me an *insider* as I spoke the same language as the target population and related to their way of life besides being female just as my primary informants. Nonetheless, at the same time I still stood as an *outsider*, being not from the actual study communities (Crang & Cook 2007). Being an insider helped me to use the language of my informants and follow up on their expressions; as well as have an understanding of the power relations, especially during the focus group discussions. On the other hand, I exploited my outsider element to get more explanations and clarification on issues that arose in the interactions, and I noted that informants were willing to “educate the foreigner”.

I also recognise the power inequality that my being the “educated young girl” tended to bring forth in the interviews with the primary informants. They reckoned me as being of influence and presented themselves as utterly predisposed, which may not necessarily be the case. This put me at a compromising position as I was expected to help in monetary terms or otherwise. In other cases, they would not articulate their responses well enough but leave it up to me with the mind-set that I know better. With key informants however, the powers were somewhat reversed. I was at the mercy of the key informants. I turned up for interviews on time but had to wait for an hour or more on more than two occasions and in some cases information like health reports could not be released to me, as a student. I however had to take on a calm, determined character and continued pursuing them even though it seemed annoying to some.

4.8. Data quality

The goal of every research is to produce reliable and valid knowledge. Reliability is the repeatability or consistency of research findings while validity refers to soundness, authenticity and trustworthiness of a research (Kitchin & Tate 2000). Qualitative research produces what Moser (2008) and Kitchin and Tate (2000) call *situated knowledge*. It is therefore criticised for producing subjected knowledge; knowledge that, in quantitative sense, cannot be replicated therefore not reliable; and is highly influenced by the particular researcher therefore not valid. On a second note, since qualitative research employs a small sample size, it is faulted that the results it produces are not relevant nor applicable to the population outside the study setting.

However, qualitative research can still be reliable and valid (which qualitative research calls dependable and credibility respectively) (Glesne 2011). The *credibility* of this research rests on the triangulation of methods, informants and study sites. Having these different aspects in place provided grounds for the study to unveil authentic representation of experiences and thoughts (Gatrell & Elliott 2009; Yin 2012). Yin (2012) also assures that the use of multiple sources of evidence has the capacity to affirm the *dependability* of a research results. Gatrell and Elliott define dependability as the “minimization of idiosyncrasies in interpretations” (2009, 83), which occurs when there is a convergence of lines of evidence from three or more independent data sources. Kitchin and Tate (2000) referred to it as the repeatability or consistency in the study finding. This research used primary and key informants (from different institutions), three primary data collecting methods and reviewed secondary data sources. It is with this understanding that, the knowledge this research produces is both dependable and credible.

On the question of generalisation- the applicability of the research findings to other settings, point has to be made that this research does not seek to make generalisation to a larger population. The sample size is only 24, which for quantitative research is rather small, but the focus is not to attain representativeness of the people. Rather it sought to have deeper and saturated evidence from the informants involved. The idea is to make *analytical generalisation* rather than *statistical generalisation* (Yin 2012). Analytical generalisation is where a study can make statements that if using the same theoretical framework, other communities can find the findings from the present study relatable (ibid). That is, looking at the institutions, interventions, practices and behaviours that helped the two communities in Salima and Zomba in achieving resilience to EWEs and the consequent health impacts, other locations in the same situation would find them relevant.

4.9. Ethical considerations

A question of morality is another issue that any research must take into consideration. A researcher who is in keeping with research ethics behaves and treats people and places with integrity, justice and respect (Clifford et al. 2010). The same authors justify that behaving ethically aids in the maintenance of trust with the population in contact with, which is what qualitative research relies on to build relations and collect the data needed. With this in mind, one of the precautions that I as a researcher had to be careful was being aware of and consistent with the *culture* of the study communities in my dressing (ibid). Malawi being a predominately

conservative country, I had to suit my dressing and appearance with the setting of the study community by putting on less revealing clothes like long dresses and a wrapper on top during interviews in the study communities while I wore formal outfits to meetings with key informants. This was on the precept that my presentation has influence on how I get received, taken serious and fit into the community setting.

Secondly, and equally important was the seeking for *consent and voluntary participation* of the informants. This entails that participants are informed of the purpose and the intended use of the research. Crang and Cook (2007) also adds that it is ensuring that no coercion is used in recruiting respondents, rather that they voluntarily accept to take part. Before each interview, with the primary informants especially, permission of participation was asked of them. However, because they were picked by their leaders, I assume they did not have that much choice to bail out as it would be presumed as insubordination to their leaders. As for the key informants, when making the booking for appointment, the purpose and what is required of them was explained, in some cases an email of the project description was sent to them. Therefore, their participation was informed and voluntary.

Another ethical consideration that the research observed was that of ensuring privacy and confidentiality. Valentine (2001) states that asking people their experiences and opinions is an intrusion into their private lives. This study, asked for women's and their family and relations' experience with a painful event where they had lost property and even experienced ill-health. It also asked for their plans and thoughts, this is an invasion into their lives. Therefore, the study chose to keep them private by making them anonymous using only their sex, age and area or residence to refer to their statements (Crang & Cook 2007). Key informants who opted for anonymity will also have their identity concealed even though by mention of their position, it is somehow easy to pick them out. On the same, the recording and transcripts from the study will be stored only until the project is finalised therefore, not used for any other purposes other than the intended.

The last ethical dilemma which the research presented was the expectations my presence raised in the study population during the process. First, I noticed the constant mentioning of the need for financial assistance to invest into businesses as a means of recovery. This could have been because of misinformation of who I was. In Zomba, my contact introduced me to the informants as an official from the ministry of health, for example. I had to clarify to each informant that I was only a student. However, seeing and hearing the heart breaking stories from the women

raised strong sympathy in me that I had to take deliberate steps back to reflect about it. In the end, I resolved not to offer any monetary assistance, as that was not my position and neither did I have the capacity to, even if I wanted. The second instance was my own consciousness to the commitment the Area Development Committee showed in helping me move about the area and directing me from informants' house to another in Salima. Noting that their work is done as a volunteer service, and that their only project that financed their activities phased-out two years back, I had to provide lunches on the days I was in the community, paid them for the bicycle transportation they provided me with and refunded them on the expenses they made on calls. Clifford et al. (2010) write that there is no one prescribed standard of wrong or right regarding support, rather every situation or context will call for unique solutions to it. Even though giving money to informants is like giving a bribe for information, I was convinced that for the time and the sacrifice they made to help me, this compensation was befitting.

CHAPTER FIVE

OCCURRENCES OF EXTREME WEATHER EVENTS AND THE HEALTH EFFECTS

5.1. Introduction

Over the years, it has become more evident that the global climate is changing, and the intensity and frequency of it is on the increase. With the change in global climate are extreme weather events including heavy rainstorms, droughts and floods. In Chapter two, UN-Habitat (2007) noted that Africa and Asia has experienced the fastest rate of increase in such disasters and the effects are particularly higher. For example, Malawi faces multiple extreme weather induced hazards in both rural and urban areas. The nature and pattern of the EWEs is also changing in that there are increased occurrences; frequency, intensity, extent and impact of natural disasters. Concurrently, the world is and becoming even more urban as half of humanity currently reside in cities and a concentration of much of the world's assets are in cities; and thus a locus for much of the destruction and loss from disasters. The occurrence of climate related disasters presents a myriad of challenges to urban areas and their population ranging from human, material, economic, social and environmental sectors.

Therefore, this chapter endeavours to identify EWEs that have plagued urban areas of TA Kalonga in Salima and Sadzi ward in Zomba in Malawi and the health effects thereof. The chapter is divided into two sections. The first section, presents extreme weather situation in the study areas; occurrences and trends. The second part presents findings of the health effects to women and children based on both some quantifiable records and subjective perceptions.

5.2. Occurrence of EWEs

The first part of objective one purposed to establish the history of extreme weather events in the study sites and to identify the trend thereof (appendix ii). Derived from the national disaster profile from the Department of Disaster Management Affairs (DoDMA), Tables 5.1 and 5.2 below present a summary of the EWEs for the two study areas: Salima and Zomba between the years 2000-2014.

With almost yearly occurrence, floods, stormy rains and dry spell prove to be the most common manifestation of climate change in Malawi. This confirms UN-Habitat (2007) findings that floods and windstorms are prominent cause of risk and disaster to cities; and Menon (2007) conclusion, that floods, heavy storms, droughts and dry spells are main EWEs in Malawi. With

attention to the particular study areas; according to the national level records found during the study, Salima has had a yearly occurrence of floods and stormy rains; while the Salima District Council (2014) includes dry spells to the list. On the other hand, Zomba City Council (*unpublished b*) cites that the city is prone to both climate-related like flash floods and windstorms; and geomorphological risks like landslides. Confirming the City Council, the results show that Zomba district as a whole experiences floods and storms almost on a yearly basis. However, the city part of Zomba district has had its first experience with floods only in 2015 (Zomba City Council official, personal communication, August 4 2015).

The data (Tables 5.1 and 5.2) attempt to show frequency, duration, areal extent and magnitude of the identified EWEs (Adger 2006). Floods show to mainly occur in the months of January-February while stormy rains/heavy rains usually occur in November-December (with exception of a few cases in Zomba where floods have occurred in December and stormy rains in February and March), sometimes twice within one month. As such, this shows the interaction between the events; that heavy rains lead to floods. Nearly all EWEs did not have indication of the number of days the events occurred. Therefore, duration of the EWEs cannot be fully described or delimited.

The area of extent of the EWEs is presented by Traditional Authorities (TA) column (within Salima and Zomba districts) that experienced them. While Salima District Council (2014), recognises that all 12 TAs in the district are frequented with floods, the study shows that some TAs seem to take a great share of the floods. For example, Ndindi and Pemba in Salima have close to a yearly occurrence of either floods or stormy rains within the study period, while TA Kalonga seem to be a new areal extension of EWEs in the district (Table 5.1 refers). In Zomba, TA Chikowi, Malemia and Mwambo of Zomba district show to have for a long time frequently been hit by stormy rain and floods. However, since 2010, TA Mlumbe was included to the list and Zomba urban as of 2015 displaying the increase in area extent of EWEs (Table 5.2 refers).

Population affected column presents level of impact. It covers everything from loss of or damage to material things like houses and household properties, damage of crops in the fields; and displacement of, injuries and fatalities on human life. December to March, are growing months for maize (a major food crop and source of staple food in Malawi), with January and February as the most critical (Food and Agriculture Organisation of the United Nations 2016). Unfortunately, as observed, these are the very months when floods and dry spells occur. Thus threatening crop production, food security and eventually human health.

5.2.1. Floods

Floods are the most common cause of disaster (Smith 2001). In Salima, especially in the areas close to the lake and main rivers in the district like Linthipe and Lifidzi (refer to Figure 3.3), floods are a yearly event. The community in the study, Simeywa under TA Kalonga is said to experience floods due to the overflow of Linthipe river which borders it to the south and sometimes due to continuous rains. Besides the EWEs recorded in Tables 5.1 and 5.2, in January 2015, Malawi experienced the worst heavy rain storms and floods since independence. In the process, 15 districts (Chikwawa, Nsanje, Phalombe, Zomba, Rumphu, Karonga, Thyolo, Machinga, Mangochi, Ntcheu, Chiradzulu, Mulanje, Balaka, Salima and Blantyre) with a total population of 1,101,364 affected; either injured, killed, displaced or losing crops and livestock in the process (UNDAC 2015; World Food Programme 2015). Although Salima was among the worst hit, with 11 132 people experiencing both human and material loss and damage, it was the least affected. Semaiwa community was not affected much, instead it was the dry spell that followed that hit worst as articulated by the 45-year-old woman of the area: *“This year, our area did not get much flooding, as did TA Pemba area. However, we were affected by the dry spell that dried up all our crops”*. Reflecting that populations’ and communities’ exposure to and within a disaster is not uniform, rather heterogeneous just as the communities and nature of EWEs are (Galea et al. 2008).

The situation is a little different in Zomba. Zomba district as a whole, has had stormy rains that have caused floods. However, these were confined to the rural/ district part only like areas of TA Mlumbe, Kuntumanje and Mwambo as shown in Table 5.1 above (also refer to Figure 3.4). Zomba city had not experienced any floods until January 2015. Due to heavy rains that fell continuously for about a week, Likangala and Mulunguzi rivers (main rivers cutting across the city) overflowed and flooded (Figure 5.1) the surrounding communities in all 8 of the 10 wards in the city including: Masongola, Mtiya, Chambo, Chilunga, Mpira, Likangala, Sadzi, and Mbedza (Zomba City Council *unpublished b*). Respondents also attributed the flooding of the river to the heavy river flow from its source in Mtiya ward which lies on a higher altitude than Sadzi. With 132 566 people affected with either property damage and/or loss or ill-health and displacement, Zomba city and district was one of the six most hit districts in the southern region of the country.

Table 5.1 Summary of EWEs in Salima (2000-2014)

Year	Event	Occurrence	Traditional Authority	Population affected
2000	No event			
2001	Floods	February	Khombedza, Chikombe, Kuluunda, Ndindi, Msosa	9000 households (Houses and 7773 hectares of crops damaged). 3 deaths (drowned).
2002	Floods	January	Nkwidzi, Ngodzi	185 households (crops and livestock washed away)
2003	Floods	January	Maganga, Ndindi	27568 households: (houses damaged and crops washed away)
2004	No events			
2005	Drought	June	Countrywide	<i>(Not given)</i>
2006	Floods	March	Ndindi, Maganga, Pemba	250 households affected 376 hectares of crops flooded
		November	Pemba, Ndindi	85 households displaced
2007	Floods	February	Ndindi, Khombedza	41 houses damaged 100 hectares of crops destroyed
2008	No events			
2009	Stormy winds	December	Kalonga, Khombedza	240 houses damaged
2010	Floods	March	Kalonga, Pemba Maganga	6 households lost houses and properties
	Storms	November	Maganga	61 houses damaged
2011	Floods	January	Kalonga, Msosa, Pemba	250 households (houses and crops damaged)
2012	Floods	November	Ndindi, Pemba	276 households (houses and property lost)
	Stormy rains	November 18, 27	Kalonga, Ndindi, Pemba	486 houses partially and completely damaged 1 death 24 injuries
2013	Floods	January 6-11	Ndindi	450 household displaced
	Stormy rains		Kalonga	103 houses partially and completely damaged
2014	Floods	January February	Nkhombedzi Pemba	289 households (houses and crops damaged)
	Stormy rains	January	Pemba	81 houses damaged

(Source: Department of Disaster Management Affairs, Malawi)

Table 5.2 Summary of EWEs in Zomba (2000-2014)

Year	Event	Occurrence	Traditional Authority	Population affected
2000	Floods	December	Kuntumanje	13000 households (houses, properties, crops damaged)
2001	Stormy rain	November	Chikowi	9 houses blown away
2002	Floods	January	Chingale, Nsondole, Mpokwa	5443 households affected (72 houses damaged; 1160 hectares of crops destroyed)
2003	Floods	February	<i>(Not given)</i>	3252 households (1744 hectares of crops destroyed)
	Stormy winds	December 10, 26	Malemia	18 houses blown off
2004	Floods	February, March	Chikowi Mwambo	138 houses destroyed 101 hectares' crops damaged 6.8 hectares of land washed away
		December	Mwambo	
	Stormy rains	Mid-February, November December	Malemia Chikowi, Mwambo Malemia	Several houses blown off 40 houses blown off, School and churches, police unit damaged 11 houses and a school damaged 4 deaths
2005	Floods	January 9-10	Kuntumanje, Nkangula	1001 households affected (91 houses damaged, 277 hectares of crops washed away)
	Drought	June	Countrywide	<i>(Not given)</i>
	Heavy rains	December	Kuntumanje	94 houses damaged
2006	No events			
2007	Floods	February 3-4	Mwambo	94 houses damaged 20 hectares of crop destroyed
	Heavy rains	14-15 March	Chikowi, Mwambo	253 houses collapsed
2008	Floods	January	Kuntumanje Malemia, Mwambo Kuntumanje Malemia, Mwambo	1397 households affected (houses and crops damaged)
		February	Mkumbira	1182 households displaced 3515 households lost their crops
2009	No events			
2010	Stormy rains	December	Mlumbe	34 houses damaged
2011	Hailstorm	December	Mlumbe	50 houses damaged
2012	Hailstorm	January	Mlumbe	77 houses destroyed
2013	Floods	January 7-9	Chikowi, Malemia, Mlumbe Mwambo Ngwelero, Mkumbira	1431 houses completely and partially damaged 4 deaths
	Stormy rains	January 7-9	Malemia	89 houses partially and completely damaged
2014	No event			

(Source: Department of Disaster Management Affairs, Malawi)



Figure 5.1 Day two of Likangala river flooding (Source: Zomba City Council 2015)

5.2.2. Stormy rains

According to the records, also referred to as hail storm i.e. heavy rains accompanied with strong winds, stormy rains have been an annual occurrence in both Salima and Zomba. Both primary and key informants in Salima, recounted the 2012/2013 rainy season stormy winds and flooding as the worst they have experienced in the past decade. Malawi Red Cross Society Project Officer alluded to the same that: *“in terms of strong winds, stormy winds of 2013 represent the worst in TA Kalonga that over 400 households were affected”*. He described the area’s higher topography and the lack of tree cover as a cause for the strong winds. Zomba city has no record of strong winds. Instead confirming the records in Table 5.2, a representative of the Sadzi Hill protection committee explained knowledge of, areas outside the city like Jali frequently experiencing strong winds.

5.2.3. Dry spells

Even though not recognised in the national records, dry spells present another weather related disaster that has been experienced in Salima (Salima District Council 2012). The recent being the month-long one between January and February 2015. As the rest of the country struggled with floods, Salima was struck with a dry spell (also called agricultural drought). In this, a period of no rain followed what the respondents in the community called “good rains” in the previous month. This was alluded to by Civil Protection Committee of Simeywa: *“... heavy continuous rains in December 2014, were followed by a month of no rains at all in the whole month of January”*. There was no record of dry spells in Zomba city in the study period, except

for the country wide drought of 2005. While AFIDEP-PAI (2012) also include the dry spell that affected the whole Zomba district in 2011, it shows the presence of discrepancies in the data that to a certain extent influences the trend of EWEs portrayed in the district and city.

5.3. The trend of EWEs

The Government of Malawi (GoM 2015a) declared that in the face of climate change, population growth, urbanization and environmental degradation, the frequency and intensity of disasters have been increasing in the country. This is true with the nature and manner of extreme weather events. Asked in terms of frequency of occurrence, intensity, magnitude and areal extent, the study confirms the assertion that disasters are no longer unforeseen (ibid). According to the vice-chairperson of Simeywa Civil Protection Committee (male, in his 70s), the area has experienced very erratic rainfall pattern, which has brought either floods and/or dry spells: *“over the years there has been very erratic rainfall seasons, in that rains start and stop early for example from November-January instead of December-March or indeed start late and stop early.”* This was echoed by some of the informants who asserted that the frequency and intensity of extreme weather events have been on the increase. Noted was the intensity of winds. *“Winds are blowing very strongly these days compared to past years”*, stated the 69 years old woman who has lived all her life in the area. They attributed the increase in the speed of winds to the rampant cutting down of trees that has occurred in the areas which has left the it bare, which coupled with being a lakeshore district, leaves it more exposed to strong winds (Salima District Council 2014). Besides the almost yearly occurrence of floods and storms, from the records, both Salima and Zomba has seen a jump in the frequency of the occurrences. With time the floods and stormy rains are happening twice a year within the rain season: November-December and January-February.

In its first ever Risk Management plan, Zomba City Council (*unpublished b*), recognises that the city is at risk of geo-hazards like earth-tremors and weather related hazards like strong winds and heavy rains that lead to floods. However, when asked if there have been any extreme weather events in the council’s area of jurisdiction, a key informant working with the City Council for over 5 years, recalls no experience of such in the past 10-15 years. He also expressed that the Council did not keep any records at all of such events. On the same, the 52-year-old resident of Sadzi echoed what all other primary respondents mentioned, that: *“...before this year’s floods, river Likangala would swell, but never overflow. This flooding*

and such strong winds were the first and the worst I have experienced so far.” This furthers the point that EWEs are extending into the city in Zomba district.

Unfortunately, the data present does not provide intensity and magnitude captured in figures of strength and volume of the EWEs, hence restricting the study from make any further credible and verifiable discussion on these elements. Notwithstanding the shortfalls, it is clear that the geographical extent of EWEs is changing in Zomba; in that areas that were once free of hazards like floods now stand exposed (GoM 2015b; Menon 2007). The same could be said about TA Kalonga, Salima; in that since 2000, it is only from 2009 that the area started experiencing EWEs. Simeywa CPC explained that, laying on a relatively flat area and with no drainage system, TA Kalonga which makes the town of Salima easily flooded. However, since the construction of the drainages along the main road in 1988-1992 (Misomali 2014), flooding has been under control.

Additionally, it can be observed that there has been a constant alternation of rise and fall in the impact of EWEs in both Salima and Zomba. Impact is presented by number of household affected i.e. number of damaged houses and hectares of crops destroyed. Besides, the type and intensity of the EWEs, the scale of impact is dependent on existing conditions of the affected communities (Oliver-Smith & Hoffman 1999). Pelling (2003) advances that the nature of impact is determined by human vulnerability due to socio-economic factors rather than the frequency and magnitude of the extreme weather processes. While the impact has been relatively the same in Salima and Zomba, it could be argued that cities are accruing a lot of losses and damages as seen from the January 2015 floods. The Post Disaster Needs Assessment (GoM 2015b) revealed that quantified in economic terms, Salima represented only 0.5 % of the physical, social and economic damages and losses. Zomba incurred 12.6 % with the highest being in Blantyre, the country’s commercial city, at 16.4 percent.

5.4. Risk perception: the awakening to urban disasters

Discussions with key informants revealed that urban areas and cities in Malawi were considered to be safe from natural disasters. It was understood that urban areas and cities have not experienced any long-standing disasters apart from the devastating earthquake that struck Karonga town in 2009 and sporadic hail storms in some parts of Lilongwe city in 2007, 2010 and 2013. In describing the situation, Zomba City Council’s representative explains here that *“...the belief even at DoDMA was that cities are immune to disasters. Even though in the past 10 years, things have been happening in urban areas that have made headlines”*. This advances

Heijman's (2001) proposition that previous experience with a risk, influences perception of danger and risk and through such perception, reality is constructed (Adams 1993).

The study makes cognisance that experience with a hazard influences individual and a community's view on their threat to risk. Such that floods, storms and dry spells seem to have become commonplace events in the small urban area of Salima, while in Zomba city, the threat to EWEs was completely unrecognised. However, the series of events in the 2014/2015 rainy season including the hailstorms and floods experienced in Blantyre city in November-December 2014 and January floods in Zomba city were a wake-up call. UN-Habitat Malawi Programme Manager is quoted describing this as what "*...raised alarm that towns, cities in the country are least capacitated to handle urban risks*", and that "*...cities and urban areas have been planned in the traditional sense that they are without enough or no readiness for such events and circumstances.*" As such, the study would argue that, urban areas in Malawi stand exposed, highly sensitive as they are bound to be severely affected and lack capacity to moderate potential damage hence vulnerable to risk of EWEs (IPPC 2012; Wisner et al. 2004). This was the same conclusion Joshua and colleagues (2014) came to in describing the urban disasters in Southern Africa; that just as is the case in Zimbabwe, disaster assessment in Malawi is focused on rural areas thus the magnitude of severity in specific urban areas, remains not clearly known.

5.5. Effects of extreme weather on urban areas: EWEs and human health

Several health problems induced by or related to EWEs were unveiled during this study. What also came out clear is that the health risk EWEs raises are not only numerous, but are through complex and interrelated direct and indirect pathways (Greenough et al. 2001; McMichael 2003). Direct health effects found includes, injuries and deaths encountered in the disaster. While indirect effects also called secondary impacts are associated with changes in ecological systems such as land and water, and human population displacement (Barata et al. 2011; Greenough et al. 2001) like infectious water-borne, vector-borne and sanitation diseases, malnutrition and mental stress. Agreeing with the environment element in the triangle of human ecology (Meade & Earickson 2000; Meade & Emch 2010), the study finds that through the change in the environment, human health is affected. However, the research agrees with Barata et al. (2011) and CDC (2015) in observing that EWEs do not introduce any new health threats, in its stead existing health threats and latent outbreaks instance are intensified.

Using disease surveillance data from health facilities in the study areas and interview discussions with both key and primary informants, this section of the chapter, explores and discusses the health effects discovered to be associated with EWEs. Depending on the main EWEs identified during the research (floods, dry spells and storms), the study focused on both bodily and mental diseases. The intention was to focus on women and children personal health experiences during EWEs; and the general view of the community and the experts on the pattern of the diseases during the periods of EWEs and on “normal” times. However, unable to access age/sex specific data, the data present could not allow separate analysis for age (except for under-5 Malaria) and sex. From the disease surveillance data, attention was given to the incidence numbers to discover if there is any defined pattern between years with EWEs and years without. Generally, six health problems emerged in the process: injuries, mental health, communicable, vector-borne diseases, malnutrition and sexually transmitted infections. These are both fatal and/or non-fatal, as well as short and/or long term.

5.5.1. Injuries and fatalities

The built environment encompasses manmade components of people’s surroundings including infrastructures and buildings making up houses, offices, and transport systems among others (Younger et al. 2008). Besides contributing to climate change, the geographical, material, and structural attributes of the built environment constitute a great contributor to the health of the occupants, even more so in the presence of EWEs (ibid; Bambrick et al. 2011). This is also what this study revealed. Floods and strong winds caused numerous damage to houses and community facilities like churches and schools in the study areas. When strong winds hit Semaiwa area in 2013, 159 houses were blown off including those for the 6 women interviewed in this research (Semaiwa CPC, personal communication, July 14 2015). Case in point is the Figure 5.2 (a) below of one of the houses damaged by this particular storm. When roofs (worse still iron sheet roofs) and loose materials fly due to the winds and/or building walls fall in the storm and floods, lives are at risk of injuries and indeed death. In the Salima case, one slight injury was recorded in the area during this event: one elderly and stroked husband to one of the informants sustained a broken arm when the roof of their house fell on him (woman of 66 years in Semaiwa, personal communication, July 15 2015).

In Zomba, the flood also caused damage to houses (refer to Figure 5.2 b). Walls of houses crumbled under the heavy rains and gushy flowing waters. One fatality of a pregnant woman was recorded as a result of being carried away by the flood. Injuries of broken legs to two

children from different families were also reported. “My six years old boy was hit by our house wall as it fell. I had to spend a month in the hospital with him”, reported the 32-year-old mother of 3 of Sadzi, Zomba. In total, 10 deaths of 3 children, 5 women and 2 men were recorded as a result of injuries from falling buildings, trees and from drowning during the floods. It therefore would be argued that due to such related injuries and premature deaths, EWEs increase the health risk of people and communities through its impact on their built environment (Nigatu et al. 2014).



(a): House damaged by stormy wind

(b) House damaged by floods in Zomba

Figure 5.2 Houses damaged by EWEs

(Sources: Salima District Assembly (2013) and Zomba City Council (2015))

5.5.2. Mental health: worry and stress

The CDC (2015) points out that the disruption of physical, biological, and ecological systems due to climate change, presents mental health threats to communities. Adverse weather events affect mental health directly by exposing people to trauma as well as indirectly, by affecting physical health and community wellbeing (Berry et al. 2010). While exposed groups can ‘protect’ themselves from injuries and acute diseases through evacuation, they cannot ‘protect’ themselves against losses due to immobile properties like houses and crops. In both Salima and Zomba, the destruction of houses not only caused deaths and injuries nor did the destruction of crop land only result in reduced food production, instead it also caused worry and mental stress. Properties and years long investments were lost in the floods and storm, and the effect is aggravated by the increased frequency of EWEs occurrence. ActionAid (2006) argue that, it is because of this recurrent occurrence of floods and drought in Malawi that makes it difficult for individuals like farmers and communities to recover.

When asked what problems the experience with EWEs has brought upon their families, some of the women had the following to say:

“We lost property that we had invested in and relied on for a long time, even the maize flour we had prepared to last through the rainy season...and now we don’t even have food. We are forced to start all over again from the scratch. And not having a job, but depending on farming makes things even difficult. Our field was also flooded and later the crops dried up in the dry spell that followed. I don’t know how I will feed the children...” with watery eyes, narrated the 35-year-old mother of 3 children also a guardian to three young men in Salima.

“We lost two houses besides our household property. We used to rent out the other house and get an income to provide for the family as well as pay school fees for the kids. Now that we don’t have that anymore, it has been hard and I can’t stop thinking of how I will make ends meet” 44-year-old mother of 7 children, Zomba.

“My house was lost in the flood, and I haven’t been able to reconstruct it. After staying at the camp, my family now stays at friend’s place. It is difficult to really live free and go about one’s business in such a setting.” 41-year-old widow of 4 children, Zomba

Mental health receives little consideration in relation to how populations will be mentally affected by climate change, perhaps due to its ‘neglected’ status as the poor relation of health (Berry et al. 2010). As a country, until recently mental illness unless severe was not recognised and is still stigmatised. However, from the resonating statements above, loss of property, possession, life and source of livelihood is a psychological insult causing worry, anxiety of the future and consequent alteration in thinking, mood and behaviour as well as associated distress. Women, especially showed more signs of worry in their composition and narration, which could be attributed their nature as carers and nurturers; which is strained by livelihood losses caused by the EWEs (Peacock et al. 2004).

Not only was the stress on the population in the adverse event only, but also other institutions involved. For example, the Environmental Health Officer at Zomba District Health Office recounted of how: *“...there was a lot of burn out and frustration among the staff as we were forced to work every day, even on weekends for about four months on straight. In the end, after camps were closed down, everyone claimed their annual leave allocation.”* Zomba has never had such a EWEs experience before, and modified their occupation and working conditions as

proposed in the human ecology of disease (Meade & Emch 2010). So, clearly, the experience was a traumatic and trying moment on both service health providers and the local communities.

5.5.3. Communicable diseases

Following the 2000 floods, Mozambique experienced an outbreak of diarrhoea (Kouadio et al. 2012). This occurred following Waring and Brown's (2005), writing after the 2004 Indian Ocean tsunami, proposition that the threat of infectious disease outbreaks is high in the days and weeks following such disasters. They argue, it is due to the displacement of large numbers of people who are forced to seek temporary shelter in often crowded conditions with inadequate sanitation and waste management, and compromised water quality. This crowding can facilitate the transmission of communicable diseases (Watson et al. 2007) like diarrhoeal diseases, measles, influenza and whooping cough. The study revealed the same, that diarrhoeal diseases and in extreme cases cholera; scabies; measles were spotted in the temporary shelters as it is explained below by the different informants in both Salima and Zomba:

“Both my two young children had diarrhoea in the camp...the hygiene in the camp was not very good. For example, there was very few toilets against many families. And since we had lost most of our possessions in the flood, we sometimes used to go into the toilets, which was often not in a good shape, without shoes on or any protection” 29-year-old mother of 3 from Sadzi, Zomba.

“Personal hygiene was compromised in the camp that there was incidence of scabies in the camps on both women and men. There was also rumours of cholera and bloody diarrhoea outbreak. There were 3 cholera suspects though, so the department was always on alert.”
Zomba Environment Health Officer

“I feel like, even though the camp provided us with shelter in time of need but we also got diseases from there...because a lot of us were crowded in a small place.” recalls the 45-year-old woman of Salima.

These statements profess the fact that due to the lack of resources and organisation of aid and reconstruction work, hygiene is compromised in the aftermath of disasters (Waring & Brown 2005). In the two study communities, hygiene facilities like toilets were lost in the floods, waters sources dried in the dry spell while those displaced were relocated into over-crowded shelter points. Thus creating conducive environment for the breeding and spread of sanitary infections.

The fact that the temporary shelters were raised just in the moment to respond to the emergency situation, aggravated the problem even more. Without planning and proper utilities, the displaced families were relocated into school blocks and churches in both Salima and Zomba. For instance, the temporary shelter in Sadzi was at ETF Education Centre, which only had less than 5 toilets and one borehole providing for 2185 people (Zomba DHO Environmental Health Officer, personal communication, 4 August 2015). The changes in human conditions, the ecosystem of pathogens and in the environment facilitate the occurrence and transmission of infectious diseases such as diarrhoea, dysentery and measles (Kouadio et al. 2012).

Not only were the sanitation and hygiene problems confined to the temporary shelters, but also within individuals' homes. There was repeated mention of toilets (pit latrines made of fresh bricks and grass thatched) being washed away or damaged by the floods and storms as well as water sources being destroyed in both Salima and Zomba. Unlike, in Zomba, most families either sourced their water from paying communal water taps or tapped water installed at their compounds. In Salima however, most of the families depended on shallow wells, which with the occurrence of floods and storms for example, provides a likelihood of water contamination. Therefore, presenting an instance of cumulative risk where pre-existing poor water and sanitation conditions exacerbated the risk for such infectious disease (Kouadio et al. 2012).

With the above sentiments, from both the locals and service providers, it would be expected that thresholds of -in this case bloody diarrhoea, would shoot high in the periods of EWEs. However, disease surveillance records over the years, do not show any distinct differences (see Tables 5.3 and 5.4). According to Salima, it would even be argued that, it is during the rainy season in years without any EWEs that the incidences are high. While in the years, with floods or stormy rains, incidence numbers are few, yet spread throughout the year. This could probably be explained based on what the Salima Environmental Health Officer mentioned: "*In the event of heavy rains, we provide our Health Surveillance Assistants, with granules of chlorine to distribute in communities to treat their water*". Hence, confirming that, the realisation of impending risk defines decision-making and behaviours. With better adapted precautionary measures being adopted in the periods of disaster than in years without (Scott et al. 2010). Also, where risk is known, from previous experience for example, unlike where the hazard came as an *uncertainty* (Pennings & Grossman 2008; Whitmarsh 2008), are relevant precautionary measures put in place.

Table 5.3 Bloody Diarrhoea incidences (absolute figures) for Salima (Jan 2000-Feb 2015)

Month/Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
January	0	9	0	23	42	0	4 ¹	4	0 ³	4 ³	4 ¹
February	0	0	0 ¹	0	0	4	2	4	4	5 ¹	4
March	0	0 ¹	0	0	0	2 ¹	4	0	0	4	
April	0	0	10	0	2	2	1	2	2	2	
May	0	0	5	0	0	0	1	0	4	2	
June	11	0	0	0	2	2	1	0	1	2	
July	0	0	0	0	0	1	1	2	6	4	
August	0	0	0	0	0	2	2	4	7	1	
September	0	0	0	27	0	4	4	2	4	3	
October	0	0	4	15	0	11	4	0	8	6	
November	0	0 ¹	1	8	8	0 ²	0	4 ³	4	6	
December	3	9	17	0	0 ²	0	8	11	6	6	
Total	14	18	37	73	54	28	32	33	46	55	8

* Records were not complete by the time of the research

¹=Floods;

²=Stormy winds and rains;

³ =Stormy Rains and Floods

(Source: Salima District Hospital 2015)

Table 5.3 Diarrhoea incidences (absolute figures) for Zomba (July-June 2015)

Month/Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	0	131	99	96	94	34	96	91	112	104	74 ¹
February	0	168	67	58	75	32	167	110	89	200	126
March	0	127	94	73	29	35	133	139	101	128	133
April	0	67	56	31	33	33	90	116	73	81	81
May	0	108	77	22	67	49	102	178	97	78	117
June	0	65	96	46	50	20	119	134	114	53	90
July	108	68	41	30	26	21	47	41*	93	57	
August	89	87	95	30	20	17	54	53	131	63	
September	54	67	56	34	38	19	90	71	115	89	
October	37	144	94	14	43	31	65	77	146	74	
November	87	188	84	22	49	34	80	55	91	84	
December	115	112	49	25	42	181	46	77	167	80	
Total	490	1332	908	481	566	506	1089	1142	1329	1091	621

¹=Floods

*=Records from Sadzi Health Centre only

(Source: Zomba District Health Office 2015)

In Zomba, while these are the numbers of new cases from the health facilities, over 50 cases of non-bloody diarrhoea and over 30 of bloody-diarrhoea were recorded within the first month of four in temporary shelters- both within the city including the one in Sadzi and those out of the city. The Environmental Health Officer at the central hospital in Zomba explained that bloody-

diarrhoea is rare, and to have such numbers within a month is definitely attributed to the compromised sanitation hygiene in the camps.

Apart from the said communicable diseases, with the displacement, incidences of acute respiratory infections were found high especially among children in the temporary shelters. The Environmental Health Officer in Zomba attributed this to the fact that having lost their property in the floods most families had nothing to keep warm instead slept in the cold and open in the chilly nights of the rainy season.

5.5.4. Vector-borne diseases

Vector-borne diseases like malaria and schistosomiasis are diseases that are spread by insect vectors. The insects act as an essential stage in the transmission of the infection from one person to another or from animal hosts to humans (Hunter 2003). In line with Waring and Brown (2008) the study finds that, the risk of acquiring malaria, dengue fever, schistosomiasis among others is very high following weather related disasters like floods and storms. Mainly it is due to the increase in the vector breeding sites and high exposure to and proliferation of disease vectors (Kouadio et al. 2012). With reference to Malaria incidence in under-five year olds, the study reveals the influence of EWEs in both Salima and Zomba as attested to both secondary data from the health facilities recorded and the narratives from primary and key informants.

The Environmental Health Officer (male, in the 30s) at Salima District hospital explained of the situation in the following way: *“During the rainy season there is a lot stagnant water and tall grass which are conducive environments for mosquitoes to breed...this is even more when the area receives heavy rains, and floods. In such periods we have an increased number of new malaria cases.”* This statement agrees with the proposition advanced by the triangle of human ecology; that the natural environment which is also modified by changes brought by climate change like EWEs can encourage the spread of diseases (Meade & Earickson 2000). One woman in Sadzi (aged 56) explained that: *“At the camp we slept without mosquito nets as we had lost most of our property in the flood. I believe that this is why two of my children were on and of malaria while we were there...they get malaria, especially during the rainy season, like January and February, but not as often as this year, within as a short period of time”.* Signifying therefore that not only the natural environment, but also the built and social environment modified by EWEs exposes people to the risk of Malaria especially to the vulnerable under-fives and pregnant women.

Malaria is a leading cause of morbidity and mortality in Malawi, especially among under 5-year-old children (Kazembe 2007). However, analysis of the under-fives new malaria cases in both Salima and Zomba collected from health facilities in or close to the study sites reveal no substantial difference in the periods with and without EWEs. The figures support the remark made by the Environmental Health Officer at Zomba DHO that: “*New cases of malaria, are usually high during the rainy season....so I don’t think the occurrence of floods had as much influence on the number of cases. However, there is a slight shoot in the thresholds.*” From the health centre records both Salima and Zomba (Table 5.5 and 5.6 refers), it can be observed that the occurrence of floods or stormy winds, does not present pronounced alteration on the pattern of incidence and distribution of malaria, especially that the disease is endemic to all areas in Malawi (ibid). Malaria incubation period is 4-8 weeks, and it will be noticed, that in the periods of floods or stormy rains, malaria cases are still high 2 months later. This is what Bissell (1983) described as “*delayed-impact*”, where peaks in incidence of diseases like typhoid, hepatitis and measles were observed months after the initial impact of hurricane in Dominican Republic.

Table 5.4 Under-5s Malaria incidences (absolute figures) for Salima (Jan 2000-Feb 2015)

Month/Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015*
January	516	2942	2904	3481	4676	4371	2194 ¹	1304	830 ³	1824 ³	1674 ¹
February	2478	3629	2144 ¹	2716	4324	2679	1706	1450	801	1721	4332
March	2027	3660 ¹	2278	3017	3161	4214 ¹	2166	1447	955	2427	
April	2106	3051	1769	3059	3199	4870	1712	1350	978	3142	
May	1862	2851	1900	2904	4051	5723	1378	1536	857	1965	
June	2221	1229	2053	3533	3554	3324	1660	1175	534	2092	
July	999	1058	389	1800	4390	2555	845	826	457	1309	
August	1565	1384	1737	2309	3367	2190	1346	762	514	991	
Sept	1354	1451	2344	2497	3789	2189	1722	856	1003	1138	
October	361	1970	2943	3401	3749	2748	2060	1618	1112	1270	
November	1738	1674 ¹	2833	2603	2139	2495 ²	1397	812 ³	786	1632	
December	1396	2182	1930	3436	2847 ²	1912	1295	599	653	1021	
Total	18632	27081	25224	34756	43246	39270	19481	13735	9480	20532	6006

* =Records were not complete by the time of the research

¹=Floods

²=Stormy winds and rains

³= Floods and Stormy winds and rains

(Source: Salima District Hospital 2015)

Besides, the increase in breeding sites for vector-borne disease, Kazembe (2007) argues that household and community activities like income generating activities also increases their exposure to such disease. In Salima, the study community is involved in cultivation of crops and fishing along the river bank, and thus further exposed not only to mosquitos but also snails

causing bilharzia/ schistosomiasis. This bolsters the proposition that peoples' behaviour manifested in their means of production (Meade & Earickson 2000; Oppong & Harold 2010) determines their exposure to disease risk.

Table 5.5 Under-5s Malaria incidence (absolute figures) for Zomba (July 2005-June 2015)

Month/Year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January	0	1029	807	1186	968	860	1647	1145	409	676	578 ¹
February	0	917	621	891	855	1084	1299	1205	342	899	573
March	0	1039	672	534	541	489	1227	1071	137	592	449
April	0	420	526	557	499	611	1046	648	340	645	582
May	0	405	668	920	650	441	1158	739	345	519	538
June	0	235	493	592	628	544	978	582*	156	448	442
July	325	226	437	488	436	655	755	323	147	268	
August	332	366	701	455	427	615	563	135	72	235	
Sept	410	389	687	755	521	422	644	194	87	232	
October	498	391	952	625	715	474	522	240	242	311	
November	535	477	1185	543	443	590	582	183	276	284	
December	733	632	916	795	792	981	785	234	251	402	
Total	2833	6526	8665	8341	7475	7766	11206	6699	2804	5511	3162

¹=Floods

* =Records from Sadzi Health Centre only

(Source: Zomba District Health Office 2015)

5.5.5. Malnutrition

Reporting on famine in Malawi, ActionAid (2006) made a conclusion that droughts and floods affect crop production heavily in rural farmers of the country. In agreement Brown (2011) argues that this is largely due to the sole reliance on subsistence rain-fed agriculture. With maize being the main source of staple food, decreased yields in times of climate variability and extreme weather events the county is at risk of food insecurity and malnutrition (ibid). This happening in a setting where Baro and Deubel (2006) argue is faced with chronic food insecurity, results in endemic threats of famine and increasing number of malnourished population. This study finds that EWEs are affecting food production system in the two study communities. Heavy continuous rains in the critical maize growing period for example erode and flood the fields while dry spell dries the plants before maturing. Agreeing with WFP (2015) and FAO (2016), farming being the sole source of both food and household income in nearly all the households involved in this study in both Salima and Zomba, floods and dry-spells led to wide spread food insecurity. In explaining how the floods and dry spell has affected the family one lady in Salima explained: “our farm yields have been very low, we are now forced to live on one meal a day...I am breastfeeding, that is also affecting the growth of my

child...and lately I see that he has lost weight. The HSA says it is because he is not being well-fed.” (23-year-old mother of 2 under-fives).

Just as was the case with Malaria, (see in 5.4.4.) the Environmental Health Officer (male, aged 39, Zomba DHO) echoes Bissell’s (1983) “*delayed-impact*” in describing the situation that: “*Zomba has experienced what I would call a “double tragedy” in food production. Farms were destroyed with the heavy rains and floods, and then this was followed by a dry spell...after analysis of the nutrition data, we can come up with a proper comment on the impact of this food shortage...but at the moment, by looking at raw figures and the amount of therapeutic cream that has and still is being distributed to children, I can clearly see a difference from the years before.*”. Even though the time of the research was not ideal to get a clear picture of the impact, however Mohamed (2016) reporting a year later after the disaster explains that the occurrence of the two extreme weather patterns consecutively has caused critical food crisis in the country which has led to serious nutrition problems especially on children. However, since the community in Salima has had long-time previous experience of EWEs, discussions with HSA of Semiawa (female aged 40), showed that malnutrition is indeed a consequent problem. She mentioned: “*...after floods or drought, malnutrition is one of the problems common in the community I work in, especially in children...because we get little harvest and have to depend on buying, but with little finances most families often can hardly afford even a single proper meal a day.*” Her explanation resounds the role of power accumulation and distribution expressed in income levels of the population in the affected communities. Chapter 7 under “socio-economic conditions” reveals that the study communities are a typical example of informal urban settlements with a concentration of low income households yet with pockets of high income people. The destruction of crop fields and failed harvest threaten the livelihoods of the families. Unfortunately, when there is situation of low harvest, food prices are hiked to exorbitant levels that only those with the financial muscles can afford (FAO 2016). Henceforth, putting the 72.7 % of the country’s population below poverty line (UNDP 2015) at risk of poor diet and malnutrition.

5.5.6. Sexual Transmitted Infections (STIs)

Despite conflicting reports (Khaw et al. 2000 & Spiegel 2004), disasters as are conflicts, encourage the risk to STIs like HIV/AIDS. The study, finds this to be the case in the study communities too. Explaining the issue, the HSA of Semaiwa explained that notwithstanding the culture of the community where promiscuous sexual practices like ‘*wife/husband sharing*’, the shock of EWEs pushes women specially to resort to sex as a survival strategy for basic

commodities such as food and shelter (Khaw et al. 2000). She explained: “*What we see is that most women from female-headed households whose livelihoods are completely disturbed by EWEs turn to sex to provide for their families*” (female aged 40, Salima). Therefore, the economic vulnerability of female-headed households and the occurrence of shocks of EWEs forces adoption of behaviours that present increased risk of STIs like HIV/AIDS, syphilis, gonorrhoea and chlamydia. With no power to bargain for protection or even the access to protection, their means of survival presents health threat. On the other hand, the Environmental Health Officer in Zomba, described what he called a ‘*surprising finding*’ in the temporary shelters: “*initially we had thought of providing the people in the camps condoms, but they refused and instead asked for food items. Funny enough, later on we recorded quite a large number of STI incidences in the camps.*” This he speculated may be due to the crowding of men and women within the same place and the disruption of sexual networks caused by the displacement of families. Even though the study did not collect any statistics on STI incidence, the Post Disaster Needs Assessment reported increased numbers of STIs including HIV/AIDS in the camps attributed to sexual assaults (GoM 2015b). This reflects the potential risk EWEs presents to women and children in particular.

5.6. Summary

Firstly, this chapter sought to give substance to the claim that urban areas in Salima and Zomba are faced with increasing hazards in the form of extreme weather events. It has therefore, in terms of type, frequency, areal extent, intensity and impact of EWEs shown that urban areas are indeed becoming the new target of EWEs like floods, strong wind and drought. Using data recorded over a period of 14 years by the DoDMA in the country, and supplemented by narratives from both key and primary informants, the study shows that EWEs are extending their area of coverage to urban areas, like cities. As experienced in the January 2015 floods and dry spell that followed most affected were informal urban low-income settlements in both Blantyre and Zomba cities as well as other small towns. However, without measurable representation of the strength and volume of the EWEs, intensity and magnitude of the events can only be speculated based on recall of previous experiences. Despite the observed intensification of EWEs, the study posits that it is rather the vulnerability of the communities standing in the risk line of EWEs that is the main problem.

The study also strived to argue that the identified EWEs present health problems to the affected communities basing on the framework of the triangle of human ecology (Meade & Earickson 2000; Meade & Emch 2010). Not specific to women and children except for Malaria, different

relevant bodily and psychosomatic diseases were identified to be somehow affected by the change in the environment, behaviour and population. However, even though some impact can only be identified over time, like in the case of malnutrition, the study is of the view that, the occurrence of EWEs does not have very dramatic impact on the incidence of most of the identified infections. This could be attributed to that most of infections like vector-borne and water related diseases are already 'seasonal diseases' by nature. Since the diseases are nearly scheduled, communities and health authorities put in place precautionary measures hence even in time of EWEs, records show fewer disease cases. Therefore, besides the data itself having defects, it may also not have presented the actual picture on the ground. However, the study also employed narratives from both the affected communities and authorities involved in the communities, hence substantiating the records and this study's findings.

CHAPTER SIX

URBAN POOR COMMUNITIES VULNERABILITY AND RESILIENCE TO EXTREME WEATHER EVENTS

6.1. Introduction

This chapter analyses the vulnerability and resilience/adaptability of urban-poor communities in Malawi to extreme weather events and its health impacts. It responds to questions three and four of the research, therefore is comprised of two sections. The first section explores factors and characteristics explaining urban-poor communities' (with particular reference to women and children) degree of exposure, sensitivity and adaptive capacity in the face of EWEs. The second section seeks to assess urban-poor communities' adaptive capacity (resilience).

The first section builds on the previous chapter, which showed that the areal extent of EWEs in Salima and Zomba is extending to urban areas and the effects are far reaching. Drawing on the data from observations, group discussions and the interviews with both primary and key informants, this part of the chapter seeks to explain how and what makes urban-poor communities of Malawi stand at risk to the occurrence, frequency and impact of EWEs. The chapter bases its argument on the understanding that storms, floods, droughts and heat waves per se are not disasters on their own, instead they are triggered by vulnerabilities of communities to the occurrence of the EWEs (Dodman & Satterthwaite 2007; Hoffman & Oliver-Smith 2002; Satterthwaite et al. 2007).

6.2. Explaining urban-poor communities' vulnerability to EWEs

As discussed in Chapter two, vulnerability is conceptualised following the IPCC's (2012) definition i.e. the state of a community that determines how much exposed, sensitivity of a system to changes in climate and the system's ability to adapt to the changes. Emerging from both theory and primary data were five themes, which explain and reveal the vulnerability of inhabitants of urban areas, in the town and city of Salima and Zomba to EWEs. These include: development policy, location of settlement, standard of housing construction, social service provision and distribution of power/ authority. These factors in no particular order, it is established, are what affect the type of EWEs and degree of impact the different communities are likely to experience, the recovery process and levels of preparedness. However, it is observed that vulnerability is contextual hence there is no one defined standard in how the

communities are influenced under these factors as such communities' level of vulnerability is in no way uniform.

6.2.1. Policy and institutions

Cutting across all three elements of vulnerability: exposure, sensitivity and adaptive capacity, the study revealed that policy, development goals and institutions mediate the vulnerability of urban communities to the occurrence of EWEs. In agreement with Brown (2011) the study found that in general development policies and strategies in Malawi, presupposes that poverty let alone climate change and its subsequent effects are a rural phenomenon. A review of the development goals like Malawi Growth and Development Strategy (World Bank 2012) and climate change adaptation mitigation measures like the National Adaptation Programme of Action (GoM 2006) which clarifies the impact of climate change on disasters, proves this rural focus. UN-Habitat Programme Manager interviewed in this study agrees with the same and expounds that: *“in general the development agenda from not only the government, but also the donor and private sectors has been focused on rural areas. The assumption is that urban areas are already well off.”* For example, both key and primary informants repeatedly referred to the government's Farm Input Subsidy Programme (FISP) as one show of such rural focused development agenda. FISP is only eligible to families' residing in rural communities under the authority of Chiefs. Perhaps this focus on rural areas is justifiable. The Director of Planning at Zomba City Council explained that *“with 85 percent of the population being rural dwellers, the country is predominantly rural. Besides agriculture, the backbone of the economy, is also rural based. I would think that things might change though, with the increase in urban population.”* However, even though urbanisation in Malawi is considered negative thus condemned and discouraged, that does not stop the process (Brown 2011). Malawi is at this stage a low urbanised country compared to other African country. Even so, Manda (2013) reports that with the rate of urbanization of 5.2% per annum, urbanisation is rather very high compared to the national growth rate of 2.8% per year and should be expected to keep increasing with time.

This side-lining of urban areas in development agenda undermines livelihoods of these communities, especially for the population in poor communities. Eventually this leads to unrecognising the risk burden (Tannerfeldt & Ljung 2006). In their mission statements, the two NGOs included in this study: Malawi Red Cross Society and Catholic Development Commission in Malawi aim to address all forms of poverty, even though their operations

display the rural development agenda focus. CADECOM is on a mission to “empower the disadvantaged...to undertake development which is integral, gender and environmental sensitive, sustainable and which promotes justice, human dignity and self-reliance...” (Episcopal Conference in Malawi n.d.). MRCS on the other hand aims to “...alleviate human suffering and improve the quality of life of vulnerable people through relief, development activities...” (MRCS n.d.). Even though both organisation have presence in Salima and Zomba they have no projects currently running in the urban areas of both districts. Communities where these organisations implement project are provided with training and financial start-packs to venture into alternative income generation activities like village savings bank and integrated food security to assist them to enhance themselves (CADECOM Project Officer, Zomba personal communication, August 6, 2015). Unfortunately, this furthers urban poverty. Discussions with the women in this study showed that they have to make purchase of everything they need including food and non-food products. With low and intermitted income from their small scale businesses and wage-labour, ignored urban poverty encourages socio-economic deprivation which pushes these urban dwellers to position themselves in risky locations exposed to hazards including EWEs, and to be affected gravely when hit; nonetheless with limited capacity to recover and adapt to the situation (Dodman & Satterthwaite 2008).

At the time of the research, Malawi had just experienced the worst floods accompanied by stormy rainy in the last decade that resulted in numerous casualties, property damages and losses in 15 of the 28 districts (United Nations Disaster Assessment and Coordination 2015). The two cities of Blantyre and Zomba were for the first time in history included. From the findings of occurrences of EWEs in Chapter five, Salima town centre and immediate surrounding areas are seen to have experienced EWEs for a longer period of time by the time of the research. This difference in EWEs experience, it is revealed, had an influence on the risk perception in both the local masses and authorities in the country. A clear display of the unrecognised risk is that, until 2015, all four cities in Malawi did not have disaster risk reduction plans. It was only during the time of the research that Zomba city council, was drafting one. Salima on the other hand, like all other district councils that have for long been prone to EWEs, including Zomba district council had disaster plans in place already (Salima District Council, Disaster Risk Management Officer, personal communication, July 17 2015).

In this way, we see the contextual vulnerability influencing people vulnerability. Legislation and structures did not recognise risk, and neither did the people in the community. Together the District Environmental Health Officer at Zomba DHO and representative in the Disaster

planning office at Zomba city council reckoned the '*politics of urgency*' i.e. "the speed of being seen 'to do something' that is brought to the fore, no time for reflection and planning involved"- (Medd & Marvin 2005, 44) in dealing with the situation. Both offices did not have any plan or preparation in case of disaster, instead they provided reactive and ad hoc response for instance the temporary shelters that were raised in schools, when the floods struck.

6.2.2. Urban settlement

Observation of the two communities concurred with discussions with key informants that settlement of the urban-poor communities compromises their safety and standing to risks like EWEs. The study advances that urban areas may not necessarily experience more occurrence of EWEs, however the degree of impact is grave and is likely to increase. It affirms UN-Habitat (2011) study report that argued that impacts of EWEs and climate change in general are most severe in urban areas. Specially in developing countries this is because urban areas that are growing fastest are those in informal settlements and slums, least equipped to deal with such threats and challenges. The report cites an example of floods that hit Mozambique in 2001, in which 70 percent flood-related deaths occurred in urban areas. Just like the studied communities in Salima and Zomba, the urban poor of Maputo, Matola, Chokwe and Xai-Xai cities lived in informal settlements and unregulated slums constructed in undesirable and hazardous location and with easily collapsible materials were the ones hardest hit. Two themes emerge in this regard to explain urban vulnerability in terms of settlement, and thus: settlement location and housing standards (Huq et al. 2007; Pelling 2003; Wisner et al. 2004). These two themes point to exposure to the occurrence of EWEs (especially location of settlement), while housing standard refers to both exposure and the degree of impact (sensitivity) when the EWEs befall the location.

6.2.2.1. Location of settlement

By own observation, the study advances that the urban-poor live dangerously. Their communities develop on precarious sites which pose not only weather related risks but also relevant geological risks like landslides, earth tremors and earthquakes (Tannerfeldt & Ljung 2006; Sherbinin et al. 2007). In describing the location of the study community in Salima the former Project Officer of Malawi Red Cross Society in the district explained that: "*the geographical position of Salima district in general is a problem. The district lays next to the lake and there always is strong winds blowing from the lake which results into stormy winds affecting the surrounding communities*". With regard to Semaiwa and TA Kalonga in

particular, being next to Linthipe river; near its mouth section (Figure 3.3), encourages flooding both from heavy down pouring but also the accumulation of water from uplands. Therefore, the physical location of where the community in Salima developed plays a crucial role in determining the type of EWEs occurring. Where the settlements are located also has an impact on what type and extent of damage the occurrence and intensity of EWEs will bear, and contributing to place vulnerability (Cirtus 2004).

While in Semaiwa crop fields are established within the banks of Linthipe river, Sadzi community has expanded into Likangala river banks (Sadzi CDC representative, personal communication, July 30 2015). In clear contrast to St. Mary's lines; formal settlement right across the river, residents in Sadzi have constructed their houses within 15 meters close to Likangala river (Figure 6.1a).



Figure 6.1a Location of Sadzi in relation to Likangala river
(Source: Fieldwork, Zomba 2015)

Such settlement resulted in numerous house damages during the floods in Zomba. This points to the influence of economically established power relations between (Curtis 2004; Giddens 1995) the two urban communities as well as within Sadzi community, with those with high income affording to settle in formal settlements or establishing their dwellings away from the river basin. Women, with limited access to socio-economic and political power stand even more disadvantaged (Pullanikkati et al. 2013).

On the contrary, Semaiwa area in Salima sustained loss of crops in the fields that are within the banks of the river (Figure 6.1b). These items provide for livelihood options to the communities, and therefore the destruction of such compromises the communities' wellbeing (Dodman & Satterthwaite 2008).



Figure 6.1b Location of Semaiwa in relation to Linthipe river
(Source: Fieldwork, Salima 2015)

6.2.2.2. *Housing standards*

While location of settlement determines the exposure of a community, so much does the standard/quality of housing they live in. The study agrees with Adelekan's (2010) study findings in Nigeria's urban-poor communities and builds on Tannerfeldt and Ljung (2006) that due to governments' failure to cope with the rate urban communities are growing, there is immense unmet housing needs. As such the urban-poor are left to tend for their own. Nearly all of the primary respondents in this study had their houses constructed with and from very weak materials. A typical example was a house made of fresh/sun dried bricks with or without reinforcing cement and thatched with grass or iron roof (Figure 6.2, the houses on the right). Due to this, their presence in the line of stormy and heavy rains and eventual floods led to devastating damages. A Sadzi woman (aged 56) acknowledges that even though some houses constructed of burnt bricked and iron roofed were damaged too, many including hers that we damaged were made of material not strong enough to withstand the EWEs. She mentioned: *"most of the houses that fell during that time were those made of sun dried bricks and no*

cement. Actually, the houses fell due to the heavy rains which were hitting and soaking and dissolving the muddy walls, and accompanied by strong winds the walls easily crumbled". As a result, both houses that were within the flood perimeter and those further away from the flooded river were destroyed by the heavy rain and storm. The situation was not as different in Salima. The houses damaged in the strong wind in 2013, though some in burnt brick, cement and iron-sheet, were found to lack reinforcement, and were easily blown-off by the winds.



Figure 6.2 Housing standard contrast in urban areas of Malawi
(Source: Fieldwork, Salima 2015)

Explaining their choice of construction materials, the women stated: *“Getting burnt bricks and cement requires a lot of money, which we don’t have”*. This expounds the levels of inequality present in these urban areas which influences the power at play in resource allocation and accumulation (Curtis 2004; Huq et al. 2007). The Director of Planning at Zomba City Council chimed to the same power distribution negotiated by level of income in explaining the quality of buildings in urban areas of the city:

“...the standard of building required by the city is higher than the average Malawian can afford. The standard is that in building a house it must be of burnt bricks, cement and roofed with iron sheets. But because of poverty you find that within the city are mud houses...we have the standards but we cannot enforce them on the people when the level of income cannot allow them to, and we cannot do anything about it. It would be inhumane to transfer them to rural areas...these areas are people’s source of livelihoods and the only home some of them know.”

This shows the complexity of the matter; that having provisions alone is not a panacea to housing problems, but the implementation capacity by relevant authorities and socio-economic standing of the population is vital as well. In both Salima and Zomba, predominant income generating activities included petty trade like selling food items at home and/or at the nearby market, extracting sand from nearby rivers, renting out houses and food crop farming. The income is both unreliable and inadequate to provide for the households needs. In the same area were civil servants and private sector employees with a steady income, whose housing standards showed unequivocal contrast and inequality (Figure 6.2 refers) and these were spared from the damage by EWEs.

Two themes resonate from the issue of urban settlement that explain both housing and quality, and these are (1) land tenure/rights (2) the cost of land and materials agreeing with Adelekan (2010). These factors are not mutually exclusive rather they interplay as they roll-out. As for land tenure, the study finds that urban growth and expansion has resulted in the transformation of what were rural areas to urban areas. In the process, natives of the areas sold off parts of their land to those coming to settle in the areas. A member of Community Development Committee in Sadzi (female, aged 53) explained the situation that: *“the natives of Sadzi are the ones locating in river and stream catchment areas...they sold off their land to those coming to settle in the area as the town was expanding into the area.”* Through a transect walk observation of the study sites, it was noted that the settlers (also called “incoming”) constructed their houses over 30 meters away from the river banks and nearly with the standards set by the city assembly. In the end, most affected by the floods in Sadzi and floods and storm in Semaiwa were the natives of the land who sold off their land rights. Besides, there is no security to such informal selling and buying of land, hence risking eviction; (Moser 1998) though no eviction case was found or heard of in the study area.

However, not all those settling in these areas secured safe location and constructed better housing. This is where the cost of land and material comes in play. As much as shortage of suitable land in urban areas is argued as the reason why the poor cannot find a place to build, it rarely is the actual reason. Instead the study agrees with Pelling (2003) in arguing that due to the negotiable purchasing cost and ease of procedure in buying land from individuals against from the never-ending-marred-with-corruption process with government departments, many of those migrating to urban areas settle in dangerous and unhealthy places. Also there is a trade-off between socio-economic gains and choice of location as explains the 40-year-old mother of 7 children in Salima: *“I moved to live and later on bought land to settle in this area in 2001,*

because I opened a small shop in town near-by selling food, clothes, and a lot other things. Besides, the place is close to good schools which I wanted my children to attend.” Aware of the risk to floods in the area, she still settled in TA Kalonga as it did not flood as frequently as her original place in TA Pemba, besides the socio-economic benefits it offered. Semaiwa in TA Kalonga is only a short-walk away from the urban centre, the same case for Sadzi, and so provides a centrally located place to settle though not necessarily safe for housing (Smith 2001; Tannerfeldt & Ljung 2006).

A comparison of settlement in the two study areas, suggests another factor that influences vulnerability of not only urban communities but any other community. That is of perception of risk based on previous experience. Residents in Semaiwa community had their houses constructed approximately 90 meters’ way from the river bank. Between the river bank and houses were farms of maize and vegetables grown both during the rainy and winter growing seasons. A mid-70s year old member of the CPC explained that: *“Previously, people settled very close to the river. But all the low laying area within the bank of the river could flood a lot, and so people moved further away. Now, in our part of the area, only our crop fields get flooded.”* Therefore, it suggests that since these residents have had experience with floods before, they have assessed risk and redefined what it suitable land for settlement and thus sought for ways to reduce the impact of risk. The same is also revealed with regard to stormy rains and housing construction. Due to previous occurrence of strong winds, the one that occurred in 2013 being the worst in the area, Semaiwa residents were trained through MRCS project on how to reinforce their houses with easily available resource like rocks and wires so that they are not easily blown away by the winds. This was not the case in Sadzi. With no history of floods or stormy rains, the community did not consider the proximity to the river or housing quality as a safety threat. At the same time, some of the women alluded the occurrence of the floods to simply fate; that the floods happened in God’s timing. This presents a question in the community’s knowledge of their role in contributing to the occurrence of EWEs and the solution thereof.

6.2.3. Service provision

Upon observations and discussions with the women interviewed in the study, the study concludes that urban-poor communities like Sadzi and Semaiwa have appalling service provision perhaps agreeing with Tannerfeldt and Ljung (2006) and World Bank (2012). First is sanitation solutions. In Salima, apart from the two women whose households had piped

sewage systems, the rest had pit latrines. While in Zomba only one had piped sewage system in the new house the family was renting since their own was damaged in the floods. Even though pit latrine provides a viable solution to sanitation problems in these areas, it however brings problems of flooding, overflowing, ground water pollution (ibid), hence posing a health threat. The situation is even worse when they are made (which was the common case in Semaiwa and Sadzi) of fresh bricks, mud instead of cement, and grass thatched as they easily become soaked and crumble down (refer to Figure 6.3). Many of the women in Sadzi had their pit latrine destroyed and were for some time using other families' facilities since they returned from the temporary shelter. As such the study submits that, with a situation like that, the susceptibility to health risks of water-borne diseases following floods is higher.



Figure 6.3 Pit latrine in Sadzi (Source: Fieldwork, Zomba 2015)

Also lacking in Sadzi and Semaiwa were waste collection services. Mostly all households included in the study, as well as the rest of the community had dug out pits to dump their wastes in, which are buried when the pits are full while plastic and plant wastes are burnt. At the same time, open landfills were noticed during the transect walks around the community in Sadzi especially. In the meantime, the town central area of TA Kalonga, had waste collection points constructed through the MRCS project (MRCS project officer, personal communication, July 13 2015). The town assembly is responsible for emptying the bins, though this happens not as regularly considering that in the two weeks of research in the community the bins remained rather full. Aside from the obvious pollution from the garbage dumps, another risk came in when the run-off carries the wastes into the rivers along the communities which in Semaiwa also provide water source to the community. As for the rubbish pits, they provide breeding

grounds for mosquitoes when filled up with rain waters (Semaiwa HSA, personal communication, July 15 2015).

Water source and quality is also another service provision defect that proved to influence the vulnerability of the studied urban-poor communities, especially for women and children. While both study areas had piped connection and borehole as the main water source the situation is not exactly the same. In Semaiwa, over half of the interviewed women had central region Water Board tapped water connected to their house, while the rest either utilised the only one borehole operating in the area or shallow wells like the one the women is using in Figure 6.4. Since the area is considered a town/urban, the respondents recounted the struggle for safe water which is caused by government's restriction to drill boreholes in town/urban location. One woman (aged 40) explains the situation that: *“even though we have piped water at home, we still face problems when taps run dry. In such times we source our water from the Linthipe river and shallow wells made in its banks.”* With the occurrence of dry spells, the community stands to risk water related diseases like diarrhoea and cholera. Women are even more affected as they have to walk long distance in search for water since even the shallow wells dry up during the dry season and dry spells. Sadzi on the other hand, has it a lot different in that community kiosks at 300 Malawi kwacha (0.40 USD) monthly fee served half of the households represented in this research, whereas the rest had piped water connection at their homes. While the monthly fee at the community water kiosks is subsidised, residents still found it difficult to source the fee as their petty trade and wage labour, do not provide enough to meet the daily needs of their households.



Figure 6.43 a woman getting water from a shallow well on Linthipe river
(Source: Fieldwork, Salima 2015)

The study finds that this is the situation because urban-poor communities remain unrecognised to government as well as development partners. Besides, as explained in 6.2.4. below, services providers, in this case the local government, fail to collect taxes and rates in such communities where property is rarely registered (Manda 2013). Even though the people can hardly afford the taxes and it is questionable if taxes are used for service provision, such informal communities suffer as they are not provided with the most basic of services. Instead individuals are left to fend for themselves, which only favours those with the ability to. The inadequacy and/or lack of these basic services, influences the nature of impacts the occurrence of EWEs like floods would bring and mostly, it exaggerates health impacts.

6.2.4. Socio-economic conditions

Through the discussions with the women interviewed during the research, it would be justifiable to also attribute their vulnerability to their socio-economic standing. In describing the socio-economic status of Sadzi, an official at Zomba City Council agrees with the former MRCS Project Officer in Semaiwa in explaining that: *“the area is largely a low-income area, even though there are pockets of high income earners...most of the population earn their living through small business, casual wage labour and farming.”* This agrees with NSO’s (2009) reporting. Only one of the women interviewed in Sadzi had a husband who had a steady income working in civil service. While the rest, both them and their spouses (where the spouses were present), made between 10 000-15 000 Malawi Kwacha (14-21 USD) per month depending on sales from hawkers perched at their houses or from rentals of rooms constructed next to their houses. Renting out rooms was a common case in Sadzi, where most of those who owned land rented out rooms which were pegged at about 3000 Malawi Kwacha a month (approximately 4.2 USD) and made a living out of the proceedings.

Besides, such income generating avenues, some households like three in Semaiwa depended on support from their children who worked and have settled elsewhere. However long the support goes, it is often not consistent and hardly adequate as one elderly woman aged 69 in Semaiwa explains: *“apart from farm crops surplus sales, we depend on support from our children...it helps but, I understand they have to provide for their families too. So we are careful on how we spend the money.”* One family in the same area also receiving support from the elder son, uses piped water only for drinking and cooking, while the rest of the family chores are done with water from unprotected sources like the borehole and shallow wells.

Like is the case with the other 80% of the country's population (NSO 2011) both communities, farming was a major source of sustenance providing food and/or monetary income after sales of surplus. While in Semaiwa, the farming occurred within the community's reach, in Sadzi, four of the families that farmed did it at their rural family farms either within and/or outside Zomba district. However, both communities bemoaned that due to the erratic rains experienced in the past rain seasons their yields have been very meagre. One family reported yielding only three 50 Kilogram bags of maize, when they usually harvested 10 bags on average.

Besides the economic condition, nearly all of the women interviewed in the study did not have an education beyond primary school, were married young and had more than 4 children. The HSA of Semaiwa explained that, it is due to the *Yao* culture in the area that girls marry as early as their mid-teens and have no concern for education. However, it can also be argued that the situation is attributed to the fact that the households cannot financially afford keeping the children in school. Instead the families depend on and require them to work and contribute to the family income from rather a young age. The study finds this places the women in a disadvantaged economic position. The women in the study areas did not have strong enough bargaining power to acquire services and resources to position their household away from different types of risks like EWEs and various social problems.

Aside from influencing when and how the communities developed and are established, to a large extent, the socio-economic conditions of the population also encouraged the destruction of the surrounding environment (GoM 2010). In trying to earn a living, the river banks provide the community with open source of reeds, sand and bricks for house construction both in Salima and Zomba. The problem is that such activities contribute to stretching the river basin and removing the barrier to stop the river from flooding into the communities. At the same time, trees are cut both for construction and firewood, while rocks are quarried in the hill slopes of Sadzi hill. This has left the hill bare subjecting it to heavy run-off of rain water flowing down the communities damaging the roads and houses. In Semaiwa, the cutting down of trees opened the area up to receive strong winds from the lake as well as heightened the speed of wind as there was no blockade to it. To this, the official at the Zomba City council, condemned the communities for not being responsible of their environment but only pushing the responsibility on the government. Nonetheless, with limited and expensive clean power supply, like hydroelectricity, the communities are forced to use surrounding forests for energy for cooking for instance. The study here argues that people's vulnerability has influenced place vulnerability in these two communities as their income generating activities expose the areas

and populace to, and incite ease of flooding and strong winds. Therefore, it defies risk compensation, as their settlement location is hardly a choice.

6.2.5. Authority vacuum

Urban governance or rather the lack of it is a rather surprising factor that arose from the study that influences urban-poor's vulnerability to EWEs. The UN-Habitat Programmes Manager is in this study stating that unlike rural areas and some formal communities in urban areas, there seem to be no clarity on who is in control and authority of the transitional kind of urban areas. Agreeing with Manda (2013) the confusion and conflict is especially prominent in the process of land acquisition and development. Sadzi and Semaiwa communities are urban communities that have grown out of rural communities, so called '*transitional urban areas*' (Lindstrom 2014). While Chiefs have established and recognised authority in rural areas, their position is very ambiguous in such urban areas. One main role of Chiefs is land allocation. The 65-year-old member of the CDC in Sadzi explained that initially land in Sadzi, like is the case with all rural areas, was customary land and under the jurisdiction of the Chief. However, transitioning into urban, the authority over land is shared between Malawi Housing Corporation, the Ministry of Lands, Department of Physical Planning and traditional Chiefs. The situation is explained as follows by an official at the City Council in Zomba: "*there is no harmonised policy, because the central government recognised Chiefs (giving them political power), while the local government did not. So Chiefs claimed the mandate to distribute land, but did not follow up with the city's building controls.*" Such are example of contradictions that results in urban areas, especially transitioning ones to develop unplanned such that 64% of urban residents are in unplanned locations in the country (UN-Habitat 2012).

In a democracy, Cammack, Kanyongolo and O'neil (2009) explained that it is unlawful to have Chiefs in urban areas. However, until 2014's elections, there had not been Councillors elected who are supposed to take the role of Chiefs in urban areas. Even after Councillors were elected, town Chiefs and their block leaders still reigned. It was only in May 2015, that the President issued a directive to ban Chiefs from exercising their power in town and urban areas (Mkula 2015). This created confusions and upheaval, that Zomba City council was sitting to one such conflict case when I visited for this research. It should be noted though, that despite the role of Chiefs being reduced and rendered redundant, most of the land in the two communities has been (in Semaiwa it still is happening) sold by individuals through the authorisation of Chiefs. All of the women interviewed in this research who settled in the communities from other

communities, bought land from individuals who are/were natives of the communities. Even though Sadzi developed into an urban setting a lot earlier than Semaiwa, the situation is pretty much the same as far as land acquisition is concerned.

The multiplicity of landlords is not necessarily the problem, but mostly their lack of coordination and the failure in reinforcing urban development standards, the study agrees with Manda (2013). Underlying this, is the poverty, exclusion and lack of alternative present to the urban-poor dwellers and women in particular. Even though, city assemblies' claim to have in place 'town rangers' who check for any illegal development in the urban locations, their qualification is questioned as they are also known to be corrupt. CDC member of Zomba bemoans that: "*To be honest, the city assembly is failing us. It does not control settlement, and it just watches as people construct their houses along the river and right on the slopes of Sadzi hill.*" (Figure 5.1 refers). For this reason, Semaiwa is developing unplanned like many other transitional urban communities, Sadzi inclusive. Nonetheless, since the process of land acquisition from urban councils can take as long as 10 years, and is wrought with corruption, low income urban population are forced to acquire land from individuals informally and illegally by urban council's standards. The problems come when plots are acquired in risky locations like the case in Sadzi. The problem is aggravated due to the unprecedented growth happening in these informal settlements and the lack of adequate income to construct permanent housing. As a result, in these communities, low income dwellers especially female-headed households construct their dwellings in locations that expose them to risk and constructed with weak materials they incur great damage. Therefore, pointing to the power divide, both between authorities and people in the community; to which those with higher income are advantaged to access safer location and construct strong dwellings as well as to remain untouchable by law enforcers.

6.3. Adaptive capacity of the urban-poor to EWEs and the health impacts

Having identified that urban areas, even more, urban-poor communities are increasingly faced with EWEs and various health effects in Chapter five, and having defined what contributes to the vulnerability of such communities in the first part of this chapter, this section of Chapter six seeks to assess their adaptive capacity (here referred to as resilience). It looks at resilience as how *systems, agents and institutions* in urban areas (Tyler & Moench 2012) like Semaiwa, TA Kalonga in Salima and Sadzi ward in Zomba respond to change and disturbance brought by EWEs. Employing discussions with informants complemented by secondary data, an

attempt is made to examine the response, strategies and interventions adopted in the presence of not only present but also perceived future climate risks. To which the study finds that following continued occurrence of EWEs in urban areas, the threat of risk is considered not so random and isolated anymore. The study notices the emergence of interventions beyond just immediate response to improve the capacity of urban areas to cope and recover from the risks as well as adapt to future risks (Gibberd 2014). Different measures were identified in the study, which cross-cut the three components of resilience: *systems*, *agents* and *institutions*.

6.3.1. Urban disaster risk management

The first interventions and, in my opinion, major adaptive capacity enabling factor is the recognition of the need and the development of a disaster risk management policy. Besides a national disaster risk management plan that was developed and adopted in the year (GoM 2015b), cities in particular also were for the first time seen developing their risk management plans. An official at Zomba City Council explained that the city council with recommendation from the national office (DoDMA) were at the time of the research drafting their DRM plan too. He explained that: “*At present, no particular activities are undertaken to plan and prepare for disasters in general in the city apart from the ad hoc response when disaster strikes.*” Realising the need to be scale up the interventions, the DRM plan with aims to upgrade the city’s ‘Disaster preparedness, mitigation and prevention arrangements...in addressing timely..., well-coordinated response to a disaster...’ (ZCC *unpublished b*, 19) since proper management of disasters is essential in reducing impact and effects to the affected and/or exposed communities and population. On the other hand, Salima district council had DRM plan already in effect by 2012 to enable them to provide urgent response in order to minimise and mitigate impacts on individuals and populations involved (Salima District Council 2012).

The development of plans and arrangements to improve the respond to EWEs against ad hoc response shows that agents and stakeholders have learnt from past experiences and failures and taken on proactive responsiveness (Tyler & Moench 2012). Included in the DRM plans is a structure for disaster risk management which brings together and distribute particular roles to the different actors involved in the urban system from the national level to village level (Salima District Council 2012; Zomba City Council *unpublished b*). This is to ease collaboration of actors, ease flow of information like early warnings, avoid duplication of efforts and most importantly, facilitate decision-making in times of disaster. During the flood response in Zomba, a lot of local and international organisations came into the health cluster to provide

health support. The challenge arose when they all demanded reports, in different particular formats, from the health personnel. The Environmental Health Officer criticised this that it presented a lot of demand to the already strained workforce. It is thus the hope that the DRM plan of action will help avoid such situations as well as like the one in Sri Lanka's 2004 tsunami disaster response where a lot of organisation coming in to provide help, yet nothing tangible was seen done, thus undermining the affected community's recovery (Khasalamwa 2009).

Whether urban areas are/will be resilient after this is rather debatable. Also supported by District Commissioner of Salima forward, plans do not in themselves minimise and mitigate impacts of disasters on individuals and populations, rather the careful implementation, and constant adaptation of the plan does (Salima District Council 2014). There is serious need to invest resources into the cause. Especially in the aspect of weather forecasting and early warning systems, as the MRCS former Project Officer in Salima complained of the poor system at present: *"the challenge with early warning system now is that the forecast provided for by Malawi Meteorological Services (MET), is very general and not specific to small particular areas. It therefore becomes a problem because people do not take the forecast seriously"*. Early warning system is an important tool in weather-related risk management and adaptive capacity building as it allows for effective disaster preparedness. However, place and time specific and well communicated forecast is even more effective and required.

6.3.2. Collective action

In a manifestation of agency transcending systems (Giddens 1995), found in both Semaiwa and Zomba were community groups taking initiative to protect and conserve the natural environment surrounding the communities. In Semaiwa, the Civil Protection Committee was initiated during the implementation of *'Strengthening the Resilience of People Living in High Risk Urban and Semi-Urban Areas to weather-related disasters'* project by Malawi Red Cross Society (Nordic Development Fund 2012). The committee is made up of volunteers whose responsibility is to raise community awareness on climate change, coordinate environmental management activities and stand as the bridge between the community and the district council office (Semaiwa CPC, personal communication Salima, July 14 2015). One of the activities the committee is working on is growing of trees along Linthipe river and a woodlot on the ditch between the river basin and where the houses begin. They do this because: *"through the project by Red Cross we learnt that our area has become open and exposed to strong winds and flooding because trees have been cut down causing deforestation...and to reverse this problem*

we found it wise to plant trees around the community to create wind breaks and block the overflow of the river,” explained the chairperson of the committee (female in her early 40s, Semaiwa). The study identifies that this kind of interaction between MRCS and the community brought the understanding of the role and responsibility the community have towards their own environment. It fostered learning and contributed to building the community’s capacity to self-organise collective action (Nordic Development Fund 2012; Tyler & Moench 2012) to reduce risk, prepare for and improve the respond to EWEs related disasters. The committee is still active even after the project lifespan came to an end in 2014, nevertheless they bemoan the insufficiency of funds to facilitate their activities.

In Sadzi, the community in their own initiative took it to task to rehabilitate the hill surrounding the community as it had been immensely degraded. Explaining the development of the group the chairperson said: *“As concerned citizens, with the authorisation from the ward councillor, we formed a group of volunteers called Sadzi Hill Protection Committee. The aim is to stop all cultivation and stone quarrying happening on the slopes of the hill”* (male in his 60s, Sadzi). As such the group made rules and regulations which include fines for anyone found cutting tree, cultivating and quarrying in the hill. From these fines, the committee run its activities. The committee engaged different stakeholders including the City Council, Chancellor College community radio, organisations like Leadership for Sustainable Development (LEAD) and Forest Research Institute of Malawi (FRIM) both to raise awareness and to source support such as tree seedlings. Formed in mid-2014, the group is yet to register success, such that at the time of the researcher two members of the committee (the chair person and treasurer) were at the Councillor’s compound with a case of a man found quarrying in the hillslopes. However, they are of the view that the occurrence of the floods, has shaken the community to reality and should perhaps get them to start taking care of their environment.

It is however, arguable whether this community collective actions have brought/will bring about resilience in the population to future EWEs. The MRCS former Project Officer in Salima district refused to make the association that the presence of the project in the community has thus made the community well recovered from and better prepared to EWEs and their impacts. Instead he made reference to the limited livelihood options in the community that has restrictions on their capacity to exchange; access to goods and services like health, water, electricity, housing and food. For instance, nearly all the women in both Salima and Zomba suggested that for their recover, they would need financial assistance to set-up and/or revamp businesses through which they can provide for their families and rebuild their houses. This

buttresses earlier reporting by Moser's (1998) that urban life is characterised by high *commoditisation*, which compromises the coping, recovery and adaptive capacity of those with low means of exchange if there are no interventions to address it.

Social safety nets: On the same issue of assets, the research noted the powerful display of social safety nets in the form of mostly informal reciprocal networks of trust (ibid; Dercon 2014). For instance, In Sadzi, community members provided for each other's housing and daily upkeep in the aftermath of the floods. *"During the floods, part of our house was damaged...all the nine of us (7 children; 3 girls and 4 boys) could not fit in the now two roomed house. Our friends helped to keep our boys until we could fix the other rooms"* one respondent (female, aged 40) reported. This makes a case that in spite of the said social fragmentation due to numerous heterogeneity found in urban areas, the close-spacing of and social relations in urban-poor communities can provide base for coping with vulnerability like the presence of EWEs. However, with persistent occurrence of EWEs shocks, this coping measure becomes difficult Dercon (2014), hence calling for more sustainable adaptive efforts.

6.3.3. Disaster emergency response

During a disaster, regardless the location, a lot of actors feel obligated to lend a helping hand. In both Semaiwa and Sadzi, numerous religious, profit, non-profit organisations, government bodies and the general public flew in to offer relief; either in terms of evacuation, shelter construction, food and utensils items as well as health services and facilities. CADECOM, a national and local organisation, was one of the organisations that reached out during the floods in Zomba. On one occasion the, organisation provided food items like maize, beans, soya porridge flour and cooking oil to the people at temporary shelters in the city. Others like Aglow International (a Christian grouping of women), members of parliament, Chancellor College University student groups and the DoDMA distributed food items, blankets and cooking utensils like plates and cups. Additionally, the environmental health department of the central district hospital was on daily basis making rounds in the camps providing health services but also closely monitoring any chances of outbreaks.

On the one hand, CADECOM response came in despite that it was outside their work mandate: *"our catchment area in rural areas only, that's where we have long standing projects. But when it comes to emergency response, we are not restricted by where our jurisdiction lays...we decided to respond to Zomba city disaster because the situation was severe"* narrated the Project Officer (female in her early 30s). As such, like any other organisations, after the ad hoc

response phase and people left the temporary shelters, no further programs were and are being implemented in Sadzi or Zomba city to facilitate the recovery of the affected population. On the other hand, MRCS by mandate responds to disasters and emergencies both in rural and urban areas, but also implements longer project. It is among the few organisations that have implemented a climate change adaption project in urban areas; working in urban-poor communities of Lilongwe city and Salima-TA Kalonga inclusive. This was based on realisation that urban areas are neglected by the development community as argued here by the former MRCS Project Officer in Salima: *“MRCS decided to extend its work to these urban areas because, looking at the impact of EWEs, more people are affected in urban areas as these areas are densely populated and they are as vulnerable as people in rural areas”*. This showed a move away from the *‘politics of urgency’*, as it is observed was and somehow still is the status quo (Medd & Marvin 2005). There is no preparation for or attempt to mitigate EWEs in urban areas, instead much effort is put in the response, which does not support the people over a longer time. The communities who participated in the project now, are more aware, better knowledgeable of how to live with floods and stormy winds hence in some way strengthening their ability to adapt to EWEs.

6.4. Are urban-communities resilient then?

Weighed against the Urban Resilience framework, these responses and interventions, leave so much to ensuring the resilience/adaptability of urban communities to EWEs. The framework identifies that resilience lies on the interaction of three elements of: systems, agents and institutions. What can be observed is that, the communities tried to respond to disturbance but did not move ahead to build capacity to self-organise nor to learn and adapt to EWEs.

From the component of systems, the study exposes that Semaiwa and Sadzi, like any other urban communities in the country rely on the ecosystem for survival. The ecosystem is a source of livelihood in so many ways than one: it’s a source of income generation, food, energy for production, water, construction materials and eventually has great bearing on human health. With no diversity and redundancy in food production and sources, income generation and no concrete activities to support sustainable use of natural resources in the urban communities, the occurrence of EWEs, in the long run cripples the functionality of such communities and jeopardises human well-being (Gibberd 2014; Tyler & Moench 2012). Since the ecosystem is open, dynamic and connected; and urban areas are only a continuum (Toulmin 2010), the implementation of climate change mitigation projects in rural areas only is rather myopic and

precludes safe failure therefore failing to hold the communities resilient in the face of shocks like EWEs.

As for the element of agents, the development of DRMs in the four cities of the country is great proof of learning from the past and present experiences while aiming to improve on the responsiveness by being prepared and organised (Tyler & Moench 2012). So too the collective action by the community is an attempt to reduce their exposure (vulnerability) to EWEs. However, without addressing the issue of assets and resource distribution and accumulation, faults the intended progress. For example, the MRCS former project officer in Salima was not confident to claim that due to the project the organisation implemented in Semaiwa the community has effectively recovered from the previous shocks and is well capacitated to accommodate future risk. Supported by the respondents in both Salima and Zomba, the lack of dependable, diverse livelihood sources like income generating activities has undermined their recovery from the EWEs they experienced and hinders them from preparing for future risks by for example constructing better housing (Wisner et al. 2004). Resource acquisition is also a challenge facing the health facilities, local governments and NGOs in both Salima and Zomba. Resonating with other key informants the Environmental health officer in Salima explained that: *“though we may have plans put in place, there is no resources particularly set out for when disaster strike. We as such have to depend on donations in the moment of the disaster.”* In this case, even though DRM plans are present, disaster strikes when the agents have no capacity to even respond; and this is no way close to adapting to the shocks of EWEs.

The understanding in Malawi is that urban communities are well and endowed with resources to manage and recover from EWEs. This is the institution that set rules and conditions of how agents act (Giddens 1995; Tyler & Moench 2012) in responding to climate stress. For example, NGOs having offices in urban areas, travel out to implement their development projects in rural areas. Urban areas are strake with grave inequalities; and population in urban-poor communities are often as vulnerable as those in rural areas, or even worse (Martine et al2008). Besides, urban areas are exposed to more than just weather related hazards, but also are a locus of human-made disasters like engineering failures. This mode of operation, leaves those with less capacity to provide for themselves in a worse position than before the hazard, and leaving them to recover by themselves just because they are in the urban setting is rather retrogressive. These people, will go into the open source natural resource to cut down trees; cultivate and quarry stones along hillslopes; pick sand, make and burn bricks along the river banks. In the

end heightening the frequency, intensity and magnitude of EWEs and other hazards. This is not resilience, rather the flipside of it: vulnerability.

6.2. Summary

There are numerous factors that influence the level of exposure to, sensitivity to impact and capacity to cope and adapt to the future risks. As it has been noticed, the factors are in no way independent. Instead, they interact and influence each other to either expose the communities to EWEs or how and how much to impact them and also how the communities will rise from the experience with the hazardous event. On the second note, as it has been observed, the two communities of Semaiwa in TA Kalonga in Salima and Sadzi ward in Zomba, there is a difference in how the five factors influence their vulnerability.

One thing that stands out however is that some of the factors influence place/contextual vulnerability while some affect the positioning of the people, hence people/compositional vulnerability. For instance, the authority vacuum has led to the development of unplanned and unmonitored urban development causing the location and development of settlements in risk locations and conditions, leading to place vulnerability. On the other hand, socio-economic standing is about people's disadvantaged position against risks. Agreeing with Adelekan (2010) argument, place vulnerability interact and influence people vulnerability and vice versa. In the end, no two areas, Semaiwa and Sadzi for example, will have the same form and level of vulnerability. As far as people vulnerability is concerned, it is an issue of power distribution and marginality as Pelling (2002) explains. With those with low income, women-headed households lacking the control of resources. The study concludes that urban-poor communities in Salima and Zomba stand at risk of exposure to a number of EWEs like floods and stormy winds, to which the impact is severe as the standard and quality of living conditions cannot stand in the face of EWEs. Even more, their ability to respond, cope and recover is nearly non-existent. Henceforth, this group is critically vulnerable to EWEs.

Urban-poor vulnerability and resilience is, however, complex. It can be noticed that, as much as the people can influence their own vulnerability and adaptive capacity, it does not happen out of their own making. Their vulnerability is embedded in the social, economic, political structures surrounding them. Case in point, are structures of power, asset and resource allocation that are at play in these communities which regulate how agents and system interact. Reflecting the duality of agency and structures/institutions (Giddens 1995). The study suggests that, unless the institutions that dictate and govern interaction, operations, production and

distribution in urban areas change, it will be impossible to reduce vulnerability and build resilience with regard to hazards like EWEs. However, since no two areas are the same, interventions for building adaptive capacity must be context specific.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1. Introduction

This study sought to examine how the health of urban-poor in the areas of TA Kalonga in Salima and Sadzi in Zomba is affected by extreme weather events and how adapted they are to the conditions. Accordingly, presuming that urban areas are at risk of EWEs, the study identified cases of EWEs occurrence in the said urban areas and the health effect experienced thereof. Secondly, it endeavoured to explain the vulnerability of urban-poor women and children to EWEs and their health effects. Lastly, the study examined the adaptive efforts employed to ascertain the resilience of the urban-poor to EWEs and the consequent health effects. The study was built around the meta-framework of human ecology of disease model (Meade & Earickson 2000) to understand human health. Various concepts of risk, vulnerability, urbanisation and resilience were identified to contextualise the study, while Giddens' structuration theory was the employed to define the human-environment relationship. Interpreting study results was dependent on study findings, and theory.

7.2. EWEs and health

7.2.1. Occurrences of EWEs

The first objective of this research was to identify occurrence of EWEs in the urban-poor communities of TA Kalonga in Salima and Sadzi ward in Zomba. Followed by exploring the health effects the occurrences brought forth in the said communities. In this regard, the study has found that despite difference in topography of the two communities; Salima being relatively flat and Zomba hilly, both are at risk and have experienced stormy rains and floods. Salima has strong winds and dry-spells on top of the former two. An examination of EWEs cases in the two districts of Salima and Zomba reveal that the two study urban communities have only experienced these EWEs in recent times, with Zomba city only having an encounter with stormy rains and floods in January-February 2015.

Even though both key and primary informant alluded to the fact that the intensity of EWEs has heightened over time, secondary data available for the study does not offer the opportunity to make verifiable comment about the intensity of the winds or floods. However, both secondary and primary data point to the understanding that EWEs are becoming more frequent; for instance, the stormy winds and rains are seen to occur twice in some cases thrice in a year. Of

particular interest is the extension of EWEs to urban areas of the country where the loss and damage has been seen to be exceptionally high. Nevertheless, the study finds it debatable to allude the extent of the damage to the trends in EWEs. Instead, as discussed in Chapter six, the man-environment interaction in urban areas, in particular urban-poor locations present cumulative risks. In the same view, what were otherwise normal weather conditions are exaggerated as threats of EWEs, with the potential of leading to disaster.

Agreeing with theories of risk, the study finds that based on previous experience the perception of risk in the two study sites, among both key and primary informants was different. In that, the area in Salima the community was more aware of the risk of floods, strong winds and dry-spells and could identify what has contributed to them; and devised preventative strategies like relocation and the recent initiative to plant trees. At the local government level, DRM policy was already in place, though the implementation remains rather questionable. This is different from Zomba where some of the primary informants even alluded the floods to fate (God's timing), hence distancing themselves from both as causative agents and solutions bearers. However, the study finds it difficult to agree with the notion presented in risk compensation, as most urban-poor dwellers are often left without the capacity to make calculated choices over their settlements.

7.2.2. Health effects of EWEs

In the second section of objective one, the study concludes that following extreme weather events are a myriad of human health problems. Despite the statistics prohibiting age/sex specific analysis of the health effects, the study finds that EWEs enhanced women and children's susceptibility to ill-health. Aside from injuries and deaths that occurred due to contact with EWEs; mental, skin, diarrhoeal, respiratory, dietary and sexual-contact infections were some of the health problems that were/are directly attributed to EWEs. The study finds that the transformation in the social, built and physical environment presents grounds for inflated incidence rates. As for mental health, stress and worry was not only present for primary informants but for key informants too. Though not directly mentioned, the interviewed women in both locations expressed the extra challenge the loss of property and crops in the floods and dry-spell presents on them. They dread that they will not be able to provide for their families, and this was especially worse where the women headed their families, which was a common scene especially in the community in Salima. Concurrently, health personnel in Zomba experienced fatigue from the response activity during and after the floods.

From the health surveillance data, the study finds that due to their nature some disease like malaria, malnutrition and most likely, STIs present a '*delayed effect*'. Due to their longer incubation periods, diseases like Malaria (a big problem in children and especially expectant women), showed increased incidence rate in months after the occurrence of EWEs, therefore can sometimes not be easily attributed to EWEs. In the same frame, malnutrition, has only recently been cited as a problem facing the country right now. Besides, some of these diseases like diarrhoea are '*seasonal diseases*', to which the occurrence of EWEs does not have much effect, if not simply a minor shoot in the threshold of incidences. The study also observes, that in relation to '*seasonal diseases*', there are precautionary measures taken. In Salima for example, in the rainy season the hospital distributes mosquito nets to pregnant women and, through HSAs provided chlorine to communities to treat water. In the end, the effect EWEs would have had is rather minimised. Implying that a forecasted EWE could actually reduce the number of cases or incidence due to the possible victims/ exposed people take strong precautions like reinforcing their homes in readiness for a storm and refraining from health risk activities.

While the destruction of livelihoods, forces women to seek the means to provide for their families in ways that increases their risk of STIs including HIV/AIDS, children are forced to drop out of school and seek work to help provide for the families too. This, in the end continues the circle of poverty and risk accumulation. Lastly, the study finds that, even though temporary shelters are timely, they are also a health-scare when not properly planned for as was the case in both Salima and Zomba. The shelters became sites for acute respiratory infections in children, sanitation and hygiene related infections like measles and diarrhoea. As such, the study, condemns the '*politics of urgency*' prevalent in the country in the face of not only weather-related disasters.

7.3. Urban-poor's vulnerability

The vulnerability of urban-poor communities; women and children, has been found to result from diverse interrelated factors. The factors range from historical, social, economic, political, cultural, institutional and natural environment, which make the study conclude that even though people often create their own vulnerability, it is not in their own making (Giddens, 1991). The growth of urban-poor communities in usually unliveable locations like hilltops and river banks and inhabitable housing, is intended as stride away from rural poverty as well as a manifestation of the inequalities in resource accumulation and distribution. That these urban-

poor settlements develop unplanned, and without any basic and emergency services, is a display of the failure or deliberate choice of national and local governments to recognise them. Much so is the unwritten but clearly agreed upon presupposition that urban areas, just for their status, are affluent than rural areas when these urban-poor locations like Sadzi in Zomba city are a concentration of poverty. Besides, until 2015, the threat of EWEs was not recognised in Malawi's four cities, restricting any poverty reduction, and risk adaptation and mitigation programmes to rural areas.

A rather worrying finding is that urban areas in Malawi, especially transitional one like Semaiwa in TA Kalonga Salima, and Sadzi in Zomba have a lot of actors claiming authority over them. In the area of land control and distribution, three departments in the local government and traditional authorities (Chiefs, now declared invalid for elected Councillors) claim control, yet no one seems to be working in fact. In the presence of such many actors, the legal and formal procedure of acquiring land has been found to be lengthy and often corrupt, forcing those without the political and economic muscle to opt for the informal routes. Chiefs however proved to command authority over local government, in transitional urban areas, the only challenge is they do not adhere to controls of quality in the housing or infrastructures constructed. Even if the controls are enforced, the economic status of a large population, including nearly all the women interviewed in this study would not afford to have a home.

7.4. Resilience to EWEs and health impacts

The last objective of this study pursued to assess the adaptive capacity (also called resilience) urban-poor communities to EWEs and their health effects. In this regards, resilience like vulnerability has been found to be depended on several interrelated factors and conditions of agent, systems and institutions. Resilience has also been found to be the flipside of vulnerability. The overall study finding, however, is that poor neighbourhoods in urban areas are at the moment further away from reaching a state when they can claim to have absorbed present shocks, prepared and adapted to future risks. Besides the recent national and local DRM policy institution put in place, to guide the planning and coordination of activities towards the reduction of impacts of disasters in the different sectors involved, there are no tangible sustainable adaptation efforts employed in urban areas. Neither is there a harmonised health and environmental sector policy. In the presence of such institutions, actors and systems are mediated to short term-in-the-moment coping mechanisms like disaster responses are and have been employed where disasters have hit urban areas. With exception of 2015 floods where

clusters were used, during the response activities, too many players none with a particular role to play resulted in the duplication of efforts, and frustrations. While Salima hospital, resource allowing, provided precautionary measures like chlorine for water treatment, there is no other concrete plan of action set in readiness for when disaster strikes. Hence resorting to ad hoc responses, which does not provide platform for recovery. The study, therefore, advances that with well-coordinated planning and adequate investment into the development of urban areas, it is possible to reduce the risk of disasters like EWEs among others, as well as to manage them well, when they occur. It is highly essential that actors, not only in urban areas, should realise that risk reduction is at all time and not just before or just after the occurrence of a disaster.

7.5. Critical issues and limitations of the study

The process of this study was not without challenges and restrictions including methodological and analytical ones. Presented below are some of the challenges:

- Accessing health data from the DHO offices in Zomba was a great problem. The Environmental Health Officer who I had interviewed and had promised to send me the data, as he was so busy to prepare and provide it at the time of the interview did not come through. Even with repeated reminders and visits to his office, only four months later through another office in the department was I given the data, after paying for it.
- The nature and quality of both health surveillance and disaster profile from DoDMA was not satisfactory and open for further manipulation and interpretation:
Firstly, is the health surveillance data: In Salima, records from the main hospital and a private clinic were used, since the population in Semaiwa patronised both depending on the level of income and kind of health problem. In Zomba, Sadzi did not have its own health facility until 2012, so the community either shared the health facility with their neighbouring community and most serious cases were and are referred to the main hospital. This meant the data could hardly be used to make independent and meaningful interpretations for residential area specific disease incidence, neither could the disease statistics be split by age group and gender, therefore restricting the study's initial intention of identifying health impact on women and children. Besides the fact that not all disease cases are reported at health centres; camp health records were not present nor were HSA records for the research, therefore, data used in this study may not depict the actual numbers of the affected.

Secondly is the disaster profile data. Without scale and depth of the EWE and impact, the data was inadequately documented. For example, there was no measures of intensity and magnitude; and contacting the office responsible for clarification at both DoDMA and MET proved futile. Therefore, even though the study would have found relevance in a clear depiction of EWEs' intensity and magnitude, it could not be allowed to do so.

- Despite the use of quantitative data, the qualitative methodology employed in the study restricts possibilities of other variables, besides the descriptive analysis of quantitative data does not utilise the data to its maximum potential to depict change.

7.6. Recommendations

With reference to this study's findings, the following are suggested as recommendations for stakeholders' action to risk reduction and adaptation as well as further research:

- Urban areas are not exempted from EWEs, in fact due to the concentration of population and development investments, the impact is grave and will increase rapidly in the coming years. Therefore, the government of Malawi needs to take serious measures probably beginning by recognising urban-poor communities and locate resources to them in order to plan for their development, provide basic resources, invest in high level weather forecasting and evacuation procedure.
- Early warning systems such as high level and accurate weather forecasting coupled with effective communication are pivotal to adaptation and risk reduction. Early warning system informs decision-making, and Malawi should invest in it, if it is to move forward in the set DRM goals.
- NGOs should bring their interventions into urban areas too as there is more poverty in urban communities than assumed. However, the techniques have to be suited to particular urban communities as they are different (transitional/ urban urban). For example, they should take advantage of knowledge and skills already available in the urban population. At the same, the interventions should take into consideration the time restriction in urban communities; as relying on business for income generation, urban dwellers do not have as much 'free' time as people in rural areas who depend on seasonal farming.
- Disaster management actors should consider cash transfer as a recovery and adaptation strategy so that the affected population can make their own preferences for improvements of their life situation.

- There is a need for another study to carry out and provide a comprehensive assessment of the vulnerability to EWEs and climate change in general in the four cities of the country.
- A further study should be implemented to project the future of urban disasters/EWEs, if the present situation remains the same.
- Having developed DRM policies in the four cities of the country, a follow up study should examine how the implementation process is going and the effects thus far.

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APPENDICES

Appendix I

Primary Informants interview guide: affected women

Topic: The Urban-poor and EWEs: health effects, vulnerability and adaptation Salima and Zomba, Malawi

I. DEMOGRAPHIC PROFILE AND BACKGROUND INFORMATION

1. Age and Gender
2. Number of people in household. Who is the head of household?
3. How long have you lived in this community? Why did you choose to settle in this area?

II: REFLECTION QUESTIONS

a. Occurrence and Effects of Extreme Weather Events

1. What EWEs have you experienced living in this area? What and When?
2. Describe the damage caused. Which other areas were affected
3. Explain what impacts the EWEs had on: Your household and Community.
4. Were there any health problems: illness, diseases and injuries that your household/ community experienced around the occurrence of EWEs in the area?
Was the situation (incidence and prevalence rate) any different than in absence of EWEs?
Who were affected most? (Women/men/children/new-comers/natives)

b. Urban-poor Vulnerability

1. What are the physical location characteristics of the areas?
2. Describe your socio-economic status:
What type of house do you have?
How do you earn a living?
Do you have access to WASH: (how far? Shared?)
Access to health facilities: (how far? Private or public?)
How is the Social organisation: relation with other members of the community?
3. When EWEs occur in your area who are severely affected? Explain why:
4. Have you received training/help to prepare for EWEs in the past 5 years?
5. Are there any organisations working in the area providing help before and after EWEs?

c. Adaptive Capacity

1. What practices do you use (as a household and community) to deal with the health problems that come with EWEs?
In Water Sanitation and Hygiene, food, and housing:
Which ones have worked/didn't work, why?
2. Who developed the practices? At what point (before or during or after the EWEs)
3. Do you think you have recovered well from the recent EWE?
Do you consider yourself well prepared if another happens?
In what way? How?

Any other comments?

Thank you for participating!

Appendix II

Key Informants interview guide: Department of Disaster Management

Topic: The Urban-poor and EWEs: health effects, vulnerability and adaptation Salima and Zomba, Malawi

I. DEMOGRAPHIC PROFILE AND BACKGROUND INFORMATION

1. Gender/Age group
2. What is your current job title? How long have you been working for the department?
3. What are your responsibilities at work?

II: REFLECTION QUESTIONS

a. Occurrence and Effects of Extreme Weather Events

1. What EWEs have occurred in the district, study area in the past 10 years? When?
And how long? Are there any records and Maps produced?
2. Describe the:
Intensity (wind strength and volume of water):
Areal extent (which other areas were affected):
Frequency (how often in a year):
Magnitude: (how much damage):
3. Explain what effects/impacts the occurrence of EWEs has had on: the Department
Community/People (women and children):
4. During EWEs period, were there any health problems experienced?
5. Mention them. What were the incidence rates? Normal or Above normal
Explain why they occurred in this way.
Are there any document/ reports of health situation during and after EWEs?

b. Urban-poor Vulnerability

6. What are the physical location characteristics of the areas?
7. Describe the socio-economic status of the areas:
Population:
Housing and land entitlement:
Occupation:
Water Sanitation and Hygiene (WASH):
Access to health facilities:
8. When EWEs occur in these areas, are the communities at any threat of being severely affected: Explain why?
9. Are there any organisations working in the areas with disaster management thematic areas? What work do they do?

d. Adaptive Capacity

1. What policies/guidelines are in place in the district, and how do they work?
2. What interventions have been used (in line coping with the health problems)
What worked, what did not work, why was that so?
Who were involved in developing the interventions?
At what point (before or during extreme weather events)?
3. Do you think these areas have recovered well and are well prepared?
And your department?
4. What do you recommend for the communities to better deal with EWEs?

Any comments?

Thank you for participating!

Appendix III

Key Informants interview guide: Health personnel

Topic: The Urban-poor and EWEs: health effects, vulnerability and adaptation Salima and Zomba, Malawi

I. DEMOGRAPHIC PROFILE AND BACKGROUND INFORMATION

1. Gender/ Age group
2. What is your current job title?
3. How long have you been working for the department?
4. What are your responsibilities at work?

II. REFLECTION QUESTIONS

a. Occurrence and Effects of Extreme Weather Events

5. What EWEs have occurred in the district, study area in the past 10 years? When?
6. Explain what effects/impacts the occurrence of EWEs has had on:
Department:
Community/People:
7. During EWEs period, were there any health problems experienced?
Mention them:
Incidence rate? Normal or Above normal:
Explain why they occurred in this way:
Are there any document/ reports of health situation during and after EWEs?

b. Urban-poor Vulnerability

8. Describe the socio-economic status of the areas:
Population:
Housing:
Water Sanitation and Hygiene:
Access to health facilities:
9. When EWEs occur in these areas, are the communities at any threat of health problems:
Explain why:

c. Adaptive Capacity

10. What interventions have been used to with the EWEs and the health problems?
What worked, what didn't work, why was that so?
11. Who were involved in developing the interventions?
At what point (before, during or after EWEs)?
12. What policies/guidelines are in place in the department in relation to disasters?
13. Do you think these areas have recovered well and are well prepared?
And your department?
14. What do you recommend for the communities to better deal with EWEs?

Any comments?

Thank you for participating!

Appendix IV

Key Informant interview guide: NGO Official

Topic: The Urban-poor and EWEs: health effects, vulnerability and adaptation Salima and Zomba, Malawi

I. DEMOGRAPHIC PROFILE AND BACKGROUND INFORMATION

- III. Gender
- IV. What is your current job title?
- V. How long have you been working for the organisation?
- VI. What are your responsibilities at work?
- VII. What is the organisation responsible for in the study area(s)?

II: REFLECTION QUESTIONS

15. Occurrence and Effects of Extreme Weather Events

16. What EWEs have occurred in the district, study area in the past 10 years? When?

17. Explain what effects/impacts the occurrence of EWEs has had

Department:

Community/People:

18. During EWEs period, were there any health problems experienced?

19. Urban-poor Vulnerability

20. What are the physical location characteristics of the areas?

21. Describe the socio-economic status of the areas:

Population:

Housing:

Occupation:

Water Sanitation and Hygiene:

Access to health facilities:

22. When EWEs occur in these areas, are the communities at any threat of being severely affected? And women and children? Explain why.

23. Adaptive Capacity

a. What work does/did the organisation do in the study area (s)?

b. What policies/guidelines are in place in the organisation with regard to disasters?

c. What interventions have been used (in line dealing with the EWEs and the health problems):

What has worked, What didn't work, Why was it so?

Who were involved in developing the interventions?

At what point (before, during or after extreme weather events)? Why?

d. Do you think these areas have recovered well and are well prepared?

And your organisation?

e. Can you elaborate what exactly will be done differently in case of another EWE

f. What do you recommend for the communities to better deal with EWEs?

Any comments?

Thank you for participating!

Appendix V

Focus Group Discussion topic guide: Community Development Committee

Topic: The Urban-poor and EWEs: health effects, vulnerability and adaptation Salima and Zomba, Malawi

- Community leadership
- History of EWEs in the area in the past 10 years
- Impacts: damages/ losses
- Population characteristics: natives/settlers; land acquisition
- Social services: water, health centre, school,
- Explain about the committee: when they started/activities
- Successes/ challenges
- Plans for the future