



# An exploration of early warning systems and its negative impacts of prevention, reduction of loss of lives and livelihood problems of women in T/A Kawamba in Kasungu district.

\*<sup>1</sup>Tiwonge E Kulemeka and <sup>2</sup>Dr. AP Senthil Kumar

\*<sup>1</sup>P.G. Student, Department of Social Work, DMI-St. Eugene University, Lusaka, Zambia.

<sup>2</sup>Associate Professor, Department of Social Work, Jigjiga University, Jigjiga, Ethiopia

## Abstract

Early warning systems (EWS) are vital tools for disaster risk reduction, providing critical information to communities and authorities to prepare for and respond to disasters. While EWS are designed to save lives and protect livelihoods, this study delves into the often-overlooked negative impacts of these systems, with a particular focus on the vulnerabilities and challenges faced by women. This exploration draws on empirical research and case studies from various disaster-prone sites of TA Kawamba highlight the multifaceted dimensions of EWS and their implications for gender equity. It examines how EWS can inadvertently exacerbate vulnerabilities among women and hinder the achievement of disaster resilience and sustainable development goals. Among other outcomes, the study revealed that Women, especially in rural and marginalized communities, often face restricted access to EWS information due to gender-related disparities in education and technology access. This limitation leaves them less informed and less able to take timely actions to protect themselves and their families. On the same, the relocation of communities away from hazard-prone areas as a disaster risk reduction measure can disrupt traditional gender roles and expose women to protection risks, including gender-based violence and exploitation. On economic situation, the study revealed that, economic disparities often affect women's ability to prepare for disasters. Limited access to financial resources, land, and assets can hinder their capacity to invest in disaster-resilient infrastructure or to recover post-disaster. The study was done in TA Kawamba, Kasungu District.

**Keywords:** Early warning systems, prevention, reduction of losses of lives, livelihood, women, Kawamba.

## 1.Introduction

Early warning has been defined as ‘the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of

harm or loss’ (UNISDR, 2009) <sup>[1]</sup>. There are generally considered to be four main elements of any natural hazard-related early warning system: risk knowledge; monitoring and warning; dissemination and communication; and response capability (adapted from UNISDR, 2006) <sup>[2]</sup>.

Early Warning Systems (EWS) constitute a crucial tool for authorities to implement optimal policies to prevent or at least attenuate the impact of a financial turmoil. The first EWS was proposed by Kaminsky, et al., (1998) <sup>[3]</sup> (KLR hereafter) relying on a signaling approach. Climate change and human activities are playing influential factor for disasters. Global warming is an important cause of serious natural disaster (Such as cyclones, a rise in the water level, droughts and floods etc.

## 2. Statement of The Problem

Malawi is generally a green, lush country, with plateaus, highlands, forests, mountains, plains, escarpments and dramatic river valleys. Three quarter of the total land area of is hilly and many villages are situated on or adjacent to the unstable hill slopes. As a result, the floods with debris flow occurs. Unplanned settlements and physical constructions without due consideration to the natural hazards are considerably aggravating the mountain environment. Each year Kasungu District is one of the districts that is always affected by flash flooding in specific areas that are allocated along the river line areas. In a year flash floods occur every year especially at the onset of the rainy season from November until March. Out of 1000 people a total number of 600 HHs are affected especially those living along the river line areas such as the BUA and Lusa River in Kasungu.

In Malawi On average, flooding poses a threat to all low-lying regions around Lake Malawi with an annual average of 100,000 people and 200 education and healthcare facilities are affected nationally by river flooding each year. (World Bank 2019) <sup>[4]</sup>. Though it is unfortunate that early warning systems are not fully yet developed in most parts of the district. Currently the district depends of the seasonal forecast that is disseminated by the Department of Climate Change and Metrological Services (DCCMS). Early warning has been one of the main agendas in the Hyogo framework of action to reduce the disaster loss in terms of lives, property damage and livelihood. In Kasungu, as much as the seasonal forecast is disseminated there still is no adequate warning system for the floods and other hazards. Currently early warning systems in Malawi are insufficient to provide the population with timely, relevant information that can help them make decisions that safe guard their livelihoods, from seasonal forecasts that can help farmers plan their harvests, to information on coming floods. It is mainly due to the lack of technical manpower and adequate resources. Translating warning into concrete local action is crucial, even in countries with effective capacities for forecasting, detecting and monitoring hazards and suitable technologies for disseminating advance warnings. In many countries, even accurate, timely early warnings were often not acted upon effectively.

Though the successful early warning system are facing hindrances like community perception, lack of knowledge on responding to floods and prepare for it, lack of co-ordination between the stakeholders and lack of community interest are emerging. With the above mentioned hindrances it is always a question on people's perception regarding the message in forecasting and warning, and people response on the basis of warning, and issues regarding the sustainability which need to be addressed by the NGO's and concerned stakeholders for the success of Early Warning Systems to increase the resilience of the people.

Enemark (2010) <sup>[5]</sup> stated that "by combining disaster risk information with people perception and other relevant

information of land use, people understanding about the hazards and responses during and aftermath of disaster is crucial. Therefore, information regarding the perception community responses in needed in the emergency and pre disaster phase. Fakruddin (2011) <sup>[6]</sup> describes that lack of people understanding on forecasting and warning message though the installation of the Early Warning Systems increases the vulnerability and risk among the potential beneficiaries of Early Warning Systems

With the increase in the frequency and occurrence of disasters due to climate change, it has been observed that most communities in Kasungu District are negatively affected by the outcomes of disasters, this is mainly due to the lack of functional Early Warning Systems. Women continue to face challenges impacted much by climate change impacts. The consequences of natural disasters in addition to man-made crisis are enormous, not only in the short term with injuries, loss of life, damaged infrastructure, but also in the long term with changes in social and economic conditions of women.

## 3. Literature Review on Floods problems

Flash floods have been a problem in Malawi and beyond since long ago due to many contributing factors but not limited to climate change. Nations have been putting in place measures to lessen the adverse effects of climate change as well as their occurrence using different ways, of which early warning systems have been a center of attention.

The government of Malawi together with its development partners have put in place ways of preventing and managing floods risks through community based approaches. According to Trogrlić et al. (2018) <sup>[8]</sup>, the community based approaches gained momentum through realization that disasters are more a consequence of socio-economic than natural factors and the evidence that the traditional, top-down approaches very often do not adequately face the vulnerabilities of those at risk.

However, despite such approaches being in place, Malawi still experiences floods in different parts of the country. The impacts of flooding as outlined by Trogrlić et al. (2020) <sup>[9]</sup>, pose a challenge to what is culturally accepted such as men and women using the same accommodation in the shelter camps and have influences on other cultural practices which mostly hinder women's rights more. On top of that, the displacement of large numbers of people due to flood events can lead to disruption of essential services.

The effects of climate change related disasters floods inclusive, affect members of communities differently, due to different levels of capacity and access to resources. Such inconsistencies can also manifest within the same household. Societal inequalities such as the distribution of resources and power, lack of awareness of rights and duty bearer capacity and/or commitment to uphold such rights as well as repressive cultural rules and norms, contribute to differing experiences of disasters.

### Early warning

Managing flood in an informed and effective way is of utmost importance to reduce damages and mitigate long-term impacts on development. The area of flood risk management, including the development of monitoring and early warning systems, has seen much progress in the past years (Werner et al. 2013) <sup>[10]</sup>. However, for drought risks governments often still have a reactive approach instead of a proactive risk management approach. According to Buurman et al. (2014) <sup>[11]</sup>, monitoring and early warning systems aim at providing relevant

information to policy and decision makers in order reduce the negative impacts of floods and droughts. Forecasting and early warning systems should be able to identify and mitigate an impending disaster, while monitoring systems provide inputs to forecasting, early warning, and disaster management.

Perera et. al. (2019) <sup>[12]</sup> categorised Floods Early Warning systems in technologically basic system that uses simple methods such as upstream water level observations to predict floods and does not involve a dedicated Flood Forecasting Centre (FFC) with technical professionals, technologically intermediate FEWS where limited technical resources are available for a systematic approach to predict floods, for instance, it does not include a flood forecasting system; instead, warning is issued based on past experiences of flood forecasting professionals and real-time observations and technologically advanced FEWS that involves sophisticated and systematic approach with sufficient technical resources including hydrologic and hydraulic model-based forecasting, telemetric observation systems As stated by Trogrlić and Homberg (2018) <sup>[13]</sup>, importance of integrating IK in development and DRR work at community levels cannot be overemphasized. Community-based disaster risk reduction, as a predominant approach led and implemented by NGOs in the developing world, is built on a premise of participation, incorporating local perspectives, and delivering solutions that are locally accepted and sustainable. Their study revealed the use of upstream water level measurement and information dissemination to lower stream so that there is some sort of preparation for a reaction.

Early Warning Systems (EWS) are critical components of disaster risk reduction and crisis management strategies. They are designed to anticipate and provide timely and effective information about imminent threats, enabling individuals, communities, and governments to take appropriate actions to mitigate potential damage and save lives. EWS encompass a range of technologies, processes, policies, and community engagement initiatives aimed at reducing vulnerabilities and enhancing preparedness. The fundamental concept of early warning systems revolves around the timely and accurate dissemination of information concerning potential hazards, whether natural or human-made. The main objectives are to minimize loss of life, injury, and damage to property by providing advance notice and facilitating preparedness and response. EWS operate on the principle that informed and prepared communities are more resilient and better equipped to deal with adverse events.

### The experiences with EWS

Early warning systems are crucial tools for disaster-prone communities to mitigate the impact of natural disasters. These systems provide advance notice of impending hazards, allowing people to prepare and take protective actions. One of the most significant benefits of early warning systems is their ability to save lives. When communities receive timely warnings about approaching disasters such as hurricanes, tsunamis, or wildfires, they can evacuate or take shelter, reducing the risk of casualties. Early warning systems encourage disaster-prone communities to prepare in advance. This preparation may include building infrastructure to withstand disasters, creating emergency plans, stockpiling essential supplies, and conducting evacuation drills. These proactive measures can significantly reduce the impact of disasters.

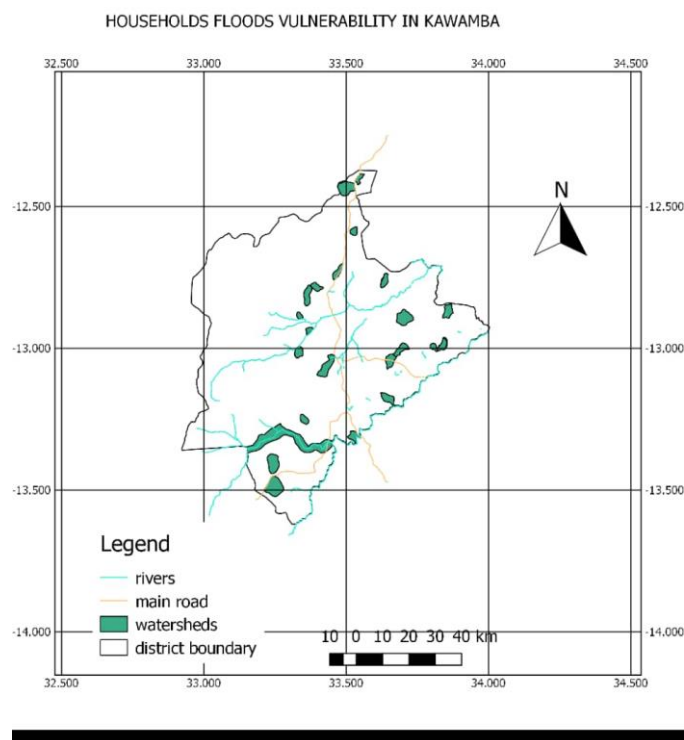
In cases where evacuation is necessary, early warnings allow residents to leave their homes and move to safer areas. This can prevent people from becoming trapped and increase the chances of a successful evacuation. In addition to saving lives, early warning systems help protect the livelihoods of people in disaster-prone areas. Farmers can harvest crops early, fishermen can secure their boats, and businesses can safeguard their assets, minimizing economic losses. Over time, communities with effective early warning systems become more resilient. They learn from past experiences, adapt their strategies, and develop a culture of preparedness. This resilience enables them to better cope with future disasters.

### 4. Significance of the Study

The findings of this study will not only benefit the community of T/A Kawamba but the whole district as a whole. Through this study various stakeholders will be able to identify the gaps and rectify the causes by fully utilizing the EWS in order to reduce the impacts caused by these hazards. Furthermore, this study will also act as a tool for the Department of Climate Change and Metrological services, to help identify the gaps they have when it comes to dissemination of the seasonal forecast. The Department of Disaster Management Affairs can also take advantage of this study to have preparatory and mitigation activities in place.

### 5. Scope of the Study

The study area is T/A Kawamba located South East of Kasungu. Below is a Map of T/A Kawamba showing the distribution of rivers and Watersheds. This study was conducted around communities that are along the river line areas of T/A Kawamba.



### 6. Objectives of the Study

#### Main Objective

The aim of this study is explore the early warning systems and its negative impacts of prevention, reduction of loss of lives and livelihood problems of women in T/A Kawamba in Kasungu District.



### Specific Objectives

- ✦ To identify and analyze specific risks faced by women in various flood disaster-prone scenarios, including natural disasters, conflicts, or socio-economic crises, T/A Kawamba.
- ✦ To evaluate the existing early warning systems in place, considering their effectiveness, coverage, and accessibility, particularly in relation to women's access and understanding.
- ✦ To investigate the direct and indirect impacts of early warning systems on women's livelihoods, considering their roles in agriculture, household management, and community resilience.
- ✦ To identify barriers hindering women's access to and utilization of early warning information.

### Research Questions

The study had the following research questions in trying to achieve the objectives.

- ✓ What are specific risks faced by women in various flood disaster-prone scenarios, including natural disasters, conflicts, or socio-economic crises in T/A Kawamba.
- ✓ What are the existing early warning systems in place, considering their effectiveness, coverage, and accessibility, particularly in relation to women's access and understanding?
- ✓ What are direct and indirect impacts of early warning systems on women's livelihoods, considering their roles in agriculture, household management, and community resilience?
- ✓ What are barriers hindering women's access to and utilization of early warning information?

## 7. Research Methodology

The research strategy in this study used an explorative research design. Qualitative method involves collecting views, attitudes and opinions from women based in TA Kawamba, Kasungu and key informants. The adoption of this method is to gather as much information as possible from the participants through face to face interaction and to get an in-depth understanding on the in the challenges faced due to lack of early warning systems when disasters struck. Qualitative method was used because the researcher wanted to make use of the face to face interaction which involves views, ideas and expressions which could not be quantified. The Focus group discussions and in depth and semi structured interviews were used in this study, so that researcher could capture their feelings and narrated stories. Making use of key informants during this study allowed the researcher to collect information from a wide range of people including community leaders, professionals, & residents who have firsthand knowledge about the community. Secondly, this method was used because it allowed the study of concepts that could not be quantified such as behavior or attitude. Liamputtong, (2009) [18] explains that qualitative research is designed to reveal a target audience's range of behavior, the perception that drives it with reference to specific topics or issues. This method enables the respondent to explain the phenomena more deeply and exhaustively mainly because the researcher asks open ended questions which gives room for further probing hence much information is sought from Participants. This comes from the argument that quantitative methods involve less interaction with the Participants since highly restricted questionnaires are sent or given to the

Participants to fill without that personal interaction that allows the researcher to ask for further clarification in the event that she/he did not grasp what was said. Therefore, the aspect of establishing a good rapport with the Participants made it easy for the researcher to choose this method which is crucial for the collection of not only sensitive information but also their feelings and experiences since they are given the freedom to do so (Kalelo- Phiri 2010:10) [15].

Furthermore, this study used a qualitative approach because it involves broadly stated questions about the impacts of early warning systems and its impacts of the loss of lives, loss of property and livelihoods that are experienced by women in TA Kawamba., experiences and realities, studied through sustained contact with the people in their natural settings, generating rich, descriptive data that helps their experiences and attitudes, this is according to Rees (1996) [16].

A sample is a group of individuals who participate in the study. Study borrows sampling methodology by Woodbury, (2008) [17]. The study targeted participants who were systematically chosen from a group of relevant people.

**Sample** (n) =  $(Z^2 * (1-P) P) / (E^2)$

Where E = allowable error 5% having a sample size 50 people, and was distributed to various targets KII, FDG and the in-depth interview.

Z= critical value at 95%

z=95% confidence interval level under the normal curve, (1.96)

e=marginal error 5% that means 0.05

The study used interviews and key informant interviews to collect primary data and a wide range of resources for secondary data.

## 8. Results and Discussion

This chapter will be able to show the findings from the research and the interpretations. The findings presented were able to respond to the research questions that the researcher wanted to address.

### Demographic characteristics

Table 1 summary of demographic characteristics of Participants.

Demographic variable	Category	Frequency	Percentage
Sex	Female	50	100
	Male	0	0
Age	<<<30	5	10
	31-40	22	44
	41-50	23	46
Education	Primary	24	48
	JCE	12	24
	MSCE	8	16
	NONE	6	12
Marital status	Married	24	48
	Divorced	15	30
	Widowed	7	14

	Single	4	8
<b>Household head</b>	MHH	23	46
	EHH	8	16
	CHH	2	4
	FHH	17	34

Table 1 below shows categories of participants to the study. There was a total of 50 participants who participated all of which were female. The group of people had less junior secondary school completers as compared with primary completers and only who have never gone to school. Out of the 50 that participated in the study 24 women representing 48% belonged to primary school and only 16% having completed their Malawi School Leaving certificate. 24 of the women are married and are from male headed household families with 46%. Lastly, the group had a lot of people with that were falling under the age range of 41-50 years of age.

### Opinions on Early warning systems

Early warning systems play a crucial role in disaster risk reduction and community resilience, especially in areas that are prone to various natural hazards, such as floods, droughts, and storms. Implementing effective early warning systems can help communities prepare for and respond to these hazards, potentially reducing the loss of lives and property. The study revealed several issues to do with early warning systems. The prerequisite for effective early warning is the strong recognition of the human dimensions of early warning mechanisms (UNISDR, 2008) [19]. Early warning messages must reach, be understood, believed and personalized by the public at risk, in order to be acted upon so as to reduce immediate exposure to hazards. Therefore, community involvement is essential to the design of locally efficient and socially relevant early warning systems. During the FGD with the people of the community were hostile about the EWS that was installed in the community as, the tower was built in the same year floods occurred in the village but system was not useful for the people of the community. Due to the nature of the EWS it was not so popular among the people of the community. This watch tower needs some watchmen to look after the river but after the NGO handed it over to the community it has not been maintained due to lack of resources. The results further overwrite that early warning systems can empower individuals and communities by providing them with actionable information. People who believe that their actions can make a difference in mitigating the impact of disasters may have a positive view of the information shared. The participants were in support of this and women group affirming positively to the discipline. Some people have opinions on the effectiveness of communication channels used for disseminating alerts can impact perceptions. If alerts are delivered through accessible and widely-used channels, such as mobile phones or community meeting and community radios, the system is more likely to be seen as valuable.

However, most respondent's stated that Early warning systems cannot contribute to a sense of preparedness within communities. They believe that even though people are aware they believe that they may need to be more equipped to respond effectively when a disaster is imminent, reducing panic and confusion, there has been less scenarios where such have been materialized in times of the disasters.

### Available EWS

An initial interview with metrological officer revealed that a flood early warning system is implemented with the support of various organizations, including the Department of Climate Change and Meteorological Services, the Malawi Red Cross Society, and the World Food Programme. This system aimed to provide timely alerts to vulnerable communities along the Lilongwe River, which is prone to flooding during heavy rains. The government, in collaboration with NGOs, installs water level sensors along the Bua and Lusa River and rain gauges within the village to monitor water levels and rainfall in the area of Kawamba. On the same, key informant interview (met officer and rain gauge meter reader) revealed that The FEWS in Malawi uses weather forecasts and river monitoring data to provide early warnings for potential flooding events. It utilizes rainfall and river level data to predict and assess flood risks. The system disseminates alerts through various channels, including radio broadcasts, SMS messages, and community meetings. The trio also underlined the use of Malawi Red Cross Society's Community-Based Early Warning System. This initiative involves training community volunteers to monitor weather conditions, river levels, and other indicators. Volunteers then share this information with their communities, raising awareness and helping people prepare for potential disasters. The program also uses radio broadcasts to disseminate warnings. This is widely used through radio dissemination thou not widely adopted. Lastly, there is also Community-Based Climate Early Warning System (CC-EWS). This focuses on empowering local communities to monitor and respond to climate-related hazards. It involves training community members to collect data on weather and climate indicators and share this information with relevant authorities. Community-Based Climate Early Warning System aims to improve resilience by promoting localized responses.

### Roles of EWS

The results reveals that Early warning systems provide advance notice of impending hazards, enabling communities to take proactive measures to reduce vulnerability. By preparing for disasters, communities can minimize the negative impact on livelihoods, homes, and infrastructure. The ideology was lined with only 10% of the women and few men supported the ideology on reduced vulnerability. On the other hand, timely alerts allow people to secure their livelihoods by protecting crops, livestock, and other income-generating assets. Of women group, 30% narrates that early warning systems helps to maintain economic stability and prevents loss of income, which is crucial for vulnerable populations. There are also interesting setbacks on the views on preparedness discipline. Less than 10% of all genders made a say that despite the fact that Early warning systems promote disaster preparedness through training and education, still, Communities cannot develop response plans, conduct drills, and build capacity to effectively manage disasters, thus not safeguarding their socioeconomic interests. Furthermore, the results further gave a highlight on economic hand recovery of early warning systems. A group of women had a positive articulation that, by taking proactive measures in response to early warnings, communities can mitigate the economic losses caused by disasters. This includes protecting property, infrastructure, and assets that are crucial for economic activities

### Effects of EWS on Women livelihood

Traditional gender roles may dictate that women are primarily responsible for household chores, caregiving, and other domestic tasks. Early warnings and evacuation orders can disrupt these roles, placing additional burdens on women and

affecting their livelihood activities. Early warnings can prompt women to temporarily abandon their livelihood activities, such as farming, small businesses, or informal work, to prioritize their families' safety. This interruption can result in economic losses and decreased financial independence. Resource allocation during disaster response and recovery efforts may not always consider the specific needs of women. Limited access to essential resources such as food, clean water, and medical care can disproportionately affect women's well-being.

### **Challenges women face**

Women often have less access to financial resources, land, and credit facilities. In post-disaster situations, this impede their ability to restart businesses or agricultural activities'.

'Many women work in informal sectors, such as small-scale agriculture or home-based businesses. Disasters disproportionately affect these sectors, making it challenging for women to rebuild their livelihoods without proper support and resources'.

'The post-disaster environment increases the risk of gender-based violence. Displacement, crowded shelters, and breakdowns in law and order made women more vulnerable, affecting their ability to engage in livelihood activities without fear.

### **Livelihood problems in flood prone areas**

Women who engage in agriculture, livestock rearing, or home-based enterprises lost productive assets during disasters. Early warnings enable them to take protective measures for their assets and livelihood. Early warning systems play a crucial role in alerting communities about impending disasters. However, women who rely on informal or daily-wage jobs may have limited flexibility to respond to early warnings, resulting in income loss and economic disruption, women Participants 18'. Women may have restricted access to communication tools or may not be targeted by early warning messages due to cultural norms or lack of access to technology. This leaves them unaware of impending disasters, hindering their ability to prepare.

### **Role of communities**

Local communities actively involve women in decision-making processes related to disaster preparedness, response, and recovery. Women's perspectives and experiences should be considered in all stages of planning. Communities can initiate gender-sensitive projects that address women's livelihood challenges, such as promoting income-generating activities and building disaster-resilient infrastructure. Raising awareness about gender equality and disaster risk reduction within the community can help challenge harmful norms and promote the active involvement of women.

## **9. Conclusions**

Opinions on early warning systems in communities are shaped by various factors, including access, trust, cultural considerations, and the effectiveness of the systems. A gender-responsive, participatory, and culturally sensitive approach to early warning system design and implementation is crucial for addressing challenges and ensuring that communities can effectively prepare for and respond to disasters. Furthermore, opinions surrounding early warning systems in communities reflect the complexity of disaster management. While positive aspects, such as enhanced preparedness and technology-driven

innovations, underscore the value of EWS, critical opinions highlight the necessity for equity, gender sensitivity, and cultural relevance. Community engagement emerges as the linchpin, driving the discourse toward locally owned, participatory systems that account for diverse needs and experiences. Integrating these opinions within policy and practice frameworks can lead to more effective, inclusive, and responsive early warning systems that truly serve and protect communities in times of crisis. Furthermore, the availability of early warning systems within communities is a dynamic and multifaceted issue. While technological advancements have greatly expanded accessibility, disparities persist due to technological, linguistic, and cultural barriers.

## **10 Recommendations**

There is a need implement CBPR methodologies involving women, local communities, and stakeholders in the assessment and co-design of early warning systems. This participatory approach ensures the incorporation of women's perspectives and needs in system development. There is also a need to evaluate the effectiveness of communication channels used for disseminating early warnings, particularly their accessibility to women in rural, marginalized, or remote areas. Assess the suitability of language, format, and mediums used for information dissemination. There is a need to conduct vulnerability mapping and risk assessments, specifically focusing on gender-specific vulnerabilities and socio-economic factors influencing women's resilience to disasters. This aids in identifying areas where early warning systems fall short in addressing women's needs.

### **Limitations**

The limitations of this study referred to the limitations related to the nature of the study and to those attributed to the researcher. The researcher encountered challenges in accessing some of the Participants particularly during the peak farming season bearing in mind the food security challenges in the district. Most women were searching for food to eat. Due to limitation of the current statistical data, the sample did not fully represent the women living in T/A Kawamba as a whole but the information gathered may be helpful to effect changes for the benefit of all women. Some women were hard to find due to different schedules. The researcher observed the unwillingness of some women to be interviewed and this was because some women did not fully understand the purpose of the study. Some women would opt to go for piece work to earn money than to sit for 30 minutes to respond to questions. The study used purposive sampling techniques to get participants for FGDs and therefore information was not only obtained from a familiar group of women. This technique was very prone to research bias..

### **References**

1. The United Nations International Strategy for Disaster Reduction.  
Online:[<content://https://www.googleadservices.com/pagead/aclk?sa=L&aived=2ahUKEwi3i5bTuf2CAxWWVUEAHQm7CgEQ0Qx6BAGKEAE/>]
2. The United Nations International Strategy for Disaster

Reduction.

Online:[<content://https://www.googleadservices.com/pagead/aclk?sa=L&aived=2ahUKEwi3i5bTuf2CAxWWVUEAHQm7CgEQ0Qx6BAGKEAE 2006/>]

3. Kaminsky, Lizondo and Reinhart. Leading indicator of currency crisis, 1998/>]
4. Ryan, R. L., Kaplan, R., Grese, R. E., Grummon, A. H., & Cooper, C. B. The role of horticulture in human well-being and social development. Journal of Environmental Horticulture, 2017/>].
5. Enemark, N and Egbu, Disaster Risk Reduction Conceptual Framework: Open Data for Building Resilience in Critical Infrastructure2017/>]
6. Frankudidmerge. Online: [https://uk.linkedin.com/in/fakruddin-mohammed 81b839159<content://com.sec.android.app.sbrowser/readi nglis t/0927024430.mhtml 2017/>]
7. Frankudidmerge. Online: [https://uk.linkedin.com/in/fakruddin-mohammed 81b839159<content://com.sec.android.app.sbrowser/read inglis t/0927024430.mhtml 2017/>]
8. Trogrlic R.S., Duncan M., Wright G., Homberg M and Adeloye A. and Mwale F. Natural disasters 2018/ >]
9. Trogrlic R.S., Duncan M., Wright G., Homberg M and Adeloye A. and Mwale F. Natural disasters 2018/ >]
10. Werner, online:[https://scholar.google.com/scholar?q=Werner+et+ al.+2013&hl=en&as\_sdt=0&as\_vis=1&oi=scholar/>]
11. Buurman J., Dahm R. and Goedbloed A. Monitoring and Early Warning Systems for Droughts: Lessons from Floods, 2014/>]
12. Perera D., Seidou O., Agnihotri J., Ramsy M., Smakhtin V., Coulibaly P. and Mehmood H. Flood Early Warning Systems: A Review Of Benefits, Challenges And Prospects 2019/>]
13. Trogrlic R.S., and Homberg M and Adeloye A. and Mwale F. Natural disasters induction 2018/ >]
14. Kalelo- Phiri Online:[[https://www.researchgate.net/publication/342898584\\_Assessing\\_the\\_impact\\_of\\_rural\\_livelihoods\\_in\\_Malawi-Joseph\\_Kalelo\\_2010](https://www.researchgate.net/publication/342898584_Assessing_the_impact_of_rural_livelihoods_in_Malawi-Joseph_Kalelo_2010)>]
15. Kalelo- Phiri Online:[https://www.researchgate.net/publication/342898584\_Assessing\_the\_impact\_of\_rural\_livelihoods\_in\_Malawi-Joseph\_Kalelo\_2010/>]
16. Rees Online:[https://www.scirp.org/(S(351jmbntvnsjt1aadkposzje))/reference/ReferencesPapers.aspx?ReferenceID=1223505 1996/>]
17. Woodbury online[https://books.google.com/books/about/An\_Introduction\_to\_Statistics.html?id=ol8TzRHt4-wC 2002/>]
18. Liamputtong Online:[https://onlinelibrary.wiley.com/doi/abs/10.1071/HE09133/>]