UNIVERSITY OF NAIROBI

THE SOCIO-ECONOMIC EFFECTS OF FLOODS IN THE SEMI-ARID LOWLANDS OF BARINGO SOUTH SUB-COUNTY, BARINGO COUNTY,KENYA

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REG. C50/6441/2017

A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD DEGREE OF MASTER OF ARTS IN SOCIOLOGY (DISASTER MANAGEMENT),UNIVERSITY OF NAIROBI

MARCH, 2023

DECLARATION

This research project paper is my original work and has never been submitted to any institution.

Signature Date **21st March 2023**

KOECH BETTY JEPKEMOI
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This research project paper has been submitted for examination with my approval as university supervisor.

Signature Date **21st March 2023**

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DEDICATION

I dedicate this study to my family and colleagues at the University of Nairobi for their support and encouragement.

ACKNOWLEDGEMENTS

I thank almighty God for the gift of life, knowledge, and understanding. I thank Prof E.Ontita for his guidance and advice throughout the study. I acknowledge the University of Nairobi's department of Sociology and Social work for the facilitation of this study; I extend my acknowledgment to myfamily, my Father, Julius Cheptoo, and my husband, Vincent Kimeli, for their support, patience, and encouragement. Finally, I thank the people of Baringo South Sub-County, Baringo County, for their cooperation and support during my data collection period.

ABBREVIATIONS AND ACRONYMS

GDP	Gross Domestic Product
GFDRR	Global Facility for Disaster Reduction and Recovery
FGD	Focus group discussion
IPCC	Intergovernmental panel on climate change
NACOSTI	National Commission of Science, Technology, and Innovation
NGOs	Non-governmental organizations
SPSS	Statistical package for the social sciences
UNICEF	United Nations International Children's Emergency fund
UNISDR	United Nations International Strategy for Disaster Reduction and Recovery
WMO	World Meteoroidal Organizations

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ABSTRACT

Flooding is a natural disaster that occurs when water inundates dry land. Kenya has been a victim of such a disaster where its citizen loses their valuables. Baringo South Sub-County is one of the country's hotspots. In 2013 houses were submerged, crop fields destroyed, health centers, schools, and roads damaged. This study aimed to investigate floods' socio-economic effects in the Baringo South Sub-County's semi-arid lowlands. The following objectives guided the study: To establish the vulnerability of the communities to floods, assess the socio-economic effects of floods, evaluate risk preparedness for floods, and explore the management practices usedfor floods in Baringo South Sub-County. A purposive sampling technique was utilized to identify respondents. The survey, focus group discussion and key informant interviews were methods used in data collection. Quantitative data were analyzed using descriptive statistics, and qualitative data were analyzed thematically. The study revealed that poverty was the leading cause of people's vulnerability to floods, and floods destroyed pasture lands, displaced people from their homes, and destroyed cultural centers. Risk reduction measures applied were forecasts, and timely evacuation and management practices were cash transfers and humanitarian aid.

In conclusion, floods affect people negatively, and there is a need for measures to be invented to avoid them. Therefore, help given to the victims should be pre-disaster and not post-disaster. Suggestions for further research are the study of the socio-economic effects of floods on communities surrounding any other lakes in the rift valley.

CHAPTER ONE

INTRODUCTION

This chapter describes the background and problem statement of the study. It also explains the purpose of the study; this chapter highlights research objectives, research questions, significance, and the scope of the study.

1.1.Background to the Study

Living close to water bodies has advantages such as favorable soil for farming and accessibility to water for domestic use, among many others. These advantages, therefore, encourage people to settle on riparian lands. In the past, people used to practice agricultural production in the lowlands while they lived far from flood-prone lowland areas. Even though floods have contributed a lot to a loss, they have also brought along some benefits, such as increased soil fertility and improved agricultural production (Koskei, 2020). However, in recent decades extreme flood events have frequently been occurring, leading to excessive losses.

Population growth, socio-economic activities in riparian lands and varying climatic conditions experienced globally have increased cases of floods (Muriithi, Olago, Ouma,and Oriaso, 2018). In a flash, flood-prone areas increase in disaster-associated losses has been reported. These losses have been escalated by an increase in the number of people and investments in those areas (Kundzewicz et al., 2014).

In southern Nepal, Chitwan district, floods destroyed the social lives of people, whereby the vulnerable groups, the older people, were left alone with no one to look after them (Ariyabandu & Wickramasinghe, 2005). Disasters such as floods can take away breadwinners of families, leaving the most vulnerable people who cannot fend for themselves with depression, not knowing where to start to get their daily needs.

Africa has experienced flash floods in different parts of the continent (News Africa, 2019). In March 2019, a population of 739,000 was hit by floods in Malawi, and from the victims, a population of 230,000 was made homeless. In 2007 more than 3000 people in Mauritania were forced to leave their homes when floodwater rose about two meters high (Khidir, 2018). Floods inZambia displaced more than 16680 people.

Kenya has been affected by different kinds of hazards; the common ones are weather-related natural hazards, including drought, floods, landslides, lightning, wildfires, and strong winds (United Nations international strategy for disaster Reduction, 2008).

Over 5,000 people are estimated to be affected in the lower Kano plains annually. This generally happens during the rainy seasons, labeled as long and short, resulting from heavy downpours within the catchment of the river (Mungai et al., 2004, p. 43).

Baringo South sub-county is one of the arid and semi-arid areas in Kenya. It is occupied by three communities: Pokot, Tugen, and Ilchamus. The main economic activity here is pastoralism, beekeeping, horticulture, and fishing.

The area is one of the marginalized areas in Kenya. The area faces other disasters besides flooding's,such as drought and cattle rustling. The area is surrounded by two lakes, Lake Bogoria and Lake Baringo, and the Molo, Perkerra, Endao, and Loboi Rivers.

Flooding has made people flee their homes which are flash flood-prone areas, there have been interruptions in institutions, and economic activities have been stopped. As a result, the economy of the area has become dilapidated. For an economy to flourish, various sectors play a part in ensuring that this is achieved. These include tourism, transport, housing, agriculture, public, and industrial processes, among many others. When a flood disaster hits, all those sectors are affected, slowing down the economy (Otiende, 2009). These happenings have been a major source of increased poverty rates in the area (Kiptim, 2019).

1.2.Problem statement

Flooding cases in Kenya have been rising over the last few years, and their negative effects have been felt whenever a case is experienced. The experience of floods effect has been unique to each population affected, as there are people who are more vulnerable than others. Different measures have been formulated to address the matter, but people are still affected.

In 2013 heavy rain increased water levels in Lake Baringo, forcing close to 2000 people in Kampi Samaki to flee their homes for higher grounds (Konrad et al., 2016). Lake Baringo's rising water disrupted people's normal lives, destroying properties, health systems, and religious activities.

As a result of floods affecting people negatively around Lake Baringo, it was therefore paramount to conduct a study to establish how floods affect people socio-economically and to find out the effectiveness of the measures put in place to curb the flood's negative effects.

1.3.Research questions

1. How vulnerable are the communities living in the Baringo South sub-county to floods?
2. How do floods affect people socio-economically in Baringo South Sub County?
3. How have the relevant authorities prepared the people of Baringo South sub-county for floods?
4. How effective are the flood management strategies in Baringo South Sub-county?

1.4. Research Objectives

The study's main objective was to investigate the socio-economic effects of floods in Baringo South Sub-County, Baringo County, Kenya.

The study had the following specific objectives.

1. To establish the vulnerability of the communities living in Baringo South Sub-County to floods.
2. To assess the socio-economic effects of floods in Baringo South Sub-County, Baringo County, Kenya.
3. To evaluate the risk preparedness for floods in Baringo South Sub-County, Baringo County, Kenya.
4. To assess the effectiveness of management practices used for floods in Baringo South Sub-County, Baringo County, Kenya.

1.5. Significance of the study

This study is essential as it examines the socio-economic effects of floods on people living around Lake Baringo. This study contributes to designing a suitable flood preparedness mechanism to reduce the impacts of floods on local communities. Researchers and scholars can benefit from this study as they can get means of reference for future studies. This study benefits people living in the Baringo South sub-county as they get educated on the dangers of floods that might occur when it rains.

1.6. Study justification

The study has been formulated to educate the community on the dangers of floods and their mitigation measures. The community under study has been facing different environmental challenges, such as floods, which have made it difficult for people to have equal grounds and opportunities to perform socio-economically. It is therefore important to ensure that justice and cohesion prevail in society whereby everyone is equal regarding social development and lives in a safe and clean environment. When a community is knowledgeable about the dangersof floods, it will create ways to handle them appropriately (Baan and Kiljin2004). Mitigation measures against floods are important as it has been practiced in other countries and has saved many people and led to the avoidance of unnecessary inconveniences caused by floods.

1.7. Scope of the Study

This study was carried out in Baringo South Sub-County, Baringo County, because it is a flash flood-prone area. Household heads in the communities were the main target. The researcher used a descriptive research design to understand the socio-economic effects of floods and their mitigation measures.

CONCLUSION

In conclusion of chapter one, flooding is a disaster affecting people around the world regardless of the status of a country. Therefore, various studies should be done so that people can learn and handle the subject matter properly.

CHAPTER TWO

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.0. Introduction

This chapter focuses on the conceptual and theoretical frameworks for the project study. The chapter also brings on board the vulnerability of people to floods, a literature review on the socio-economic effects of floods and their mitigation measures worldwide and identifies gaps in the literature.

2.1. Review of literature

Flooding has been giving communities living close to water bodies' sleepless nights. This issue has brought about the loss of loved ones and belongings. Studies have established that flooding is the leading calamity worldwide, and its casualties have always been the needy in society. Even the amenities affected, such as schools and hospitals, have always been the public ones whose services have always been consumed by the poor. Flooding has been studied in different aspects and the purpose of this study is to identify the gap in those studies.

2.2. Vulnerability of People to Floods

According to APFMA 2004, cultural attachment and the unwillingness of communities living around flood plains to move to safer places have been identified as the main cause of people's vulnerability to floods. Many studies on floods have found that most people living close to water bodies are poor. They depend on burning charcoal and cutting firewood as a source of livelihood.

UNESCO 2010 noted that factors such as epitomized environmental degradation posed by deforestation, biodiversity loss, water supply reduction, and desertification increase the risk of climate change-related disasters such as flash floods, which sometimes lead to landslides. A decrease in vegetation in the ridged slopes can cause an increase in landslides and floods. Some people are vulnerable to floods because of the nature of their work fishermen, for example, have to live closer to water bodies because they have to go fishing sometimes late at night. Since they do not earn much, they cannot afford to spend an extra coin to pay for transport; hence they chooseto live close for easy accessibility.

In most developing countries, low-income inhabitants cannot choose to move somewhere when the water recedes (Khidir, 2018). They prefer to stay back and take care of their belongings, hoping that the flood water will subside quickly and return to their normal life.

In the Baringo South sub-county, 87% of the population depends on agriculture and livestock rearing as their economic mainstay (Little et al., 2008). These economic activities earn little community income and cause environmental degradation through soil erosion. These communities mostly embrace pastoralism as it is their culture. Every community member must have livestock, which signifies wealth and power. The community grazes its livestock around the Lake during the dry season. This behavior makes land vulnerable to soil erosion; hence during rainy seasons, there are floods and water run-offs to the houses and homesteads. Opondo (2013) highlighted two important functions of vegetation cover that facilitate water absorption into the soil and reduce the speed of running water on the ground. Therefore, vegetation cover is paramount in reducing the negative impacts caused by floods.

2.3 Socio-Economic Effects of floods

2.3.1Effects of floods on health

A flood assessment report conducted by the National Drought Management Authority around the shores of Lake Baringo in 2013 showed that health facilities in Ng'ambo Salabani, Ilngarua, Kampi Samaki, and Kokwa highland had been either fully or partially flooded. This made access to health facilities by community members difficult, risking the lives of patients seeking healthcare.

Another study of flood hazards in the Philippines reported that people who live in flooded areas are at risk of being infected by respiratory infections, gastrointestinal illness, and skin allergies; children are most likely to be at risk (Few et al. 2003).In the year 2000, floods led to the infection of drinking water by the interference of sewage systems triggering an outbreak of dysentery and cholera in Maputo, Mozambique.

The heavy rains experienced in the years 1997/1998 and 2006-2007 provided a conducive environment for the reproduction of disease-causing insects affecting human beings and livestock. As a result, diseases such as malaria, blue tongue rift valley fever, and many

others emerged (Department of veterinary services 2007)). The emergence of Rift valley fever disease killed humans and animals (Nguku et al., 2010). The pit latrines being sunk and others being flooded contaminated Lake Baringo with fecal matter posing a risk of aoutbreak of water-borne diseases, including cholera, since schools and households near theshore, depends on lake water for drinking (NDMA 2013).

2.3.2Effects of Floods on Education

Ensuring access to education and keeping students healthy enough to attend school in a difficult time is a big job (Kenya Red Cross 2012). Destroyed infrastructure makes access of the population to schools difficult; this directly affects Schools as they cannot operate since the staff is out of reach.

It has been reported that teachers in flood-prone areas opt to move to flood-free zones to avoid inconveniences and risks caused by floods; as a result, students in flooded areas do not get quality education.

Increased school dropout during floods has been experienced around the world. According to UNICEF, 2012 between June and July 2012, the dropout rate of approximately 385,000 children affected by floods in Ethiopia reached 50 percent because of floods.

In Kenya, sizable numbers of children still find themselves out of school for several reasons, one being floods (Achoka & Maiyo, 2008). This goes against a child's right to access education.

In Baringo South Sub-County, 11 schools were fully and partially submerged by floodwater making learning difficult as they had to study under trees, waiting for another alternative solution (Assessment Report in Baringo South, NDMA 2013).

2.3.3. Loss of Lives and Properties

Floods destroy settlements, cowsheds, cattle dips, and other communal structures. People, especially the old and children, are vulnerable to the effects of floods, sometimes succumbing to adverse floods.

Heavy rains have been known to destroy many things valued by human beings. A study by Needham et al. (2015) found that heavy rains damage properties kill people and livestock, and destroy crops. Heavy rains bring losses to crop farmers as it delays harvesting and destroys soil by making them waterlogged. It brings transport problems as rainwater floods the roads and destroys storage facilities (Sivakumar, 2014); this disrupts the socio-economic systems of the community. Floods destroy people's homesteads by marooning residential homes, storage facilities, and business premises (Armah, 2010). People are forced to leave their ancestral land as the Lake submerges land.

In Baringo's South Sub-County, it is estimated that 127 Ha of land with crop already planted on it was submerged by the Lake, leaving farmers to count on losses. (NDMA Assessment Report, 2013). This further exposes communities with a fragile socio-economic system to hunger and dependency on donor food programs.

2.3.4 Psychosocial Effects of Floods

Floods inevitably disrupt community lifestyles and culture. This forces the community to find natural ways of adapting and coping with these changes. The community often requires psychosocial support to help them cope with experiences of displacement, loss of settlements, and loss of human and livestock lives and other belongings (Akello, 2014).

Psychological impacts such as despair, anxiety, and sorrow are difficult to assess as they develop after a long period (Khidir, 2018). According to flood management Australia 1998:81, people affected by the flood were emotionally disturbed, and nothing was done to the victims could make them forget their horrible experiences. The elderly, people with disabilities, and children are mostly affected when flooding occurs.

In the Lake Victoria basin, Floods displaced people from their homes, causing them to seek refuge in relief camps in which stressful conditions were unanimously recognized. These include sexual abuse of women by antisocial elements, exploitation of children through child labor, and neglect of the old (APFMA, 2004). In Baringo South Sub-County, the community experience stressful conditions in relief camps.

2.3.5. Effects of Floods on Livelihoods

Floods have derailed the agricultural sector in sub-Saharan Africa, leading to an economic and social stretch in the population living in that region (UNDP et al., 2002). Flood water has been reported to have submerged lands that had been in use for crop plantations and grazing areas from which people earn a living.

The floodwater marooning on the beehives' potential to carry a large amount of honey and later be sold at a cost that will enable people to buy their daily essentials is worrying. It is noted that approximately 1000 installed log hives that had the potential to produce 8 tons of honey every 4-6 months had been marooned in the Baringo South Sub-County are partially or fully made inaccessible by floods (NDMA Assessment Report 2013).

Several flood-prone areas have become breeding grounds for disease-causing organisms that have ended up infecting animals, leading to the closure of markets for fear of spreading diseases (Lelenguya, 2013).

The case of Lake Baringo submerging tourist hotels has made many people lose employment. This has made people helpless as they are forced to look for other employment, which has proven difficult to find.

2.3.6. Effects of floods on the ecosystem

Adverse Floods destroy habitats and cause loss of biodiversity. The aftermath of flooding usually takes a long time to blossom back; this makes the growth and adaptability of new and surviving biodiversity difficult.

In Baringo South Sub-County, the case of crocodiles and hippopotamus encroaching on homesteads is a common thing (Deichsel, 2019). This is a devastating and great source of fear for people living along the shores of the Lake.

2.4 Floods Risk Preparedness and Mitigation measures

2.4.1 Forecasts

The forecast predicts future events, done scientifically or traditionally, to understand the trend. Flood prediction enables the community and other stakeholders to plan on reducing impacts.

Through Kenya's meteorological departments, the Kenyan government has been giving updates on expected weather changes, which has been helpful for communities living in flood-prone areas as they are made aware of impending disasters that weather changes might bring. The government has also been training various communities on the early warning system.

In Budalangi, 10 community members have been selected and trained on the early warning system in India. This has been a great move in alleviating flooding as the trained members would go back to the community and train others. Masinde Muliro University, in partnership with the government of Kenya, has also been training and sensitizing the community on flooding.

Countries like Cuba, Bangladesh, Vietnam, and Madagascar have managed to reduce impacts posed by potential weather-related disasters like floods and tropical storms by embracing quality forecast structures, mitigation measures, and other measures that reduce the risk of disaster occurrence (UNISDR, 2008). An early warning system is important for efficient and effective service delivery when disaster strikes (UNISDR, 2008).

Impact-based forecasting translates meteorological and hydrological forecasts into potential impacts on people and livelihoods (GFDRR, 2016). Adapting this forecasting will enable the organization concerned to plan ahead of the disaster, which will further lead to the effective provision of services during a disaster.

Advantages brought by forecast cannot be assumed as it has played an important role in reducing losses brought by disasters in other countries. Therefore, it is paramount for Kenya to adopt better forecast systems to prevent the negative impacts of floods.

2.4.2 Traditional knowledge

People living in flood-prone areas have learned various ways to alleviate floods from experiences they have had before. With the knowledge they have gained, they can transfer to the next generation to protect each other from the devastating effects of floods.

African communities have been using animal behaviors to predict weather patterns. Ghana's localcommunities utilized hippopotamus behavior to determine impending floods (Macknight, Saito, Agyeman, Baofo, and Jasaw, 2018). The hippopotamuses come out inland when heavy rains, but during the sunny season, they stay in the water.

Local knowledge has been in use for a long time. The local community has embraced it into a culture that has been useful in all community practices (McKnight et al., 2018). In rift valley Kenya, people have been using goat's intestines to determine weather predictions (The standards news June 2021).

The local community living in the study area employs these traditional means to predict weather changes and when floods are likely to occur.

2.5. SUMMARY OF REVIEWED LITERATURE AND GAP IDENTIFICATION

The literature reviewed revealed that flood is a disaster affecting many people worldwide. The above literature shows that floods have been studied in different aspects APFMA (2004) studied the effects of floods in Western Kenya. APFMA focused on the experiences of people displaced by floods in the Nyando district and losses experienced by farmers. Khidir 2008, conducted the environmental effects of flooding in South Sudan, which has proven to be a different experience in the Baringo South sub-county. Opondo 2013 conducted a study on the environmental effects of floods in the Baringo south district; he argued that human activities such as deforestation had been a major cause of floods; Opondo also focused on environmental effects such as soil erosion and physical effects but did not focus on social aspects of effects.

Achoka&Maiyo 2008 researched the effects of floods on education. The researchers did not accommodate other people that are not going to school and the effects of floods on the culture of people. Needham et al. 2015 conducted a study on the physical effects of floods but did not bring on board the social aspect of the effects of floods. Lelenguya (2013) conducted a study on the effects of floods on the spread of animal diseases; he brought about how floods have created a breeding ground for disease-causing organisms; his study majored on the effects of floods on livestock but did not focus on flood effects on people specifically psychosocial aspect.

The literature review established a gap as most scholars majored in the effects of floods on the environment. In contrast, others focused on the effects of floods on education and the physical effects of floods. Few focused on the socio-economic effects of floods. The ones who have focused on the socio-economic effects of floods did not conduct a study in Baringo South but conducted their research elsewhere.

2.6. Theoretical Framework

Natural selection theory was adopted in this study to explain that society faces selection pressures that force it to adapt to its internal structure through internal differentiation. According to (Mitza et al., 2003, p. 7), floods affect people differently. The most affected are the poor people who might be unable to recover from the loss of livelihood and property. The capacity of a person and social system to recover from the impact of floods is determined by general socio-economic indicators, coping mechanisms, structure, Age, poverty, gender, education, institutional development, race, social relations, the proportion of the population with special needs children, elderly and the like (Blaikie et al., 1994).

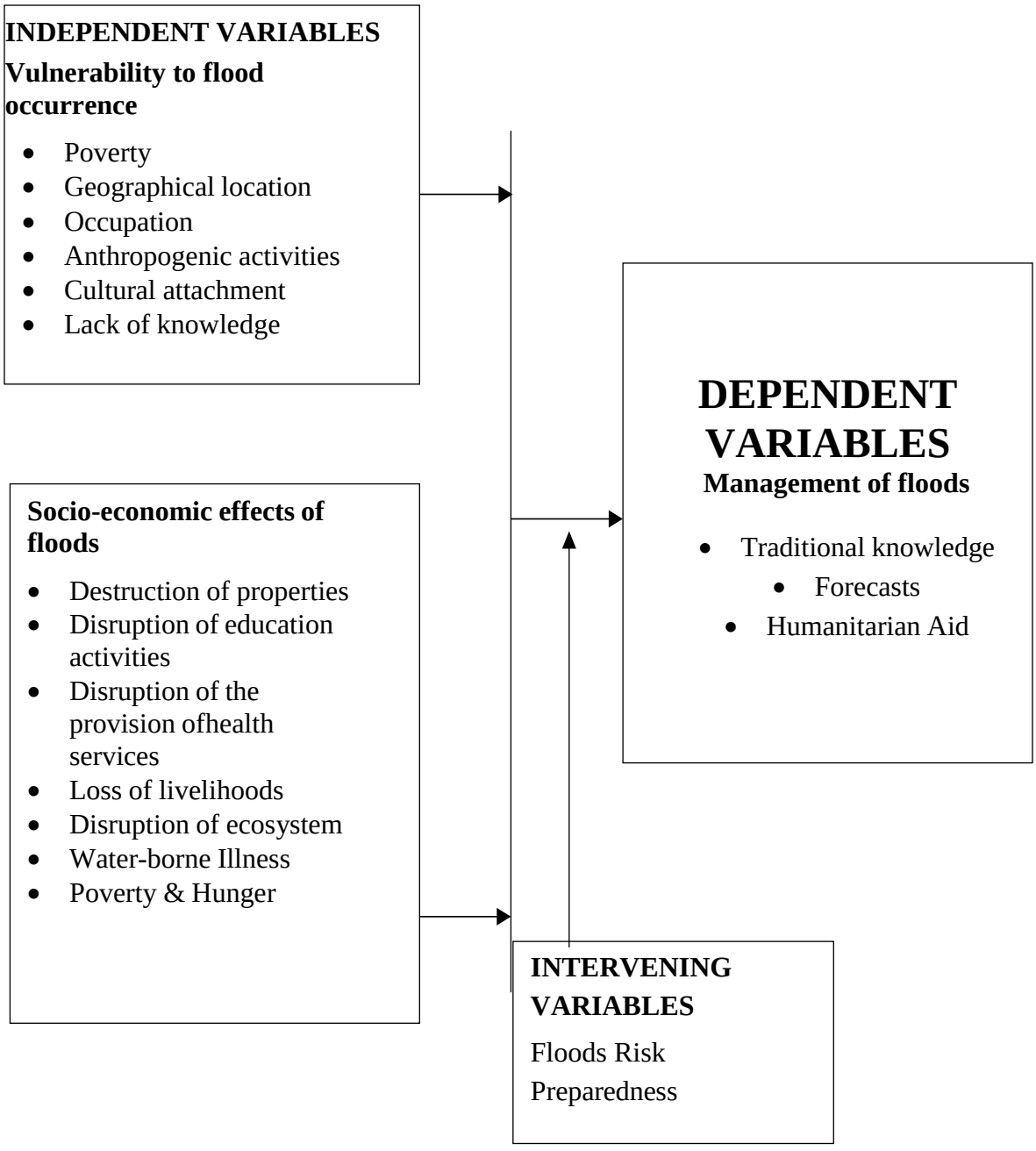
In India, slums are mostly found in areas likely for disasters to happen; these places include areas close to riverbanks, hillsides, or places with open drains and sewers (Lall & Deichman, 2012). Most of the residents of these hazard-prone areas are mostly poor as they cannot afford better houses far from the hazardous areas.

Flooding has been identified as contributing to Africa's population's increased poverty levels (Matiki,2005). A study in South Africa noted that, even if calamities affect most people and increase vulnerability, poor people feel the loss more (Khandlhela and May 2006:276).

The prevalence rate of flood disasters in Kenya has reached 27%, and 5% of Kenya's population have ever been the victim of disasters of any kind. Deaths caused by floods involve over 60% of people affected by floods in Kenya (United nations environmental program2010). Most floods arefound among the most vulnerable members of society (Achoka & Maiyo, 2008).

2.7. Conceptual framework

The figure below highlights the vulnerability of people to floods. It helps understand the overall effects of floods on the socio-economic setup of the population in the study area.



The figure above highlights dependent, independent and intervening variables. The variables are important for the study. The independent variables include, Poverty, geographical location, occupation, anthropogenic activities and cultural attachment. The dependent variables are traditional knowledge, forecast and humanitarian aid and intervening variable is flood risk reduction and preparedness.

Conclusion

Many studies have been done with different purposes; as a result, more knowledge as regards floods has been spread. This study's main purpose was to investigate the socio-economic effects of floods. Literature has been very useful as it gives more information on floods and one would have a picture of the effects of floods even before going to the field to collect the data.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0. Introduction

This chapter deals with a description of the study area; it also focuses on research design; the sampling procedure is presented here, and it introduces data collection tools, pilot study, and the procedure for data collection is also an area of interest. This chapter finally introduces data analysis and ethical considerations.

3.1. Research Design

This study used a descriptive survey design to investigate the socio-economic effects of floods and their mitigation measures. Descriptive survey research was important for this study because it enabled the researcher to get in-depth, systematic, and comprehensive about a topic under study (Kothari, 2004).

3.2. Description of the Study Area

The study was conducted in Baringo South in Baringo County. The sub-county under study is surrounded by other sub-counties, including East Pokot bordering it on the North side, Mogotio on the South, Baringo North on the Northwest, and Baringo central on the west side. In terms of area, the sub-county has a total of 1677.45sq.km (District Development office, 2011). The area is located between the latitude of 00 26' – 00 32'N and the Longitude of 36 00'-36 09 E. The rainfall averages 512mm per year, and the temperature is approximately 32°C ± 1.6°C. The area is 1060 meters above sea level. Marigat, Ilchamus, Mochongoi, and Mukutani wards were selected because they are flood-prone areas in Baringo South Sub-County.

3.3. Study population

The total population of Baringo South Sub-County is 90,955 (KNBS, 2020). The study targeted the four wards affected by the flood in Baringo South Sub-County: Marigat, Ilchamus, Mochongoi, and Mukutani, which has an approximate population of 5,000 households (RedCross, 2019). The Sub-County has disaster management officers and chiefs. Those officers were the main participants in key informants' interviews. Research assistants obtained locally were trained to contribute effectively during focus group discussions involving 5 people per study ward.

3.4. Sampling Procedure and sample size

3.4.1. Sampling procedure

The Four wards under study were selected purposively based on their terrain, which is low-lying and close to Lake Baringo, Lake Bogoria, and the river deltas. Following the number of households from chiefs in respective study wards, a household survey was conducted purposively. The household heads were the main respondents targeted. Purposive sampling was used to obtain the sample for focus group discussions, key informants, and county disaster management officers.

3.4.2. Sample size

According to Bartlett et al. (2001), the following formula for sample size calculations applies:

$$n = \frac{N}{1 + N\,(e)^2}$$

This formula enables the comparison of a variable in scientific study. Where ***n*** is the samplesize, ***N*** is the households, ***e*** to is 0.05. The representative sample size of my study was:

$$n = \frac{5000}{1 + 5000\ (0.05)^2} = 370$$

The sample size derived from the above formula was proportionately distributed to the four wards using Salkind's proportion allocation to size formula (2010).

Table 3.1: Sample Size

Ward	**No. of Household**		**Sample size**
Marigat Ward	1800	$\frac{1800}{5000} \times 370$	133
Ilchamus Ward	1300	$\frac{1300}{5000} \times 370$	96
Mochongoi Ward	1100	$\frac{1100}{5000} \times 370$	81
Mukutani Ward	800	$\frac{800}{5000} \times 370$	59
Total	**5000**		**370**

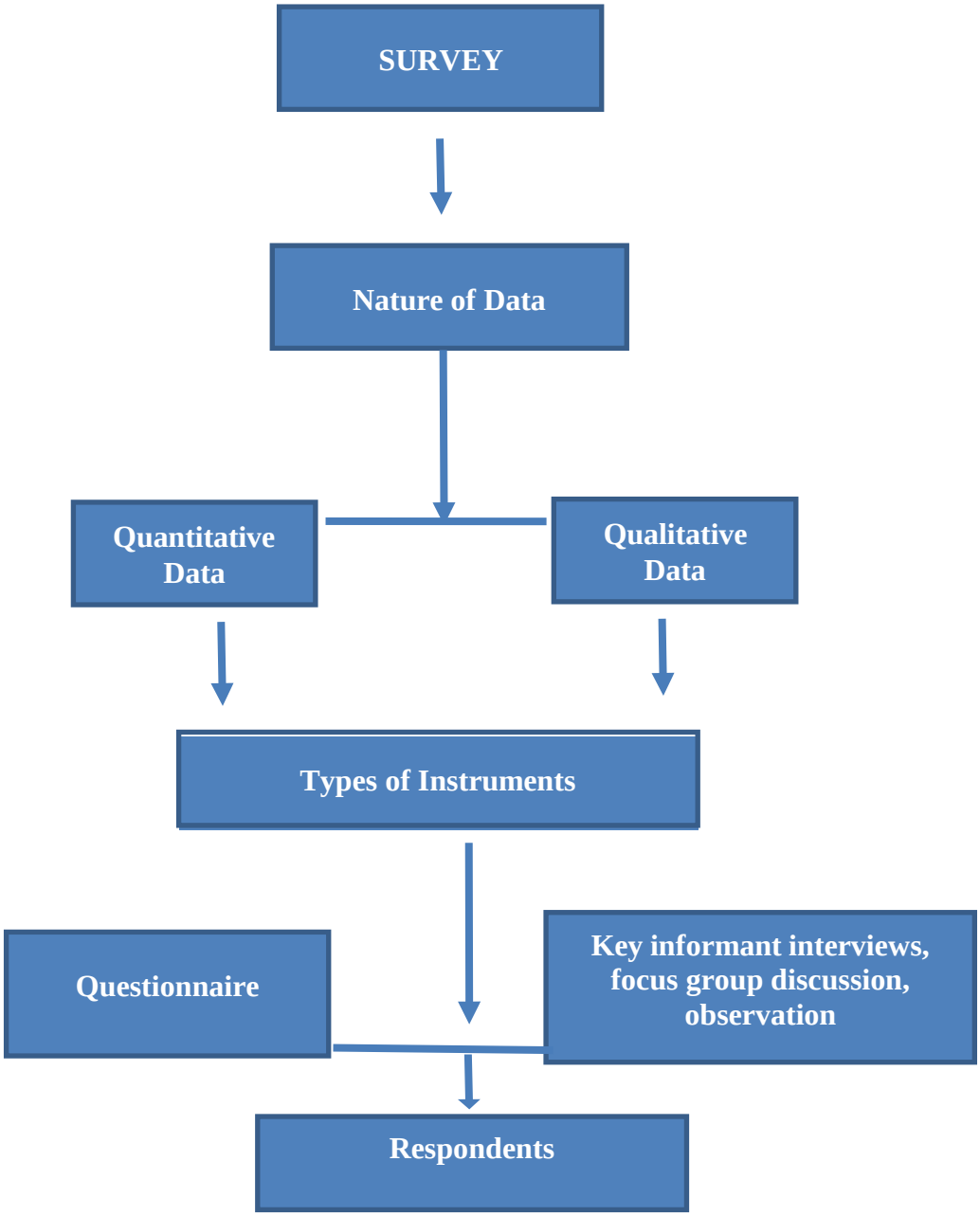
Therefore, the sample size of the specific wards was Marigat 133, Ilchamus 96, Mochongoi 81, and Mukutani 59. The total sample size for the study was 370.

3.5. Data collection methods

3.5.1. Survey research method

According to (Ordho, 2005), survey research emphasizes the frequency or number of answers to the same questions by different people. The researcher in this study, therefore, opted to use questionnaires. In each housing, the researcher introduced the study's objectives and sought an audience with the household heads with the help of a research assistant well-known by the respondents. Literate people filled out the questionnaires by themselves under the supervision of the researcher and research assistant; the researcher and questionnaires interviewed illiterate people were filled on their behalf to get answers to research questions.

The figure below shows how survey research design



3.5.2. Focus group discussion

The researcher purposively selected focus group discussion members. Four focus group discussions were done; each ward had one focus group discussion involving 5 members. Members comprised people knowledgeable about the subject matter, and with that, they were able to lay down how floods affect the community in the area and what is being done at the moment to solve that problem. This discussion gave insight into the problem under study.

3.5.3. Key informant interviews

According to (Bernard, 2002, p. 231), Key informants are observant, reflective members of the community of interest who know much about the culture and are both able and willing to share their knowledge. In this study, the researcher chose community elders, chiefs and NGOs lead as the study's key informants. The researcher interviewed the key informants and gave their perspectives on the subject matter at an agreed place. An interview guide guided this interview process.

3.5.4. Observation

This qualitative technique was employed to observe phenomena of interest in the study area. Things observed were terrain, effects of floods such as submerged buildings, marooned pasture lands, and living conditions of people in the study area. Management of flood practices in the study area was also observed. The data observed was captured in the observation guide, and photographs were taken in some instances. The purpose was to give more insights into the study area and verify some data that had been gathered.

3.6. Research tools

3.6.1. Questionnaires

Questionnaires were prepared to answer the objectives of the study. The questionnaire tool is convenient for surveying a large population because the result renders itself for analysis (Ochieng & Koske, 2013). The researcher and the research assistant to the household heads administered these questionnaires.

3.6.2. Focus group discussion guide

A Focus group discussion guide was prepared in line with the research objective. Whereby the question asked gave respondents enough room to answer questions exhaustively and ensure that the discussion remained within the study subject.

3.6.3. The key informant interview guide

The key informant interview was prepared to allow the interviewee to discuss the study matter exhaustively. This guide was important as the questions gave the researcher insight into the situation at the site of the study.

3.6.4. Observation Guide

A list of features expected to be seen in the study area was created as a clue and evidence of the effect of the flood in the area. The list was not conclusive either; the researcher was open-minded to new features that prove the effects of floods in the area.

3.7. Pilot study

The pilot study was conducted in the Salabani location. This area was chosen because it is one of the flood-prone locations and is similar to the other study population as it experiences the same.

Challenges of flooding as the other locations. The pilot study involved 15-30 household heads, whereby purposive random sampling was used to choose them. The pilot study was important as it tested the effectiveness of research tools to be used in the study and predicted challenges that were likely to be experienced during the study.

3.8. Reliability of the study instrument

Mugenda and Mugenda (2003) stated that reliability is achieved when a research instrument can produce consistent results when used over a while to test the same. The test and retest technique was applied whereby the same instrument was used on the same respondents more than once.

3.9. Validity of the study instrument

According to Kumar (2010), validity is when a measuring instrument can produce accurate results. Pretesting an instrument in a study is paramount as it facilitates the identification of weaknesses in an instrument; this leads to improvements being made before an instrument is finally used in a study.

3.10. Data analysis procedure

Quantitative data collected from Baringo South Sub-County was scrutinized for accuracy and completeness to enhance data quality; it was coded and converted to digital format through data entry using a statistical package for social scientists (SPSS). Data were analyzed using descriptive statistics and presented in percentages, frequencies, charts, and tables.

Qualitative data were analyzed thematically, interview notes were read carefully, and themes were identified from attention to detail reading. After careful comparison, connections between the themes were identified from paraphrased common ideas and quotes. The themes that emerged from the informant's perception of the socio-economic effects of floods together formed a comprehensive picture of collective experience. From there, related literature was read, which helped to make inferences from interview sessions and allowed the researcher to interweave literature and findings to develop a storyline.

3.11. Ethical Consideration

According to Kothari (2004, standards govern the behavior of researchers when conducting research. These standards include confidentiality, anonymity, voluntary participation, and informed consent. During actual data collection, the researcher assured respondents that the information they gave was confidential and that information served an academic purpose only, and no respondent was compelled to participate. The exercise was strictly voluntary.

Conclusion

Descriptive research design has been applied mostly in this chapter. The sampling was mainly purposive because the study aimed to get more information on floods. The area under study was four wards in Baringo South Sub-county. The research methods were survey, observation, and focus group discussion and key informant interviews. The tools used were the questionnaires, observation guide, key informant interview guide and focus group discussion guide.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.0. Introduction

This chapter focuses on the discussion and interpretation of findings. Specific information discussed involves demographic information, various socio-economic effects of floods, the vulnerability of people to floods, and coping mechanisms.

4.3 Demographic Information of the Respondents

Demographic information is general information from people, such as Age, gender, and source of income. This information is important as this enables the researcher to realize the kind of people she has interviewed.

4.3.1 Age of the respondents

Finding out the respondent's Ages was paramount as it enabled the researcher to understand the age bracket of the people most affected by floods and their understanding of flood events. The older generations have had so much experience with floods and are hence more knowledgeable. The findings show that the age bracket of 20-30 was the majority at 45%, followed by 31-40 at 20 %, and 61 and above were the least at 10 %.

Table 4.3 Age distribution of the respondents

The table below summarizes the Ages of the respondents.

AGE	**FREQUENCY**	**PERCENTAGE**
20-30	136	45%
31-40	61	20%
41-50	39	13%
51-60	36	12%
61 and above	30	10%

4.3.2 Education level of the respondents

In finding out the respondent's education level, the researcher understood the role played by education in determining the victims of flood disasters. Of 303 respondents who participated in the data collection exercise, 50% had primary and secondary education, 11% had diploma education, 9% had a university education, and 28 % were illiterate. From the statistics above majority had primary and secondary education, followed by illiterate at 28%, and the least was the post-graduate level. It is therefore evident that the population under study had enough knowledge to understand when they are thought on flood risk reduction and mitigation measures.

The table below summarizes the education level of the respondents.

Table 4.3.2 Education level of the respondents

Education levels

Education Level	Frequency	Percentage
Illiterate	87	28%
Primary and secondary	150	50%
Diploma	33	11%
Undergraduate	28	9%
Post-graduate	5	2%
Total	303	100%

4.3.3 Source of income of the respondents

Of the 303 respondents, 3% get their income from formal employment, 83% get their income from the farm produce, 3% sell fish products, 4% get their income from small-scale business activities, and 6% burn and sell charcoal burning for income. The source of income determines the population's vulnerability to floods. Those not formally employed are very likely to suffer most from the effects of floods as their source of livelihood is swept away by flood water. As statistics reveal, only 3% are formally employed. The rest, 97%, do not have the means to survive when affected by floods.

4.4 Vulnerability of people to flood.

The table below summarizes the opinion of the respondents on vulnerability to floods.

Table 4.4 Vulnerability to flood

Vulnerability	Strongly agree		Disagree		Agree		Unknown		Neutral	
	Rate	Percent	Rate	Percent	Rate	Percent	Rate	Percent	Rate	Percent
Cultural attachment	113	37	14	5	146	48	30	10	0	0
Occupation	106	35	67	22	113	37	9	3	8	3
Poverty	178	59	5	2	117	38	0	0	3	1

Of the people interviewed, 88 % admitted to ever being displaced by floods. The vulnerability of people to floods is not a new phenomenon in Baringo South Sub-County. However, despite people knowing that fact, the residents still find themselves being affected and needing to know how to remove themselves from the risk of being affected.

From the table above, 59% of the respondents strongly agreed that poverty is the main source of their vulnerability to floods. This can be attributed to them not having formal employment, which is a constant source of income. The number of respondents who disagreed that poverty was the source of vulnerability was 2%, and 38% agreed. In comparison, 1% were neutral on the subject matter of poverty being the source of poverty in the area.

From the researcher's observation, poverty was evident as most houses were semi-permanent. On the question of poverty as the cause of vulnerability to floods during key informants' interviews, it was evident that poverty has given people no choice in alleviating floods.

Since they do not have much to cope with or even evacuate.

Regarding cultural attachment being the cause of people's vulnerability to floods, 37% of the respondents strongly agreed, 48% agreed, 5% disagreed, and 10% were neutral on cultural attachment being the source of their vulnerability to floods.

On the question of the vulnerability of people to floods during focus group discussion, most of the respondents cited cultural attachment as the reason they still chose to stay in the area despite knowing the risk of flooding in the area. The following verbal quotes support the findings.

It is difficult for us to leave this place despite knowing the risk of floods that we face because we are used to this place.

We have buried our loved ones here, and, in our culture, we are not supposed to leave the dead alone.

This place has trees that my mother taught me that they are medicinal. I assist the community by giving them medicine I can only access from this place. I find it difficult to leave this place because it is the only place I know how to be useful to society.

There are sacred places where people living in areas around Lake Bogoria have special grass, which is very efficient during the dry season as our animals graze there.

The above quotes explain why people have continued living in flood-prone areas despite knowing the risk. The respondents cite cultural reasons for their stay. The quotes answer research questions on the vulnerability of people to floods. It also supports the findings from survey research demonstrated in the table above that cultural attachment is a source of people's vulnerability to floods.

On occupation as the cause of vulnerability of people to floods in Baringo South Sub-County, 35% of people strongly agreed, 22% disagreed,37% agreed,3% did not know, and 3% were neutral. On the question of the vulnerability of people to floods during focus group discussion, most of the respondents cited that they live close to water bodies which is the main source of livelihood. The following verbal quotes support the findings.

Being surrounded by four rivers, Endao, Perkerra, Loboi, and Molo rivers, is very favorable for irrigation. Most people with lands close to rivers consider themselves lucky as they get a constant water supply for irrigation. They, therefore, find it difficult to leave such an opportunity to generate income.

Fishermen and fish vendors like living close to Lake Baringo so that they can easily access the Lake without incurring much cost on transport since what they earn is little to sustain their families.

The above quotes explain why people stay in flood-prone areas despite knowing the risk of flooding. Some of the respondents are fishermen citing easy accessibility as their reason for their stay in the flood-prone area. Others are farmers citing easy access to water for irrigation as their reason for their stay. The quotes above support the findings from the survey research, demonstrating that occupation is the cause of people's vulnerability to floods. Loboi trading center, close to Lake Bogoria, escaped flooding just by a whisker from the researcher's observation. Flood water is half a kilometer away, and despite that, business is still going on as usual, as people cite a

Lack of alternative sources of income as their motivation. Lake Bogoria girls' secondary school is at risk of flooding as flood water is very close.

4.5 Socio-economic effects of floods

The table below illustrates how floods affect the health sector

Table 4.5.1 Effects of Floods on Health.

How floods affect health	Frequency	Percentage
Roads leading to hospitals being flooded	4	2%
Submerged health facilities	107	35%
Contaminated drinking water	192	63%
Total	303	100%

The health sector is mostly affected when drinking water is contaminated. From survey research, 63% of the respondents confirmed that contaminated drinking water affects health,2% admitted that flood water blocks the roads leading to hospitals, and 35% reported that health facilities are submerged by flood water. On observation, one of the dispensaries (Kampi Samaki) was submerged by flood water. On the effects of floods on health, many respondents indicated that the health sector had been affected. While some cited dispensaries being submerged and contamination of drinking water

We have 5 *dispensaries submerged around the Lake Baringo area; health care has been difficult to access.*

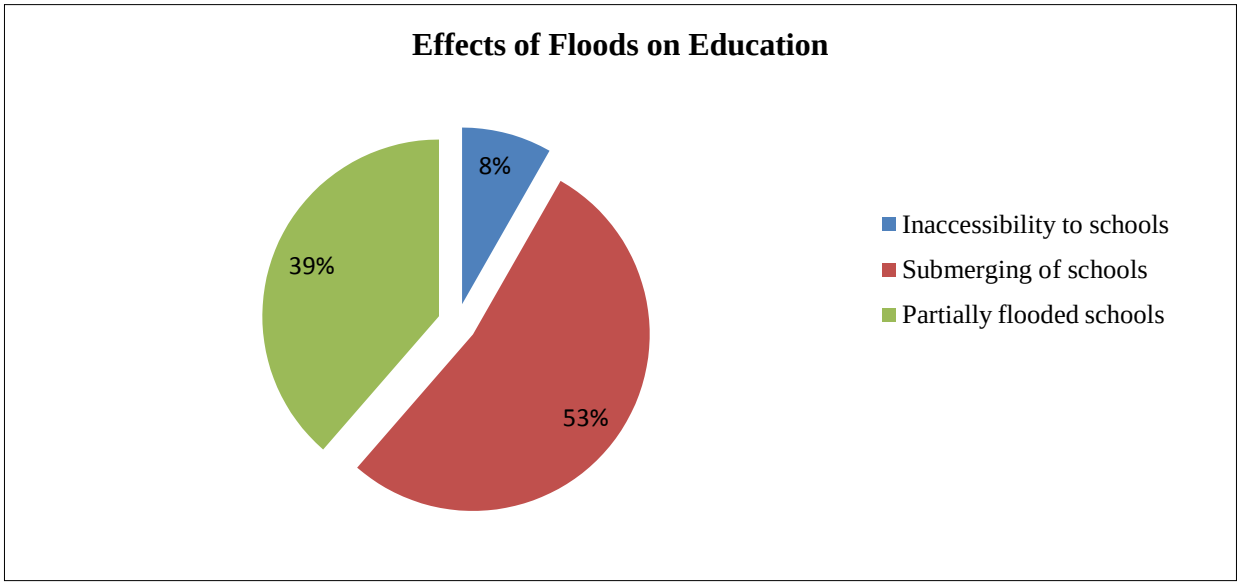
Flooding has affected the residents of this area, where most of the people have brown teeth due to excessive minerals in the water people now cannot smile confidently; others cannot walk as theirbones have been affected by excess minerals in the water.

The above quote is a response to the research question on the effects of floods on health. The quote describes how floods have marooned health facilities making them inaccessible. It also explains how the consumption of flood water has affected their health. The quotes support the study findings from survey research demonstrated in the above table. It also proves that floods affect the health of the people.

4.5.2 Effects of Floods on Education

The table below illustrates the extent to which floods affect the education system

Figure 4.5.1 effects of floods on education



From the table above, the majority of the respondents, 53%, admitted that the education system was affected when schools were submerged in flood water. This was followed by 39% of the respondents who admitted that partially flooded schools affected the education system, and 8% admitted that inaccessibility to schools affected the education system. On the question of the socio-economic effect of floods on the education system during key informant interviews, respondents informed this study that schools had been submerged and others were inaccessible due to floods.

Following the flooding of Lake Baringo, 3 schools have been submerged at Salabani primary school, and 2 other ECDs have been fully submerged by flood water. The students, therefore, have to be taught under trees, and others have had to relocate to neighboring schools, which are far; hence students get tired and will not be able to perform well.

The above quote is a response to research questions on the effects of floods on education. It confirms that the education system has been disrupted where schools have been submerged, displacing students. The quote supports the findings from survey research demonstrated in the figure above. When schools are partially submerged, schools cannot function well. As observed, some schools' playgrounds are submerged; hence students cannot play, and in some cases, classes are submerged students are forced to study under trees which are normally affected by changing weather conditions. Inaccessibility to schools affects the education system in the area. When floodwater advances closer to schools, aquatic wild animals walk closer to school, making it difficult toaccess schools. This has instilled fear in pupils and some of the staff.

4.5.3 Effects of floods on the loss of lives and properties

The table below illustrates how floods have destroyed properties and caused deaths

Table 4.5.3 effects of floods on the loss of lives and properties.

How floods have effects on loss of lives and properties	Moderate effects	Percentage	Severe effects	Percentage	No effect	Percentage
Flood water marooning beehives	30	10%	164	54%	109	36%
Floods marooning on crops	66	22%	121	40%	116	38%
Pastures being destroyed	28	9%	100	33%	175	58%
Destroyed infrastructure	117	39%	32	11%	154	50%
Destroyed household goods	43	14%	165	54%	95	32%

From the table above, it is evident that pasture lands were severely affected where 58% of the respondents admitted the case, 33% of respondents reported floods to affect pasture lands moderately, and 9% reported no effect of floods on pastureland. Areas around the Lake provide green pastures, which are very useful during a drought. When floods occur, it maroons over the pasture, destroying it. From the study undertaken, 50% of the respondents admitted that flood destroys infrastructure, and 39% reported that flood does not affect infrastructure. The effects of flooding around water bodies in Baringo South are evident. The roads are covered with floodwater forcing the government to construct others, electric posts are inundated by flood water, and the reception gates of Lake Bogoria are now completely submerged. On household goods, 32% of the respondents reported the severe effect of floods, 54% reported moderate effect, and 14% reported

no effect. On the question of the socio-economic effects of floods on household goods during the focus group discussion, it was evident that many of the residents had loosed their valuables during flooding.

Flood water entered my house, swept away my utensils, and destroyed my radio and television. It happened very fast I could not save my goods.

The above quote informs the study that floods happen so fast, giving no time for victims to save their valuables. The quote answers the research question on the socio-economic effect of floods on victims.

On marooned crops, 38% reported severe effects, 40% of the respondents reported that crops were moderately affected by flood water, and 22% reported no effect. On the effects of floods on beehives, 36% of the respondents reported severe effects, 54% reported moderate effects, and 10% reported no effect of floods on beehives.

4.5.4 Psychosocial effects of floods

The table below illustrates the extent to which floods affect people psychosocially.

Table 4.5.4 psychosocial effects of floods

Psychosocial effects of floods	**Moderately**		**Severely**		**No effect**
	Rate	**Percent**	**Rate**	**Percent**	
Grief over the loss of properties	213	70	90	30	0
Psychological disturbance over the remembrance of a turn of events during flooding	177	58	126	42	0
Stress from disorientation from normal lives routine	96	32	207	68	0
Stress over separation from friends and families	45	15	258	85	0

From the table above, 70% of the respondents reported the moderate psychosocial effect of flood over the loss of properties during the flood, and 30% reported severe effects. In remembrance of the events during floods, 58% reported severe, and 42% reported moderate psychosocial effects. 68% of the respondents reported the severe effect of floods, and 32% reported moderate psychosocial effects over the disturbance of normal lives. On separation from friends and families, 85% reported severe, and 15% reported moderate psychological effects.

On the socio-economic effects of floods on psychosocial well-being during the key informant interview, it was evident that floods affect people psychologically when people are disturbed by the loss of property and separation from their families and friends.

People are not okay with this frequent flood occurrence in this area.

We, as an organization, have been trying to counsel the victims and make them as comfortable as possible by providing them with their basic needs. Giving them their basic needs somehow reduces their stress.

The above quotes responded to the research question on the psychosocial effects of floods on victims. The quotes inform the study that people suffer psychologically when floods hit them. The second quote confirms that some organizations are aware of the psychological effects of floods and have started counseling centers to address that.

4.5.5 Effects of floods on livelihood

The table below illustrates the effect of floods on livelihoods.

Table 4.5.5 effects of floods on livelihood

Effects	**No effect**	**%**	**Moderate**	**%**	**Severe**	**%**
Loss of employment due to over-flooded hotels	46	15%	136	45%	121	40%
Loss of business stock	69	23%	145	48%	89	29%
Loss of business premises	73	24%	120	40%	110	36%
Loss of commercial crops	10	3%	139	46%	154	51%

On the effects of floods on employment, 40% reported severe effects, 45% reported moderate effects, and 15% reported no effect. On loss of business stock, 29% reported severe effect,48% reported moderate effect, and 23% reported no effect. On loss of business premises, 36% reported severe effects, 40% reported moderate, and 24% reported no effect. On loss of crops meant for sale, 51% reported severe,46% reported moderate, and 3% reported no effect. When flooding occurs, people lose their sources of income. On the question of the socio-economic effect of floods on livelihood during the focus group discussion, it was evident that most of the people have lost their livelihood to floods, livelihoods lost our business premises, employment, crops for sale, and many others.

Flood has destroyed too much of our crops. A long time before, we used to till the land close to the Lake so that we could easily access water for irrigation, but when flooding occurred, it marooned our crops.

Our beehives producing many liters of honey for sale have been isolated, making us poor.

Business premises have also been submerged, destroying the source of livelihood.

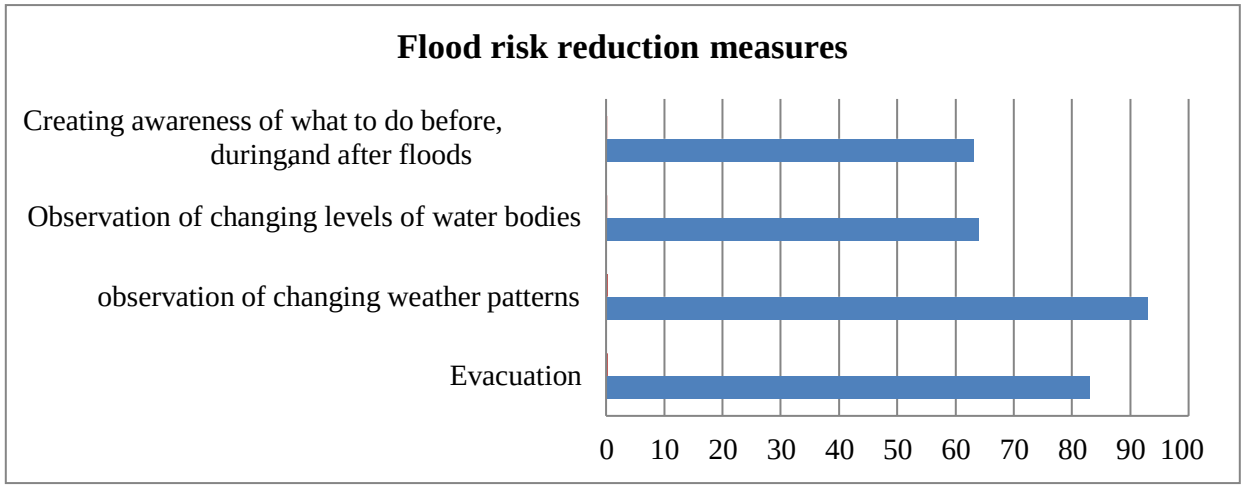
The above quotes were some of the respondents' responses during the study. It answers the research question on how floods affect people socio-economically; the quotes confirm that people lost their assets to floods.

4.6 FLOOD RISK PREPAREDNESS AND MITIGATION

4.6.1 Risk reduction measures

The figure below illustrates what has been done to curb flood risk in Baringo south sub-county

Figure 4.6.1 Risk reduction measures.



One of the objectives of this study was to evaluate risk reduction measures. Evacuation is one of the risk reduction measures pointed out by 27% of respondents as present in the area of study. Observation of changing weather patterns was pointed out by 31% of the respondents as a way to avert the risk of being affected by flooding, and 21% of the respondents declared that observation of changing levels of water bodies is a way that assists them to avoid being affected by floods. Finally,21% of the respondents cited the creation of awareness of what to do before, during, and after the flood as one of the risk reduction measures they apply. The evacuation was less tenable as it required much investment, which could not be afforded. Observation of changing levels of water bodies and observation of weather patterns were mostly used in the area though they resulted in late intervention. The creation of awareness was rare in the area. It will be important if more awareness is created in the area.

4.6.2 How residents of Baringo south manage floods in the area

The table below illustrates how often floods are mitigated in Baringo south sub-county

Table 4.6.2 Floods mitigation measures.

Mitigation measures	**Very often**	**Often**	**Rarely**	**Not at all**	**I do not know**
Forecasts	36	59	107	27	74
Humanitarian aid	45	123	86	21	28
Traditional warning	75	117	78	17	16

On inquiry on how the residents of Baringo Sub-County manage floods in the area, 36 admitted that they receive forecast news very often, 59 receive forecast news often, 107 rarely get forecast, 27 did not get any forecast, and 74 did not know of any forecast available in the area. Humanitarianaid was reported by 45 of the respondents that they receive very often, 123 reported humanitarian aid in the area, 86 reported that they rarely get humanitarian aid,21 cited no humanitarian aid, and 28 did not know of any presence of humanitarian aid. On traditional warning,75 admitted that they get the warning very often,117 often reported reception of traditional warning,78 reported rare traditional warning in the area,17 reported no warning in the area, and 16 did not know of any traditional warning in the area. All the key informants admitted the presence of humanitarian aid from various NGOs such as world vision, Redcross USAID, and others.

4.6.3 Flood preparedness measures

The table below illustrates the flood preparedness measures available in Baringo's south sub-county.

Table 4.6.3 Flood preparedness measures

Flood preparedness measures	**Frequency**	**Percentage**
Construction of dykes	125	41%
Making sand banks	53	17%
Leveling the house using sand	75	25%
Construction of water drainage channels	50	17%

Objective four is to explore flood preparedness. Various ways have been put in place in preparation for flooding. From the response given, 41% of the respondents admitted the presence of dykes as one of the flood prevention measures. 17% of respondents cited sand banks as one of the flood prevention measures in the area, and 25% and 17% of the respondents cited leveling of the house as one of the measures put in place to prevent flooding. Finally, 17% of the respondents identified the construction of water drainage as a measure to prevent flooding. During the focus group discussion on flood prevention, it was confirmed that people had applied flood preparedness in their homes. These measures included making sand banks and constructing water drainage.

CONCLUSION

This chapter presented information using tables, pie charts, bar graphs, direct quotations, and interpretation; the information was often relayed in percentages, and descriptive statistics were mostly used.

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter summarizes the study findings and conclusion. It presents recommendations and further research suggestions. It is formulated based on research findings, research questions, and objectives.

5.1. Summary

Based on the study findings, poverty was the leading cause of people's vulnerability to floods, and 59% of the population sample strongly agreed. Poverty was followed by cultural attachment, where 37 % of the study population strongly agreed. Finally, 35% of the study sample population strongly agreed that occupation is the cause of people's vulnerability to flooding.

Socio-economically different systems of society have been affected negatively by floods. Among the sectors affected are education, where 11 schools have been submerged, leading to difficulties in accessing education, and 2 tourist hotels have been submerged, leading to loss of employment for people around the area. Health care has been difficult to access in the area after 5 hospitals have been submerged and 127 hectares of crop fields have been submerged, leading to a food shortage in the area. On the question of flood risk reduction, most respondents at 31 % cited observation of changing weather patterns as a flood risk reduction measure, and 27% of the respondents cited evacuation as one of the ways to reduce flood risk. Observation of changing water levels in the water bodies was cited by 21% of the respondents as one of the ways they reduce flood risk, and another 21% cited the creation of awareness of what to do during and after flood disasters as a way to reduce flood risk.

On the question of flood management practices, 41% of the respondents acknowledged the construction of dykes, 17% cited the construction of sandbanks, 25% cited house leveling, and another 17% cited the construction of drainage channels. From the above statistics, it is evident that people have done what they could to manage floods; however, more needs to be done in civic education for more people to embrace flood management techniques.

5.2. Conclusion

Based on the study findings, it was concluded that floods affect people socio-economically. Among these socio-economic impacts is the disruption of the education system where schools are flooded. Others are completely submerged by flood water, properties are destroyed and lost, pasture lands are submerged, people lose their employment and source of livelihood, and cultural centers such as circumcision areas are destroyed. People are exposed to diseases because flood water floods latrines and brings fecal matter to the neighborhood.

The people of Baringo South Sub-County are aware of impending floods but lack the means of averting them due to inadequate resources.

Mitigation measures are important for people to avoid being affected by floods. It is, therefore, important that there is a shift from reaction-based mitigation to preventive mitigation measures.

5.3. Recommendations

More studies should be done on flood mitigation measures to educate the community on the effective methods to avoid the negative effects of floods.
The Baringo county government, under the disaster management department, should channel more funding into flood prevention and civil education on safety measures.

The government should create rescue centers for the safety assurance of the locals in case of a flood disaster emergency.

Churches and NGOs should join hands to ensure that functioning counseling centers are constructed so that cases of mental illness are reduced.

Community-based disaster risk reduction measures should be improved. This will enable the local community to sustain themselves when flood disasters strike them.

Humanitarian aid should be given to the victims before they are affected by floods and not after the flood occurrence.

Extensive education on best land practices should be done in the area.

Vulnerable groups already doing business should be empowered through training in bookkeeping.

Credit facilities should be made available to the vulnerable group to enable them to start a business, farm, or anything they are passionate about to sustain themselves.

5.4. Suggestions for further research

Research can be done on the socio-economic effects of floods around other lakes in the rift valley.

There is a need to study the effectiveness of risk reduction measures by the Baringo county government.

A study on the assessment of the vulnerability of people to floods needs to be done in another place close to water bodies.

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APPENDICES

Appendix I: Questionnaire

1. Date of the interview _____

2. Location (ward of residence) _____

3. Name of the respondent *Mr./Mrs./Miss*_____

4. Gender (*Tick Appropriately).*

☐ Male_____ ☐ Female _____

5. How do you earn a living?

☐ Farming

☐ Fishing

☐ Small scale business

☐ Charcoal burning.

☐ Formal employment

☐ others

6. Which level in terms of education did you reach?

☐ Primary or secondary certificate

☐ Diploma

☐ Undergraduate

☐ Post-graduate

☐ None

7. How old are you?

☐ 20-30 ☐ 31-40 ☐ 41-50 ☐ 51-60 ☐ 61 and above

8. How many years has this area been your place of residence?

☐ 1-5 years ☐ 5-10 years ☐ above 10 years

9. Do floods occur every rainy season in your area?

☐ Yes ☐ No

10. Which months of the year are worst affected by floods?

11. Have you ever been displaced by floods?

☐ Yes ☐ No

12. What is the frequency of flooding occurring in your area?

☐ Twice a year

☐ Once a year

☐ Thrice a year

☐ During heavy rainy seasons

☐ Once after some years.

13. What is the origin of floods?

14. a). Do your neighbors or others in your area have strategies that they use in the management

☐ Yes ☐ No

b). If your answer above is yes, please explain how these strategies work.

15. In which way are the residents of this area vulnerable to floods?

Vulnerability	Strongly agree	Disagree	Agree	Unknown	Neutral
Cultural attachment					
Lack of alternative sources of income					
Poverty					

16. Do you live close to any potential source of the flood, and if so, what is the distance between your property and that source?

Source	**Distance**
Stream	
River	
Watercourse	
Lake	

17. How do you get information on the onset of floods?

18. a). Have you ever been warned of floods by any concerned organization?

☐ Yes ☐ No

b.). If yes, please state the agency and the kind of alert you received?

19. What are the flood risk reduction measures in your area?

☐ Evacuation

☐ Observation of changing weather patterns

☐ Observation of changing levels of water bodies

☐ Creating awareness of what to do before, during, and after flood

20 What is your opinion on some of the losses brought about by flood disasters?

Effects	**Level of effects** No effect, Moderate, Severe	**Comments or reason**
Crops destruction		
Deaths of livestock		
Floods marooning on beehives		
Human deaths recorded		
Destruction of property		
Pastures being destroyed		
Destroyed household goods		

21. How has flood-affected healthcare in your area?

☐ Roads leading to hospitals being flooded

☐ Submerged health facilities

☐ Contaminated drinking water

22. How have floods affected the education system in your area?

☐ Inaccessibility to schools

☐ Submerging of schools

☐ Flooded schools

23. How do floods affect livelihood?

Effects	**Level of effects** No effect, Moderate, Severe	**Comments or reason**
Loss of employment due to over-flooded hotels		
Loss of business stock		
Loss of business premises		

24. How do floods affect people psychologically?

Psychological effects of floods	**Level of effects** No effect, Moderate, Severe	**Comments or reason**
Grief over the loss of properties		
Depression		
Psychological disturbance over the remembrance of a turn of events during flooding		
Stress from disorientation from normal lives routine		

25. a) Do you know of individuals who use traditional means to predict the weather in your locality?

☐ Yes ☐ No

b.). If your answer above is yes, please explain how they predict the weather using traditional means.

26. How do you know there is an upcoming flood in your location?

27. Give flood preparedness measures in your area.

☐ Construction of dykes

☐ Making of sandbanks

☐ Leveling of the house using sand

☐ Construction of water drainage system

28. List mitigation measures you usually access in your area and the frequency you access them.

Mitigation measures	Very often	Often	Rarely	Not at all	I do not know
Forecasts					
Humanitarian aid					
Traditional warning					

- **Appendix II: Focus group Discussion Guide**

1. Kindly state your ward of residence.

2. Name the number of people in attendance.

3. How vulnerable are the communities living here to floods?

4. How effective are the mitigation measures for floods in the community?

5. How do floods affect people socio-economically in this place?

6. How have the relevant authorities here prepared the people for floods?

Appendix III: Key informant interview guide

1. Kindly state your ward of residence.

2. Name the number of people in attendance.

3. How vulnerable are the communities living here to floods?

4. How effective are the mitigation measures on floods in the community?

5. How do floods affect people socio-economically in this place?

6. How have the relevant authorities here prepared the people for floods?

Observation guide

Observation guide table

Areas of observation	**What was observed**	**Condition of things observed.**
Conversation		
The behavior of the residents/work they do		
Evidence of flooding submerged buildings and other assets		
Weather condition/level of water bodies in the area		
Environmental surroundings		
Type of house lived in		
Flood prevention measures		