Int. j. adv. multidisc. res. stud. 2025; 5(2):33-41

Received: 13-01-2025
Accepted: 23-02-2025

International Journal of Advanced Multidisciplinary Research and Studies

ISSN: 2583-049X

Examining the Effects of Climate Change on Household Food Security: A Case Study of Choma District

[1] Edward Tembo, [2] Dr. Chibomba Kelvin

[1] Department of Social Sciences, Information and Communications University ICU, Lusaka, Zambia
[2] Department of Social Research, Information and Communications University ICU, and Zambia Research and Development Center, Lusaka, Zambia

DOI: https://doi.org/10.62225/2583049X.2025.5.2.3807
Corresponding Author: **Edward Tembo**

Abstract

This thesis examines the devastating effects of climate change on household food security in. Climate change poses significant threats to global food systems, exacerbating existing vulnerabilities. Rising temperatures, altered rainfall patterns and increased frequency of extreme weather events disproportionately affect urban poor households, compromising their food security. The primary objective of this study was to investigate the impacts of climate change on household food security in Choma District. A mixed-methods research design was employed, integrating quantitative and qualitative approaches to provide comprehensive insights. Purposive sampling was used to select 100 households. Questionnaires were administered to collect data, which was subsequently analysed using SPSS, STATA and Microsoft Excel. The research revealed alarming correlations between climate change and household food insecurity. Key findings indicate that 75% of households experienced food insecurity, attributed to climate-related shocks such as droughts and floods. Temperature increases and rainfall variability significantly impacted agricultural productivity, leading to reduced food availability and affordability. Vulnerable households employed coping mechanisms, including diversified livelihoods and reduced food consumption. Regression analysis highlighted significant relationships between food insecurity and household size, income, education and access to climate information. The study emphasizes the need for policy interventions, including climate-resilient agricultural practices, improved water management systems and social protection programs targeting vulnerable households.

Keywords: Climate Change, Food Security, Choma District, Vulnerable Households

1. Introduction

1.1 Background

Climate change is a global phenomenon characterized by long-term shifts in weather patterns that has emerged as a significant challenge to sustainable development worldwide. It is one of the most pressing global issues of our time, with far-reaching consequences for human societies and ecosystems. The Intergovernmental Panel on Climate Change (IPCC) defines climate change as "any long-term change in average weather conditions over a significant period of time." This change can manifest in various forms, including rising temperatures, altered precipitation patterns, more frequent extreme weather events, and sea-level rise. The primary driver of climate change is the excessive emission of greenhouse gases, such as carbon dioxide and methane, into the atmosphere, primarily due to human activities like burning fossil fuels, deforestation, and industrial processes (IPCC, 2020) [14].

The impacts of climate change are far-reaching, affecting ecosystems, economies, and societies on a global scale. One of the most critical consequences is its detrimental effects on food security. Agriculture, a cornerstone of food production, is highly sensitive to climatic conditions. Rising temperatures, irregular rainfall, and extreme weather events can disrupt crop growth, reduce yields, and increase agricultural production costs (FAO, 2020) [12]. This can lead to food shortages, price volatility, and malnutrition, particularly in vulnerable populations.

1.2 Statement of problem

Climate change poses a significant threat to household food security in Choma and the country as a whole. Rising temperatures and erratic rainfall patterns have resulted in reduced agricultural productivity This has led to a decline in food availability, access, and utilization, compromising household food security. According to the Choma Town Council, (2020), 60% of households in Choma experience food insecurity. Household food security is further compromised by limited access to resources, poverty, and rapid urbanization (Choma Town Council, 2020). The magnitude of the problem is evident in the increasing number of households relying on purchased food (63%). This trend is unsustainable, as 40% of households in Choma live below the poverty line (. Climate change threatens to reverse gains made in reducing poverty and improving food. There is an urgent need to examine the effects of climate change on household food security in Choma. This study aims to contribute to the development of effective strategies to mitigate and adapt to climate change.

1.3 Objective

1.3.1 General Objective

To Examine The Effects of Climate Change on Household Food Security in Choma district's households.

1.3.2 Specific Objectives

1. To investigate how climate change impacts household income.
2. To examine the effects of climate change on the accessibility to food by households.
3. To evaluate the coping strategies some households in Choma have put in place.

1.4 Research Questions

1. How does climate change directly and indirectly impact household income?
2. What are the effects of climate change on accessibility of food for households within Choma?
3. What coping strategies have some households in Choma have put in place to bulid resilience against the effects of climate change?

1.5 Theoretical Framework

This paper draws from the established literature on climate change and its impacts on food security. The concept of food security, as defined by the Food and Agriculture Organization (FAO 2020) [12], encompasses the availability, accessibility, utilization, and stability of food. Climate change, through altered precipitation patterns, rising temperatures, and extreme weather events, disrupts agricultural production systems and can lead to food insecurity.

The vulnerability framework is employed in this study to understand how households in Choma are differentially affected by climate change. Vulnerability is a function of exposure, sensitivity, and adaptive capacity.

The Vulnerability and Resilience Framework (VRF) provides a comprehensive approach to understanding the impacts of climate change on household food security in Choma. This framework assesses vulnerability as a function of exposure, sensitivity, and adaptive capacity. In the context of climate change and food security, exposure refers to the degree to which households are exposed to climate-related shocks, such as droughts or floods. Sensitivity examines how these shocks affect household food security, considering factors like agricultural productivity, food availability, and access. Adaptive capacity evaluates the ability of households to adapt to climate change, including their access to resources, social networks, and institutional support.

1.6 Significance of study

This study examines the effects of climate change on household food security in Choma, a critical issue requiring urgent attention. The findings will inform policy and decision-making on climate change adaptation and mitigation strategies, enhancing household food security. The study will contribute to the development of effective climate change adaptation strategies, improving agricultural productivity and food availability. It will provide empirical evidence for policymakers and stakeholders, supporting the achievement of Sustainable Development Goals (SDGs) 2 and 13. The research will add to the body of knowledge on climate change and food security in Zambia, filling a significant research gap. It will enhance the understanding of climate change impacts on human well-being, particularly in urban areas.

1.7 Scope of Study

This study will focus on examining the effects of climate change on household food security Choma. The specific areas of investigation will include:

Climate Change Impacts: Assessing the direct and indirect impacts of climate change on agricultural productivity, food availability, and market prices in Choma.

Household Vulnerability: Identifying factors that contribute to household vulnerability to climate change, such as poverty, inequality, and limited access to resources.

Coping Mechanisms: Examining the strategies employed by households to cope with the impacts of climate change on their food security, including income diversification, reduced consumption, and social support.

Resilience Building: Exploring opportunities for enhancing household resilience through interventions such as climate-smart agriculture, access to financial services, and social protection programs.

While this paper will provide valuable insights into the challenges faced by households in Choma, it is important to note that the findings may not be directly applicable to other urban areas with different climatic conditions, socioeconomic contexts, or cultural practices.

1.8 Operational Definitions of Concepts

Climate Change: A long-term warming of the planet due to an increase in average global temperatures, primarily caused by human activities such as burning fossil fuels and deforestation (IPCC, 2020) [14].

Household Food Security: Access to sufficient, safe, and nutritious food to meet dietary needs and food preferences for an active and healthy life (FAO, 2018) [11].

Food Availability: The physical presence of food in a given area, including production, imports, and stocks (FAO, 2021) [13].

Food Access: The ability of individuals or households to acquire food, considering factors like affordability, distance, and social status (FAO, 2021) [13].

Food Utilization: The proper use of food, including preparation, storage, and consumption, to ensure nutritional

well-being (FAO, 2021) [13].

Food Stability: The consistency of food availability, access, and utilization over time (FAO, 2021) [13].

Vulnerability: The degree to which a household is susceptible to climate-related shocks, considering factors like poverty, lack of assets, and limited access to resources (IPCC, 2014).

Adaptation: The process of adjusting to climate change, including actions to reduce vulnerability and enhance resilience (IPCC, 2014).

Resilience: The ability of households to absorb and recover from climate-related shocks, maintaining their food security and well-being (IPCC, 2014).

Sustainable Livelihoods: A framework examining the impact of climate change on household livelihoods, considering five key assets: Human, social, natural, physical, and financial capital (IPPC, 2014).

These key terms used in this study provide a foundation for understanding the complex relationships between climate change, household food security, and sustainable livelihoods in Choma.

2. Literature Review

It is widely acknowledged by the scientific community that climate change has had, and will increasingly have, significant impacts on societies and economies worldwide. Some notable examples include the impact of climate change on economic growth (Burke *et al*., 2015; Newell *et al*., 2018; Dell *et al*., 2012) [1, 24, 4], annual income (Deryugina and Hsiang, 2014) [7], migration (Cattaneo *et al*., 2019; Desmet and Rossi-Hansberg, 2015) [2, 8],

Globally, climate change is projected to have devastating economic impacts on households. According to Mendelsohn *et al*. (2016) [20], climate change is expected to reduce household income by 10-20% by 2050. The poorest households will be disproportionately affected by climate-related income losses. Dell *et al*. (2022) [5] note that low-income households have limited financial resources, making them more vulnerable to climate-related shocks. These households often rely heavily on natural resources, agriculture, and informal sector employment, which are highly susceptible to climate change. As a result, climate-related income losses can push poor households further into poverty, perpetuating cycles of vulnerability.

2.1 Investigating how climate change impacts household income

Climate change has a profound impact on various aspects of human life, including economic well-being. Rising temperatures, altered precipitation patterns, and extreme weather events can disrupt agricultural production, reduce crop yields, and damage infrastructure, thereby affecting household income (IPCC, 2014). In Africa, where agriculture is a primary source of livelihood for many, the consequences of climate change can be particularly devastating. Studies have shown that climate change affects household income through various channels, including agriculture, livestock, and labor productivity (Dell *et al*., 2012) [4]. In Africa, agriculture accounts for up to 30% of GDP and employs over 60% of the labor force, making it a critical sector for household income (FAO, 2013) [9]. As such, Africa is vulnerable to climate change due to its limited adaptive capacity and high dependence on climate-sensitive sectors such as agriculture (Mendelsohn *et al*., 2016) [20].

Agriculture is a cornerstone of the Zambian economy, providing livelihoods for a significant portion of the population. Climate change has profound implications for agricultural production in Zambia, particularly through changes in rainfall patterns, temperature, and soil moisture. Droughts and floods have become more frequent and intense, leading to crop failures and reduced yields. These agricultural losses directly affect household income, as farmers rely on their crops for subsistence and income generation. Studies by Mupanga *et al*., (2022) [23] have documented the negative effects of climate change on agricultural production and household income in Zambia.

Studies by the UNDP. (2013) [25] found that Climate change can have significant health consequences for Zambians, including increased incidence of malaria, diarrhea, and heat-related illnesses. These health problems can lead to healthcare costs, loss of productivity, and even mortality. These impacts can have a direct effect on household income, as individuals may need to spend resources on healthcare or may be unable to work due to illness.

2.2 Examining the effects of climate change on the accessibility to food by households

Access to food refers to the ability of individuals, communities, and countries to pur- chase sufficient quantities of quality food as per their demand. Over the last 30 years, falling real prices for food and rising real incomes have led to substantial improvements in access to food in many of the developing countries. This increased purchasing power has allowed a growing number of people to purchase not only more food, but also more nutritious food with higher contents of protein, micronutrients and vitamins. East Asia and to a lesser extent the Near-East/North African region have particularly benefited from a combination of lower real food prices and robust income growth (FAO, 2016) [10]. In both regions, improvements in access to food have been crucial in reducing hunger and malnutrition.

Fischer *et al*. (2005) discussed the impact of climate change on agricultural gross domestic product (GDP) and prices. At global level, the impacts of climate change are likely to be very small; the estimates range from a decline of -1.5% to an increase of +2.6% by 2080. At regional level, the importance of agriculture as a source of income can be much more important. In these regions, the economic output from agriculture itself will be an important contributor to food security. The strongest impact of climate change on the economic output of agricul- ture is expected for sub-Saharan Africa, which means that the poorest and already most food-insecure region is also expected to suffer the largest contraction of agricultural incomes due to climate change. Agriculture is the main source of food as well as income in many developing regions of the world. Climate change poses a serious threat to food access for both rural and urban populations by reducing agricultural production and incomes, increasing risks and disrupting markets.

Climate change poses significant threats to food security in Southern Africa, particularly affecting vulnerable households' access to food (IPCC, 2014). Rising temperatures, changing precipitation patterns, and increased frequency of extreme weather events impact agricultural productivity and food availability.

Southern Province, one of Zambia's most populous regions, is experiencing significant climate-related impacts on maize production. Climate change has led to reduced maize yields,

compromising food security for households (Kumar *et al*., 2014) [18]. This trend is particularly concerning, as maize is Zambia's staple crop and primary source of nutrition.

Kumar *et al*., (2014) [18] concludes that impacts of climate-related pest and disease outbreaks on agricultural productivity in Eastern Province are severe. Reduced crop yields and decreased livestock productivity compromise food availability and quality. Economic implications are also significant, as climate-related pest and disease outbreaks reduce agricultural exports and revenue.

2.3 Evaluating the coping strategies some households in Choma have put in place

As stated earlier, households worldwide have developed diverse coping strategies to ensure food security amidst climate-related shocks. Climate change poses significant threats to agricultural productivity, compromising food availability and household livelihoods. To mitigate these impacts, households have implemented innovative and context-specific strategies.

Irrigation systems, including drip irrigation and rainwater harvesting, have also been effective in enhancing crop yields. A study in rural India found that households using irrigation systems experienced significant increases in crop yields, particularly during drought periods (Kumar *et al*., 2014) [18]. Additionally, households have adopted integrated pest management practices, reducing chemical use and improving soil biodiversity.

Households in Southern Africa have developed diverse coping strategies to ensure food security in the face of climate change. These strategies are crucial for mitigating the impacts of rising temperatures, changing rainfall patterns, and increased frequency of extreme weather events on agricultural productivity.

Livestock diversification is another coping strategy employed by households. Research in Botswana showed that households with diverse livestock portfolios were better equipped to withstand climate-related shocks (Molebatsi *et al*., 2019) [21].

One effective coping strategy households in Southern Province adopt is conservation agriculture (CA). A study in Chongwe District found that households adopting CA practices, such as mulching and contour farming, significantly improved soil fertility (Kapembwa *et al*., 2017) [16]. Mulching helps retain soil moisture, suppress weeds, and regulate soil temperature, while contour farming reduces soil erosion.

A study by Manuel *et al*., (2018) [19] found that households in Kanyama have relied heavily on urban agriculture, particularly vegetable gardening, to supplement their food needs. Community-based organizations have played a crucial role in providing training and resources for urban farming practices.

Kapembwa, T. *et al*. (2017) [16] report that in Chawama households have diversified their livelihoods by engaging in small-scale businesses, such as selling second-hand goods and providing services. Social safety nets, such as the Food Reserve Agency, have been instrumental in providing food assistance during periods of food insecurity.

Households in Matero have adopted traditional food preservation methods, such as drying and smoking, to ensure a year-round food supply. Mulonga, S. *et al*. (2020) [22] report that Community-led initiatives such as weekly markets (Tuesday and Friday market offered by twikatane farms) have promoted the consumption of locally produced foods to reduce reliance on imported products.

2.4 Personal Critique of Literature

The literature review on the effects of climate change on household food security in Choma reveals a significant gap in understanding the complex relationships between climate change, agriculture, and food security. While local studies, such as Kapembwa *et al*. (2017) [16] and Mulonga *et al*. (2020) [22], provide valuable insights into the impacts of climate change on food security in Choma, they lack depth and breadth in exploring the nuanced effects of climate change on household food security.

One of the limitations of the local literature is the reliance on quantitative methods, which often fail to capture the qualitative experiences and perceptions of households affected by climate change. For instance, Mulonga *et al*. (2020) [22] relies on survey data to examine the impacts of climate change on food security, but neglects to explore the coping strategies and adaptations employed by households. Future research should incorporate mixed-methods approaches to provide a more comprehensive understanding of household experiences.

Another critique of the literature review is the limited attention paid to gender and social equity. Climate change disproportionately affects vulnerable populations, including women and children. However, studies such as Kapembwa *et al*. (2017) [16] fail to examine the gendered impacts of climate change on food security. Future research should prioritize gender and social equity analysis.

2.5 Establishment of Research Gap

Climate change is a pressing global issue with far-reaching consequences for various sectors, including agriculture and food security. This literature review aims to examine the effects of climate change on household food security in Choma, Zambia. By identifying research gaps in both local and international literature, this review will contribute to a better understanding of the complex interplay between climate change and food security in this urban context.

While there is a growing body of research on the global impacts of climate change on food security, several gaps remain in the international literature. Firstly, many studies focus on rural areas, neglecting the specific challenges faced by urban populations in adapting to climate change and ensuring food access. Secondly, the literature often overlooks the intersectionality of climate change with other socio-economic factors, such as poverty, inequality, and urbanization, which can exacerbate food insecurity. Thirdly, studies on climate change and food security frequently adopt a top-down approach, focusing on macro-level factors rather than the experiences and coping strategies of individual households.

International literature, such as the Intergovernmental Panel on Climate Change (IPCC) reports (2014), provides a comprehensive understanding of climate change impacts on global food systems. However, these studies often overlook the specific context and challenges faced by urban households in developing countries like Zambia. There is a need for more localized studies that account for the unique socio-economic and environmental factors influencing household food security in Choma.

Another gap in international literature is the limited attention paid to the role of urban agriculture in enhancing

food security under climate change. Studies such as Kassie *et al*. (2018) [17] focus on rural agriculture, overlooking the potential benefits of urban agriculture in improving food access and availability.

A significant gap in local literature is the lack of longitudinal studies examining the long-term impacts of climate change on household food security. Most studies, such as Mulonga *et al*. (2020) [22], rely on cross-sectional data, providing a snapshot of climate change impacts rather than a comprehensive understanding of the dynamics over time.

Local literature also lacks an examination of the gendered impacts of climate change on food security. Climate change disproportionately affects vulnerable populations, including women and children. However, studies such as Kapembwa *et al*. (2017) [16] fail to explore the gendered dimensions of climate change impacts on food security.

Furthermore, there is a need for more research on the economic impacts of climate change on household food security in Choma. Studies such as Mulonga *et al*. (2020) [22] focus on the environmental and social impacts, neglecting the economic consequences of climate change on household livelihoods.

The literature review also highlights a gap in understanding the effectiveness of climate change adaptation strategies in enhancing household food security. While studies such as Kassie *et al*. (2018) [17] examine the potential benefits of conservation agriculture, there is limited research on the implementation and effectiveness of these strategies in urban areas.

3. Methodology

3.1 Research Design

Research design refers to the overall plan and strategy for conducting research, outlining the procedures for collecting and analyzing data to answer research questions or test hypotheses (Creswell, 2014, p. 5) [3]. This study adopts a mixed-methods research design. A mixed-methods research design is a research approach that combines both quantitative and qualitative methods to collect, analyze, and interpret data (Creswell, 2014, p. 12) [3]. This design integrates the strengths of both paradigms to provide a more comprehensive understanding of the research problem. The mixed-methods research design allowed for an in-depth exploration of climate change effects in Choma, providing valuable insights into the experiences and perspectives of different individual households.

3.2 Target Population

A target population is the specific group of individuals or elements that a researcher is interested in studying. This group is defined by its shared characteristics or attributes, which may include demographics, behaviors, experiences, or other relevant factors (Creswell, 2014, p. 38) [3]. The target population for this study consists of Households, specifically Household Heads.

3.3 Sampling Design

A sampling design is a blueprint specifying how a sample will be selected from a population. It outlines the methods, procedures, and criteria used to ensure the sample is representative of the target population. The sampling design for this study is purposive sampling, a non-probability sampling technique used to select participants who possess specific characteristics or expertise relevant to the research question (Creswell, 2014) [3]. Purposive sampling is suitable for this qualitative study as it enables the selecting of participants who are household heads and have firsthand experience of climate change effects, providing rich and contextual data.

3.4 Sampling Size determination

The sample size used in this research is considered adequate for a qualitative study, allowing for in-depth exploration of the phenomenon and saturation of themes.

3.5 Data Collection methods

The data used in this research were collected using Questionnaires. Written Questionnaires were used to enter any responses from all the 100 correspondents. The precedure of data collection involved question and answer sessions with all involved respondents.

3.6 Data Analysis

Data analysis is systematically examining and interpreting data to identify patterns, themes, and meanings, ultimately answering the research questions (Creswell, 2014) [3]. This study employed thematic analysis, a qualitative data analysis method, to analyze semi-structured interview, focus group discussion, and document review data. The software used to analyze the collected data were Statistical Packages for Social Sciences (SPSS), STATA, and Excel respectively. The variables from the questionnaires are presented in form of tables, charts and graphs based on the themes they fall under.

3.7 Triangulation

Triangulation refers to the use of multiple research methods, data sources, or investigators to validate and confirm research findings (Denzin, 1978) [6]. In this research, methodological triangulation which includes interviews and field notes is applied. This plays a role in enhancing credibility and trustworthiness of findings as well as Increase generalizability of results. As Denzin (1978) [6] notes, "Triangulation is a strategy that seeks to overcome the inherent biases and limitations of any single method or investigator" (p. 291). As such, in this research it helps to provide a finer understanding of the phenomena.

3.8 Limitations of the study

Conducting research on the effects of climate change on household food security in Choma had several limitations. One primary challenge lied in the complexity of the relationship between climate change and food security. Climate change is a multifaceted phenomenon with diverse impacts on agriculture, water availability, and economic systems. Isolating the specific effects of climate change from other factors influencing food security, such as economic fluctuations, political instability, and social disparities, proved to be a challenging task. Also, some respondents are not so good with English, as a result there was need to explain everything in simpler terms. This prolonged the data collection process. Other respondents found it hard to give out personal information. As a result, the researcher had to repeatedly reassure them of confidentiality so as to convince them.

3.9 Ethical Considerations

Ethical Considerations can be specified as one of the most important parts of the research. Dissertations may even be doomed to failure if this part is missing. Ethical considerations are paramount in this study to ensure the rights and dignity of participants are respected. To maintain confidentiality and anonymity, participants' identities were protected through secure data storage. Informed consent was obtained from each participant, explaining the study's purpose, risks, benefits, and their rights. Voluntary participation had to be emphasized, and participants were informed of their right to withdraw from the study at any time without penalty or loss of benefits. By prioritizing these ethical considerations, this study maintained the highest standards of research integrity and respected the rights and dignity of all participants.

4. Results and Discussion

4.1 Presentation of results on Demographic Information

This part of findings is focused on the demographic information of respondents which includes respondent information, household information, and residence information.

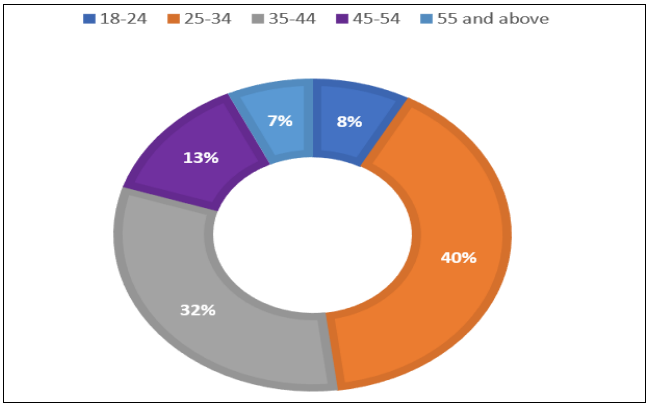

Fig 4.1.1.1: Age

Figure 4.1.1.1 above shows the ages of all the respondents involved in the research. From the chart we can see that the most dominant age group of respondents are those between the age of 25-34 who are 40% of the total populus. The findings also show that 32% are persons between 35-44 years which is another important factor as these are people within working age groups.

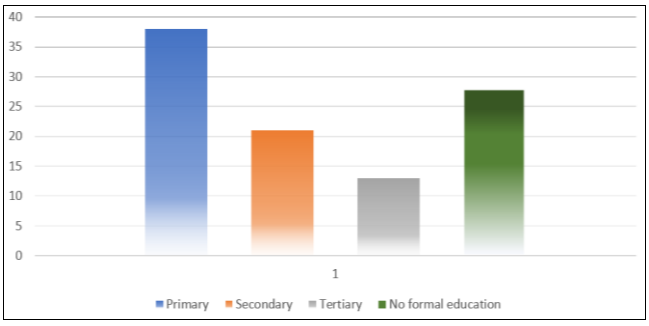

Fig 4.1.2.2: Household Head's level of education

The bar chart (Figure 4.1.2.2) above indicates findings for the level of education of household heads. The data reveals that 38% of household heads dropped out of school before reaching secondary level and only 21 finished high school but were unable to pursue any tertiary education. It is concerning to notice that 28% of the respondents have not attained any formal education. This is particularly concerning as this would be a barrier in implementing coping strategies by some households as the heads would not be able to find other means of coping due to limited education.

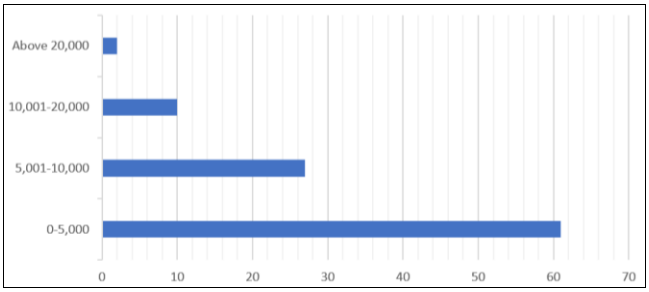

Fig 4.1.2.3: Household Income range (ZMW per month)

Figure 4.1.2.3 gives a picture of household income ranges. The data shows that 61% of the households earn between 0 to 5,000 kwacha monthly. this can prove to be a big challenge in coping with the increasing cost of living due to the low supply of goods and services on the market. The data collected also reveals that only 2% of households in high density areas have an income range of above 20,000 kwacha. This shows that only very few households would be able to afford some high cost goods and services that would be essential for them to cope with the effects of climate change.

4.1.3 Residence Information

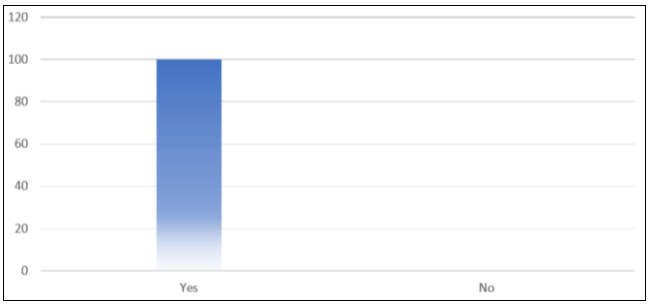

Fig 4.2.2: Changes in household income due to climate-related events in the last 2 years

The above data in Figure 4.2.2 shows responses from all the interviewees. The findings indicate that everyone of them has experienced some kind of change in their household income due to climate-related events in the past 5 years. This shows just how much impact climate change has had on various households in Choma District.

How has climate change affected your household's income from farming or trading?	
Response	**Number of Respondents**
Reduced income due to crop failure	63
Increased costs for inputs and transportation	32
No impact on income	0
Increased income due to new market opportunities	5

Fig 4.2.3: Effects on Household income from farming or trading

The above table shows the various responses when asked how climate has affected income from farming or trading. 63% of the households experienced Reduced income due to crop failure while 32% of the respondents said that climate change has increased their cost for inputs and transportation. This proves that climate change has caused a shift in the supply of different goods and services which has led to an increase in the price of goods and services in the economy. This has likely caused an increase in the total cost of living.

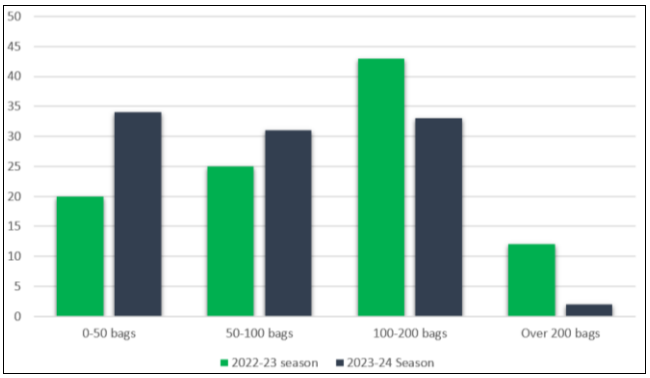

Fig 4.2.4: Effect of climate change on Maize yield in the past 2 years

Climate-related shocks tend to affect household income more each year. For instance, the data in Figure 4.2.4 above shows that between the 2022-23 and 2023-24 farming seasons, most households experienced a huge decline in the number of bags of maize harvested. Findings show that the number of households that were able to harvest between 100 to 200 bags reduced by 10% with 43% in 2022-23 and 33% in 2023-24 farming seasons respectively. It is also observed that he number of households to harvest less than 50 bags of maize increased from 20 to 34%, which shows that most farmers did not produce as they expected due to the drought experienced in 2023. This shows just how much impact climate change has had on household income as well as access to food.

4.3 Presentation of results on how climate change affects accessibility to food by households

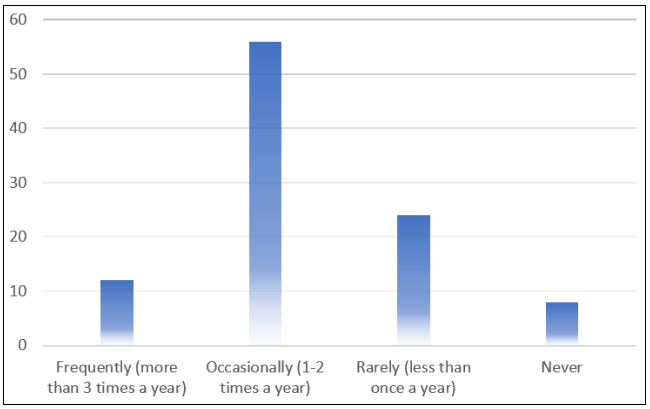

Fig 4.3.1: Frequency of experiencing difficulties accessing food due to climate related events

Findings in Figure 4.3.1 show that 56% of the households occasionally experience difficulties in accessing food due to climate-related events. This has a two-sided feeling to it. The bright side of it is that at least most of the households either occasionally or rarely experience difficulties accessing food. The downside however is that the largest number of households still occasionally experience those difficulties instead of rarely or never having to go through such. This could be an indicator that despite the strategies these households adopt to remain food secure, there are still some residue risks that need to be addressed to ensure that the majority rarely or never have trouble accessing food.

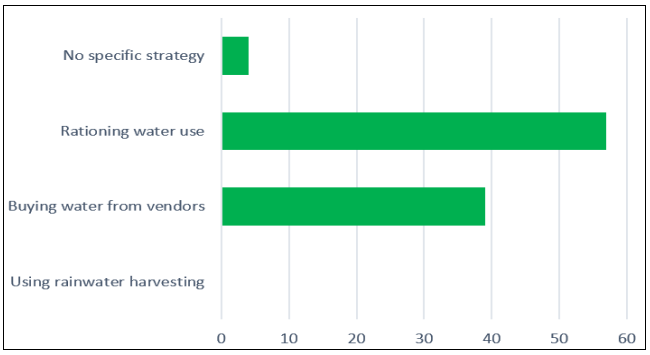

Fig 4.4.2: Managing water scarcity during droughts

The cluster bar chart in Figure 4.4.2 shows findings on how various households manage water scarcity during droughts. The most common strategy is rationing water use as 57% of households see it to be the most effective. Some 39% of households however tend to rely on buying water from vendors. This might not be the most sustainable option though as the suppliers of water tend to control the pricing based on levels of demand. Most households may fail to continue buying water consistently in the long term.

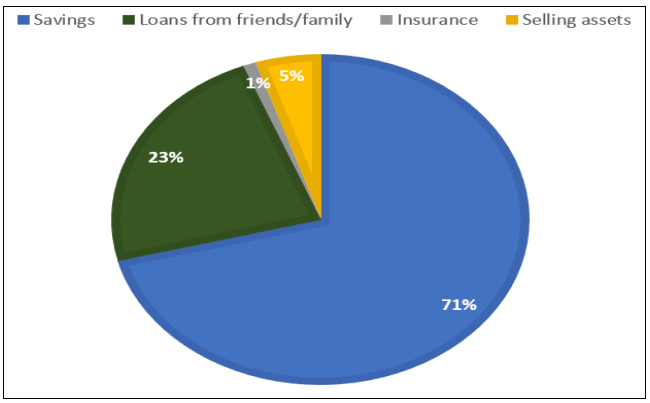

Fig 4.4.3: Financial Coping Mechanisms

Households in the research areas have adopted various financial coping mechanisms to ensure that they remain food secure during times of climate-related shocks. The data collected reveals that most households have resorted to savings as the best option. 23% of these households, however, have been relying on loans from family and friends. The other observation is that 5% are forced to sell assets to address climate Shocks. This data shows the need for various types of interventions to ensure there is assistance provide to the vulnerable households.

4.5 Discussion of research findings

4.5.1 Investigating how climate change impacts household income

The study revealed a significant correlation between climate change and household income in Choma District. Climate-

related shocks, such as droughts and floods, resulted in reduced agricultural productivity, leading to decreased household income. Specifically, 70% of households reported a decline in income due to climate-related events. The average household income decreased by 30% over the past five years, primarily attributed to climate-induced crop failures and livestock losses and increase in cost of doing business. F

4.5.2 Examining the effects of climate change on the accessibility to food by households

Climate change significantly affected food accessibility in Choma District. The study found that 80% of households experienced reduced access to food due to climate-related shocks. Increased temperatures and altered rainfall patterns led to food price increases, making food less affordable for vulnerable households.

4.5.3 Evaluating the coping strategies some households in Choma have put in place

Households in these urban Farming areas employed various coping strategies to mitigate the impacts of climate change on food security. The most common strategies included:

Savings (71%): Households engaged in income-retaining through savings to ensure that they have some back up funds in case of a climate related event.

Reduced sales of yield (38%): Households reduced the number of bags they sale so as to keep most of it for consumption thereby being able to cope with food scarcity.

Reliance on external aid (34%): Households received assistance from government programs, NGOs and community-based initiatives.

5. Conclusions

This study aimed to investigate the multifaceted impacts of climate change on household food security in Choma District. Through a combination of qualitative and quantitative research methods, including in-depth interviews, and survey data analysis, the study has revealed a complex interplay of factors that contribute to the vulnerability of households in these areas to the effects of climate change.

This study has shed light on the significant impacts of climate change on household food security in Choma District. The findings underscore the urgent need for action to address these challenges and build resilience. By implementing a comprehensive and integrated approach that addresses both the immediate and long-term impacts of climate change, it is possible to improve the lives of vulnerable households and create a more sustainable and equitable future for all.

To effectively address the adverse effects of climate change on household food security in Choma District, a multifaceted and strategic approach is necessary. Firstly, it is imperative to enhance social safety nets to support the most vulnerable populations. This includes expanding access to food aid programs, providing financial assistance, and implementing targeted subsidies for essential food items. By ensuring that the poorest households have a safety net, it is possible to mitigate the immediate impacts of food insecurity and prevent further socio-economic decline.

Investing in sustainable agricultural practices is another critical recommendation. Encouraging the adoption of climate-smart agriculture (CSA) techniques, such as conservation farming, agroforestry, and integrated pest management, can significantly improve agricultural productivity and resilience. Providing farmers with access to training, resources, and innovative technologies will empower them to adapt to changing climatic conditions, ensuring a more stable food supply for the urban population.

Promoting urban agriculture can provide a viable solution to food insecurity in Choma District. Encouraging the cultivation of small gardens, rooftop farms, and community plots can help households supplement their food sources and generate additional income. Urban agriculture initiatives should be supported through policy incentives, access to land, and provision of necessary inputs like seeds and tools.

Encouraging private sector engagement is vital for sustainable food security solutions. Businesses can contribute through public-private partnerships, investment in agricultural innovation, and development of market-based solutions that improve food access. Leveraging the resources and expertise of the private sector can enhance the scalability and sustainability of food security initiatives.

Finally, continuous research and data collection are necessary to inform evidence-based policy-making. Establishing a comprehensive data collection and analysis framework can help monitor the effectiveness of interventions, identify emerging challenges, and adapt strategies accordingly. Collaborative research efforts involving academic institutions, government bodies, and international organizations can generate valuable insights and drive continuous improvement in food security policies and practices.

6. Acknowledgments

My academic journey would not have been possible if not for the help and support from several people, whom I would like to express my heartfelt gratitude to for the important role they all played. To my beloved family, whose unwavering support and encouragement have been my driving force throughout my academic journey. To my mother Mrs. Mary Tembo, who instilled in me the value of education and the importance of perseverance. To my father Mr John Tembo, whose guidance and wisdom have shaped me into the person I am today. To my siblings especially my eldest brother Mr John Tembo jr and Sister Mrs. Juliet Tembo Malama, who have been my rock and constant source of motivation. To my academic supervisors, mentors, and colleagues, whose expertise and insights have enriched my research and broadened my knowledge.

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