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Assessing the Effectiveness of Household Drought Coping Strategies on Maize Farming: A Case Study of Lukupa Ward of Kasama Dristrict

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Abstract

This study looks at how households in Lukupa Ward, Northern Zambia, cope with drought in maize farming. It examines strategies like food rationing, crop diversification, temporary migration, early warning systems, and community resource sharing, and how these affect maize yields and food security. Using surveys and interviews, the research shows that effectiveness depends on education, gender, access to support, and finances. Challenges like poor infrastructure, weak extension services, and reliance on donor aid limit long-term success. The study recommends combining local knowledge, stronger institutions, and socio-economic support to help households better withstand droughts.

Keywords: Coping Strategies, Coping Mechanisms, Drought, Livelihoods, and Resilience

1. Introduction

Droughts are happening more often and are worse, especially in rain-fed farming areas like sub-Saharan Africa. In Zambia's Northern Province, including Lukupa Ward, irregular rains cause crop failures, water shortages, and food insecurity. Farmers growing maize, cassava, and groundnuts often lose much of their harvest, forcing them to eat less or rely on wild foods. Many people try to earn extra income through fishing, charcoal, or casual work, but these are poorly paid, unsustainable, and harm the environment. To cope, communities need climate-resilient livelihoods, better resource management, and support from early warning systems and development programs to improve food security and reduce drought impacts.

1.1 Statement of Problem

Lukupa Ward in Northern Province, Zambia, faces growing livelihood risks because of irregular rainfall and frequent droughts. Most households depend on rain-fed farming, and many live in poverty. Families cope by growing drought-tolerant crops, joining savings groups, migrating for work, fishing, running small businesses, and using indigenous methods like communal labor and traditional weather forecasting. These strategies help in the short term but are often informal, unsustainable, and sometimes harm the environment, especially through charcoal production. Although national climate policies exist, weak institutions, limited funding, and poor access to services make it hard for communities to get early warning information, drought-resistant seeds, or insurance. This shows the need for local research that evaluates how effective these coping methods are, supports the use of indigenous knowledge, and shapes stronger policies to improve resilience and protect livelihoods in drought-prone areas like Lukupa Ward.

1.2 Objective

1.2.1 General Objective

The general objective of the study is to assess the effectiveness of household drought coping strategies on maize farming in Lukupa Ward of Kasama District.

1.2.2 Specific Objectives

1. To establish the types of droughts coping strategies employed by households engaged in maize farming in Lukupa Ward.
2. To assess the effects of these coping strategies on maize productivity and household food security.
3. To examine the socio-economic and institutional factors influencing the choice and success of drought coping strategies among maize-farming households.
4. To establish the barriers to effective coping with drought among small-scale maize farmers in Lukupa Ward.

1.3 Research Questions

1. What droughts coping strategies are commonly used by maize-farming households in Lukupa Ward?
2. How do these strategies affect maize yields and household food availability during drought seasons?
3. What socio-economic and institutional factors determine the effectiveness of these coping strategies?
4. What are the major barriers that hinder the effectiveness of household coping strategies against drought in Lukupa Ward?

1.4 Theoretical Framework

This study uses the Sustainable Livelihoods Framework to understand how households in Lukupa Ward cope with drought. It examines how people use resources such as knowledge, social networks, land, money, and infrastructure to manage climate stress. Farmers depend on rain-fed crops like maize, cassava, and groundnuts, but low education, weak extension services, poor health, and limited finances reduce their ability to adapt. Households cope by intensifying farming, diversifying income, or migrating, yet these options face challenges like limited resources, environmental damage, and unsafe work. Gender norms and weak institutions further disadvantage women and the elderly. The framework helps reveal how households use their assets and support systems, highlighting gaps and guiding policies to improve resilience.

1.5 Significance of the Study

This study looks at how households in Lukupa Ward, Northern Zambia, cope with drought. The area now faces unreliable rains and dry spells, and local responses are not well known. The research helps improve policies, shows what works and doesn't, and highlights local adaptation practices. It guides government agencies and development programs, supports climate resilience and livelihoods, and contributes to SDGs on poverty, hunger, climate action, and land protection.

1.6 Scope of the Study

This study looks at how households in Lukupa Ward, Northern Zambia, cope with repeated droughts. It examines short-term actions like rationing food, migrating for work, and relying on neighbors, as well as long-term strategies like diversifying livelihoods, conservation farming, and using local knowledge. It also considers how access to resources, institutions, and social support affects coping. The study involved farmers, community leaders, extension officers, and NGOs, using surveys, interviews, focus groups, and observations to understand responses from 2015–2025. Findings focus on community-level practices and can help other drought-prone areas in Northern Zambia and Sub-Saharan Africa.

2. Literature Review

2.1 Types of Droughts Coping Strategies in Maize Farming Households

This theme shows that maize farmers cope with drought using both traditional and modern methods. Globally, farmers in places like the US, Australia, and Spain use advanced tools, forecasts, and insurance to plan ahead, while combining some traditional practices. In Africa, farmers rely more on low-cost, local solutions like intercropping, mixed cropping, early-maturing seeds, mulching, agroforestry, and off-farm work. In Zambia, strategies vary by region, and in Lukupa Ward, farmers use intercropping, local seed saving, traditional weather forecasts, community support, VSLAs, wild foods, and temporary migration. Effectiveness is limited by poor access to modern tools, institutions, and gender inequalities. Overall, coping depends on resources, knowledge, and social support, and Lukupa Ward mainly uses short-term, adaptive measures, showing the need to combine traditional and modern strategies for sustainable resilience.

2.2 Effectiveness of Coping Strategies on Maize Productivity and Household Food Security

This section shows that drought coping strategies affect maize yields, food security, nutrition, and income. Globally, practices like conservation agriculture, mulching, crop diversification, early planting, and insurance help maintain yields and reduce losses. In Sub-Saharan Africa, farmers use early-maturing crops, staggered planting, mulching, and soil conservation, but success depends on resources and support. In Lukupa Ward, households use intercropping, early planting, traditional weather forecasts, food rationing, and temporary migration. Intercropping helps, but reactive measures like reducing meals or selling livestock prolong hardship. Access to extension services, savings groups, and institutional support speeds recovery, though female-headed households face more difficulties. Overall, coping works best when traditional knowledge is combined with better inputs, climate information, and community support.

2.3 Socio-Economic and Institutional Determinants of Coping Strategy Adoption and Success

This theme explains how social and institutional factors shape the drought coping strategies used by maize-farming households. Education helps farmers adopt new practices, while gender inequalities limit women's access to land, credit, and training. Wealthier households can use better long-term strategies, but poorer ones depend on short-term measures like rationing food or making charcoal. Institutional programs such as FISP, FRA, NGOs, cooperatives, and early warning systems support access to inputs and technologies, though rural areas like Lukupa Ward often face delays and gaps. Globally, strong institutions enable advanced strategies, while in Sub-Saharan Africa, low literacy, gender inequality, and limited credit slow adoption. In Lukupa Ward, weak institutional support, low education, and gender gaps reduce effectiveness, although community initiatives like seed banks and communal labour offer some support.

2.4 Research Gap and Personal Critique of Literature

Maize farmers cope with drought using strategies like conservation agriculture, crop diversification, drought-resistant seeds, early warnings, and community support worldwide. In sub-Saharan Africa, common practices include mixed cropping, water harvesting, and staggered planting, influenced by education, gender, income, and institutional support. In Zambia, programs like FISP and NGO initiatives help but face delays and logistical issues. Most studies focus on Southern, Eastern, and Central Provinces, leaving Northern areas like Lukupa Ward understudied, especially regarding impacts on yields, food security, and socio-economic factors. This study fills that gap by examining how households in Lukupa Ward cope with drought and how socio-economic and institutional factors affect their strategies, providing insights for local policies.

3. Research Design

This study used a case study design with a mixed-methods approach to understand how households in Lukupa Ward cope with drought and how it affects maize farming. It combined quantitative methods, like questionnaires, to collect data on maize yields and coping strategies, with qualitative methods, such as interviews, focus group discussions, and field observations, to gather detailed insights. This approach helped cross-check results and provided a clear picture of what strategies farmers use, how often they use them, and why.

3.1 Target Population

The study explored how maize-farming households in Lukupa Ward cope with drought, focusing on small-scale, rain-fed farmers. From 580 households, 100 were sampled alongside 10 key informants, including local leaders, extension officers, and NGO representatives, to capture community and institutional perspectives. Lukupa Ward, in Kasama District, Northern Province, is rural, with most households farming maize, cassava, beans, and groundnuts. Frequent droughts, poverty, low education, and limited services make it a suitable context for studying household adaptation strategies.

3.2 Sampling Design

The study employed a mixed sampling approach to collect representative data from maize-farming households in drought-affected Lukupa Ward, Kasama District. Out of approximately 580 households, 100 were selected using cluster and proportionate stratified random sampling across ten villages, ensuring coverage of different social groups and vulnerability levels. 10 Key informants, including agricultural officers, village headpersons, NGO representatives, and cooperative leaders, were also included to provide insights on institutional support and local challenges. This approach ensured diverse, balanced, and unbiased data, allowing the study to reliably assess household coping strategies and their effectiveness.

3.3 Sampling Techniques and Sample Size

Sample size refers to the number of units to be selected from the population for the study, answering how many households should be surveyed and interviewed (Kothari, 1990). To determine the sample size from the given population of five hundred and eighty (580) maize-farming households, Yamane's (1967) formula was used as follows:

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

Where:

N= population of study (580)
n= sample size
e= level of significance (margin of error)

Note: $e = 0.09$ (90% confidence level)

$$n = \frac{580}{1 + 580(0.09)^2}$$

$$n = \frac{580}{1 + 580(0.0081)}$$

$$n = \frac{580}{1 + 4.698}$$

$$n = \frac{580}{5.698}$$

$$n \approx 101.8$$

Therefore, (n \approx 102). For practical and logistical reasons the household sample was rounded to 100 respondents. In addition, ten (10) key informants were purposively selected (two agricultural officers, three village headpersons, two NGO representatives, and three cooperative leaders), making the total sample size 110 respondents.

3.4 Data Collection Method

The study used four main tools to collect data. A structured questionnaire gathered quantitative information from households on demographics, farming practices, and coping strategies. Semi-structured interviews with key informants, including agricultural officers, ward leaders, and NGO representatives, explored institutional drought responses. Focus group discussions with farmers, women, youth, and elders provided deeper insights into community coping methods and traditional knowledge. Observations documented visible drought effects like crop conditions, water sources, and alternative livelihoods. Ethical clearance was obtained from relevant authorities, and local leaders were consulted before data collection. Enumerators received training, and tools were pre-tested in a nearby ward. Data collection lasted three to four weeks, with surveys conducted during the day and interviews and FGDs held in accessible community locations, all recorded with participants' consent for later analysis.

3.5 Data Analysis Techniques

The study used a mixed-methods approach, analyzing quantitative data from household surveys with SPSS to show frequencies, percentages, and relationships between socio-economic factors and coping strategies. Qualitative

data from interviews and open-ended responses were analyzed thematically to capture local experiences and challenges. Combining both methods gave a complete understanding of how households in Lukupa Ward cope with drought and how effective their strategies are for maize farming and food security.

3.6 Triangulation of Data (Validity and Reliability)

The study ensured accurate and trustworthy results by carefully testing and reviewing its research tools. Experts checked the questions, a pilot test confirmed clarity, and trained data collectors followed consistent procedures. Information was gathered through surveys, interviews, and observations from farmers, agricultural officers, and community leaders in Lukupa Ward, while secondary sources like ZamStats, MoA, FAO, and the World Bank provided context. Involving local stakeholders and discussing findings with the community helped improve the accuracy and usefulness of the results.

3.7 Limitations of the Study

This study faced several limitations that may have affected its findings. First, there was limited access to historical agricultural data in Kasama District, making it difficult to analyze long-term drought trends, crop yields, and the effectiveness of past coping strategies. Second, some farmers may have underreported losses or overstated the success of their coping methods due to social pressure, which could have introduced bias. Third, while Kasama shares similarities with other rural areas in Zambia, the specific conditions in Lukupa Ward such as rainfall patterns, institutional support, market access, and local governance mean the findings may not fully apply to other regions. Thus, while the study offers useful local insights, caution is needed when generalizing the results more broadly.

3.8 Ethical Considerations

This study followed strict ethical standards to protect participants. Informed consent was obtained from everyone, and participants were informed about the study, their right to withdraw, and how their data would be used. Confidentiality was maintained by using codes instead of names, securely storing data, and encrypting digital recordings, which were deleted after transcription. The research respected local customs and norms, conducting interviews in Bemba when needed, with proper translation. Ethical approval was obtained from both the university and Kasama District authorities to ensure accountability and legitimacy.

4. Findings and Discussion Results

4.1 Presentation of results on background characteristics of the respondents

This section presents the demographic profile of maize-farming households in Lukupa Ward, focusing on gender, age, and education. It shows the share of male and female respondents, their education levels, and age distribution to explain how these factors influence drought coping strategies. The results are illustrated with charts for easier comparison and understanding.

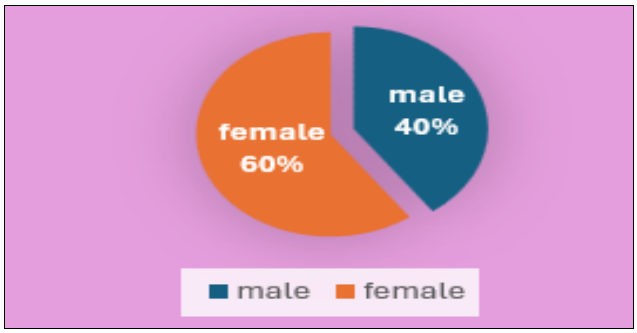

Fig 1: Distribution of respondents by gender

Figure 1 shows that 60% of respondents were female and 40% were male, meaning most participants were women. This suggests that women play a major role in maize farming and household decisions in Lukupa Ward, which helps explain possible gender differences in how families cope with drought and access farming resources.

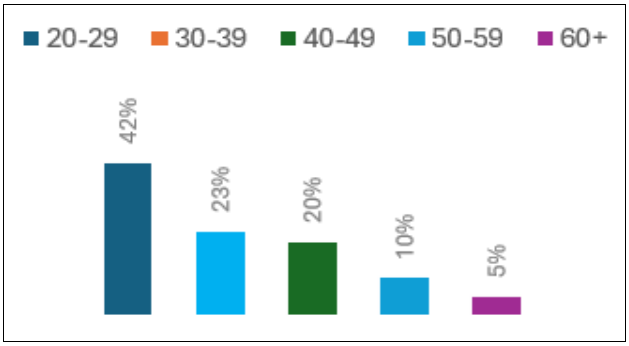

Fig 2: Distribution of respondents by age

The study found that most respondents in Lukupa Ward were young adults, with 42% aged 20–29 years, showing strong potential for adopting new farming methods. About 23% were aged 30–39 years, representing experienced and responsible household heads, while 20% were aged 40–49 years, indicating mature farmers with valuable experience but possible physical limitations. Only 10% were aged 50–59 years and 5% were 60 years or older, showing few elderly participants who are more vulnerable to shocks. Overall, the population is mainly young and active, which supports labor availability and innovation in drought coping strategies.

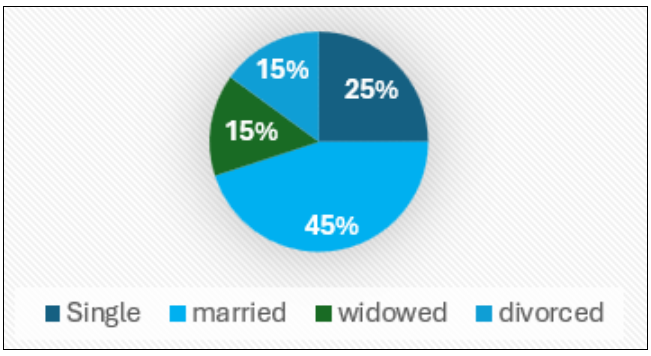

Fig 4.1.3: Shows marital status of the respondents surveyed

The study showed that 55% of respondents were married, indicating that marriage is common and important for labor sharing and decision-making in Lukupa Ward. About 20% were single, 15% widowed, and 10% divorced. Widowed and divorced individuals often faced greater economic and social challenges due to reduced labor and income. Overall, the results highlight diverse marital situations that influence household stability and resilience to drought.

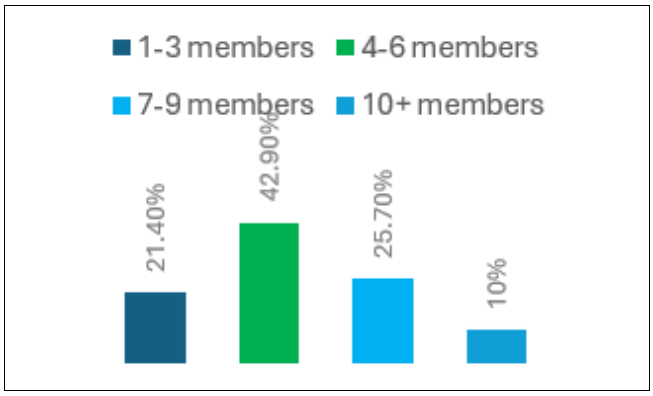

Fig 4.1.5: Household size of respondents

The study found that household sizes in Lukupa Ward varied widely. About 21.4% had 1–3 members, showing small or nuclear families, while the largest group, 42.9%, had 4–6 members, representing typical family structures. Around 25.7% had 7–9 members, and 10% had 10 or more, indicating extended families. Larger households faced greater strain on food and resources but had more labor for farming. Overall, household size influenced how families managed livelihoods and drought coping strategies.

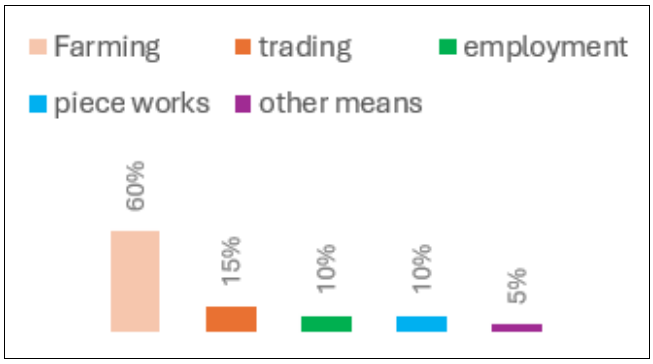

Fig 4.1.6: Shows main source of income for respondents

The study found that most households in Lukupa Ward depend on farming (60%) as their main source of income, showing that small-scale agriculture is central to livelihoods. About 15% relied on trading, 10% on formal employment, and another 10% on piecework or casual labor. Only 5% earned income from other sources like remittances or crafts. Overall, the results show heavy reliance on farming with few alternative income options, making households economically vulnerable to drought.

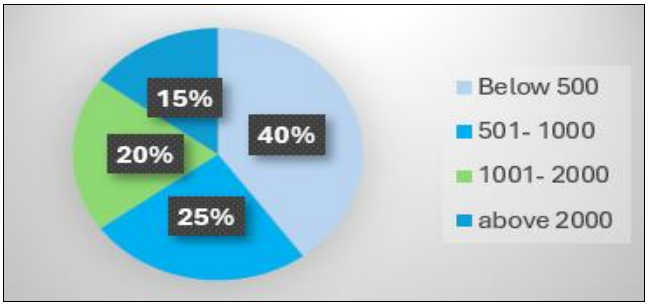

Fig 4.1.7: Shows findings on monthly household income (ZMW)

The study showed wide income disparities among households in Lukupa Ward. About 30% earned below K500 per month, while 25% earned between K501–K1000, placing most households in low-income brackets. Only 10% earned K1001–K2000, and just 5% earned above K2000, showing very few high-income earners. Overall, the results highlight widespread poverty and limited financial capacity, which restrict households' ability to invest in farming and cope with drought-related shocks.

4.2 Perception, Experiences of Drought, and Coping Strategies Employed by Households

The study found that households in Lukupa Ward used several strategies to cope with drought and protect maize production and food security. Food rationing was common, helping families stretch limited supplies. Some members migrated temporarily to find casual work or extra income, while others practiced crop diversification by planting different crops alongside maize to reduce the risk of total loss. These approaches reflect both short-term survival and long-term adaptation based on local experience and available resources, showing the community's resilience and flexibility in facing drought.

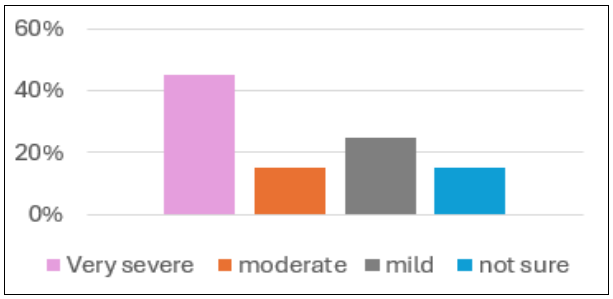

Fig 4.2.1: Shows severity of Drought

The study showed mixed views on drought severity in Lukupa Ward. About 50% of respondents said drought was very severe, citing crop losses, water shortages, and food insecurity. Around 35% viewed it as moderate, while 25% saw it as mild, likely due to better coping strategies or less exposure. Another 15% were unsure, possibly from limited experience or lack of climate information. Overall, perceptions varied, showing the need for awareness and support tailored to different household experiences.

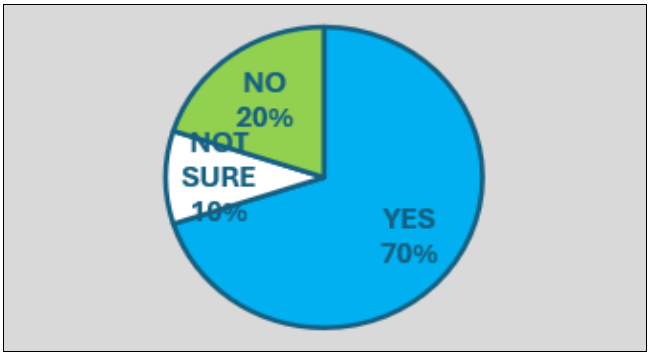

Fig 4.2.2: Illustrate perceptions of the frequency of droughts in Lukupa Ward

The pie chart shows that most respondents in Lukupa Ward (70%) believe droughts are happening more often, while 20% think the frequency has stayed the same, and 10% are unsure. This indicates a strong community perception of increasing droughts, highlighting the need to improve coping strategies and support systems.

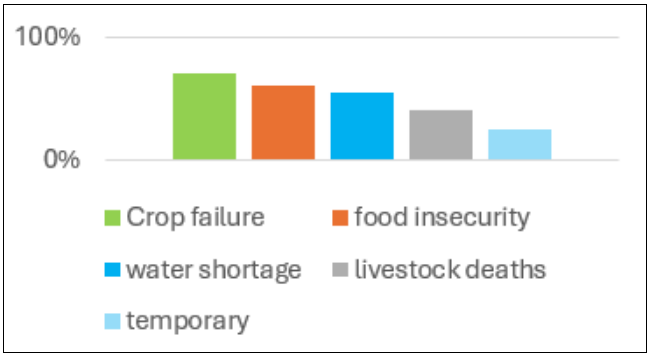

Fig 4.2.3: Shows the findings on common impact of drought in Lukupa ward

The findings show that drought in Lukupa Ward affects households in many ways. Crop failure is the most common impact (70%), followed by food shortages (60%), water scarcity (55%), livestock deaths (40%), and migration (25%). This highlights how drought threatens livelihoods, food security, and household stability, stressing the need for effective coping strategies.

Fig 4.2.5: Shows diversification

Terms	*Percentage*
Disagree	10%
agree	30%
Strongly agree	50%
Strongly disagree	10%

The findings show that most farmers in Lukupa Ward use crop diversification to cope with drought, with 50% strongly agreeing and 30% agreeing. Households grow drought-tolerant crops like cassava, sorghum, millet, and sweet potatoes alongside maize. Intercropping and using different field locations help reduce the risk of total crop failure, ensuring food security and income even during dry spells. This strategy combines local knowledge and practical experience to adapt to changing climate conditions.

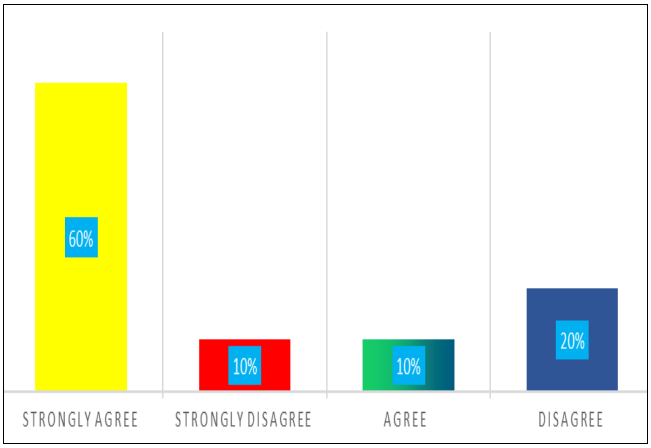

Fig 4.2.6: Illustrate Temporary Migration

The findings show that many households in Lukupa Ward use temporary migration to cope with drought, with 60% strongly agreeing. Family members, often men and youths, move to towns like Kasama or Lusaka for casual work, sending remittances home to buy food and essentials. Women sometimes migrate to sell goods locally. While this provides short-term relief, it can reduce farm labor and strain family dynamics, affecting long-term productivity.

4.3 Community and Institutional Support and their Impact

The study found that households cope with drought more effectively when they have strong community and institutional support. Early warning systems help farmers plan by adjusting planting dates and conserving water. Agricultural insurance reduces financial risks from crop failure, while engagement with extension officers, cooperatives, and local leaders provides guidance and access to resources. Together, these supports make coping strategies more practical, sustainable, and resilient.

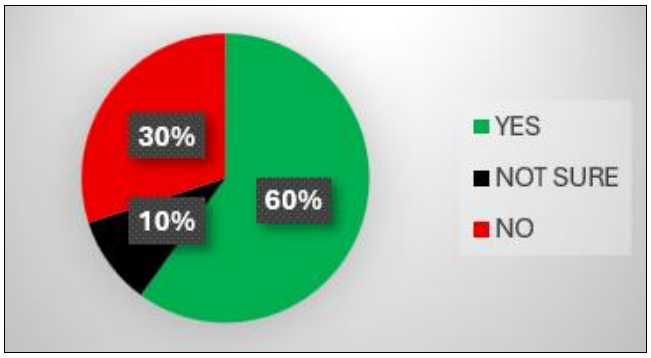

Fig 4.3.1: Shows local leader's support

The chart shows that 60% of respondents received support from local leaders in Lukupa Ward, highlighting their role in guiding and assisting communities during droughts. About 30% did not receive support, and 10% were unsure, indicating gaps in outreach or awareness. This suggests local leadership is important but needs to be more inclusive and consistent.

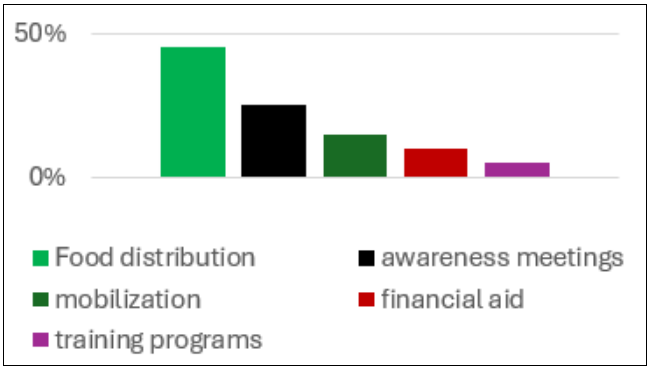

Fig 4.3.2: Shows the form of support received by households

During droughts in Lukupa Ward, households received various forms of support. Food distribution was the most common, addressing immediate hunger. Many benefited from awareness meetings and sensitization campaigns, while others received seeds, fertilizer, or small grants to resume farming. Community and church networks also provided moral and small-scale support. However, some households reported receiving no help, highlighting gaps in coverage. Overall, short-term relief is important, but there is a need for long-term support like input provision, training, and institutional safety nets to strengthen resilience.

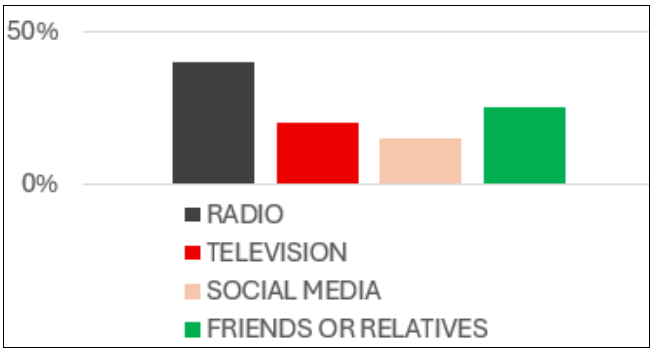

Fig 4.3.3: Illustrate access to early warning systems

Access to early warning systems is crucial for helping households in Lukupa Ward prepare for droughts. Farmers who received timely weather forecasts were able to adjust planting schedules, use drought-tolerant seeds, conserve stored maize, or delay fertilizer application, reducing crop losses. Early warnings were mainly accessed through local radio, extension officers, and SMS alerts via farmer cooperatives, though mobile coverage and literacy limited reach. Households with early warning information reported better preparedness and resource use, highlighting the importance of localized, accessible early warning systems in strengthening drought resilience.

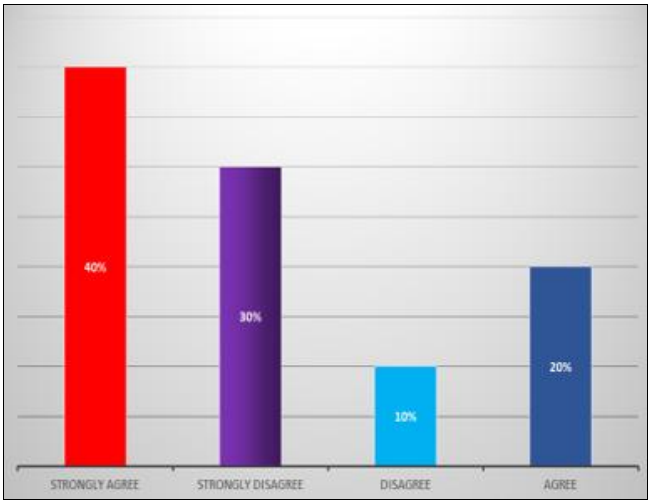

Fig 4.3.4: Agricultural Insurance

Agricultural insurance is an important tool for helping farmers in Lukupa Ward cope with drought, though only some households currently access it. Weather-indexed insurance provides payouts based on rainfall, allowing farmers to recover after crop failure by buying inputs or investing in drought-tolerant crops. Insured farmers reported quicker recovery and reduced food insecurity compared to those without coverage. Uptake remains low due to cost, limited awareness, and mistrust, but for participating households, insurance offers a financial safety net that supports long-term resilience and adaptive farming strategies.

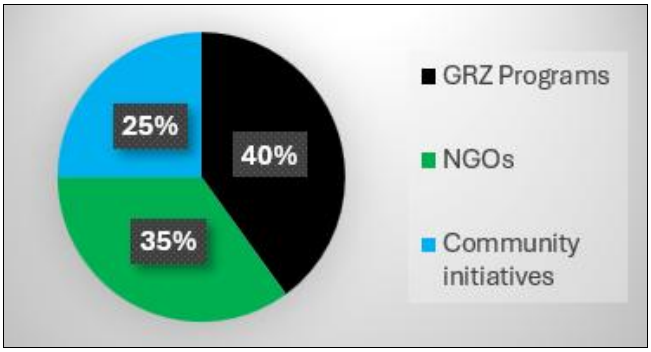

Fig 4.3.5: Shows how local stakeholder engagement impacted coping mechanisms

Engaging local stakeholders like extension officers and community leaders was key to understanding drought coping in Lukupa Ward. Extension officers provided insights on adoption of improved seeds and conservation farming, while community leaders highlighted social factors affecting household decisions, such as communal support

and informal savings. Their input helped validate household findings and revealed gaps in service delivery and resource access, showing where institutional support could be strengthened.

4.4 Socio-Economic Factors Influencing Coping Strategies

The study found that socio-economic factors strongly influenced how households in Lukupa Ward coped with drought. Gender affected access to resources, decision-making, and labor allocation, shaping which strategies were possible. Education influenced awareness and adoption of effective measures like crop diversification, soil conservation, and participation in community programs. These results show that interventions must account for socio-economic differences to effectively build household drought resilience.

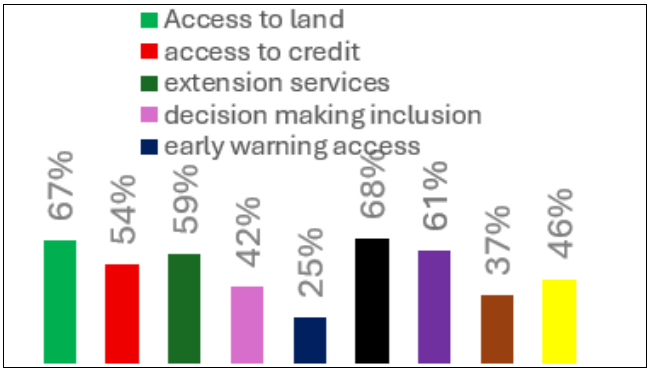

Fig 4.4.1: Illustrate how gender dynamic affects adoption of coping strategies

Gender strongly influences drought coping among maize farmers in Lukupa Ward. Female-headed households face barriers such as limited access to land, credit, inputs, and extension services, which reduces their ability to adopt strategies like crop diversification or conservation farming. In villages like Yumba and Kombe, women are often excluded from decision-making forums and cooperatives, limiting access to early warnings and input distribution under programs such as FISP. Consequently, they rely on low-impact strategies like food rationing, casual labour, or social networks, leading to higher food insecurity and slower recovery after droughts. This highlights the need for gender-sensitive policies and inclusive support systems.

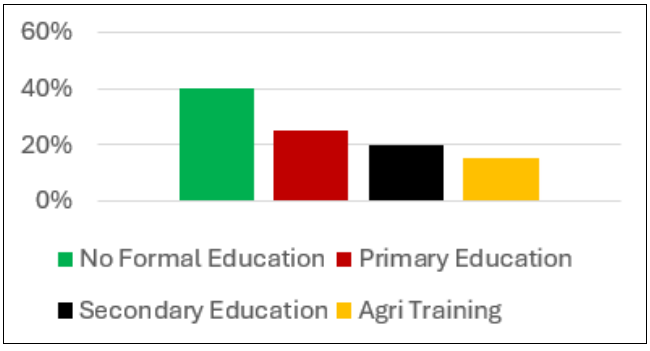

Fig 4.4.2: Illustrate how education levels affect adoption of coping strategies

Education strongly influences how maize farmers in Lukupa Ward cope with drought. Farmers with higher education or agricultural training are better able to access, understand, and use information on weather forecasts, improved seeds, and conservation farming techniques. They adopt strategies such as adjusting planting dates, mulching, zero tillage, and using drought-resistant maize varieties, while engaging more effectively with programs like FISP. In contrast, less-educated households rely on traditional practices and adopt innovations more slowly, reducing their resilience. These findings highlight the need to integrate education and training into drought adaptation policies to strengthen household resilience and ensure interventions reach the most vulnerable.

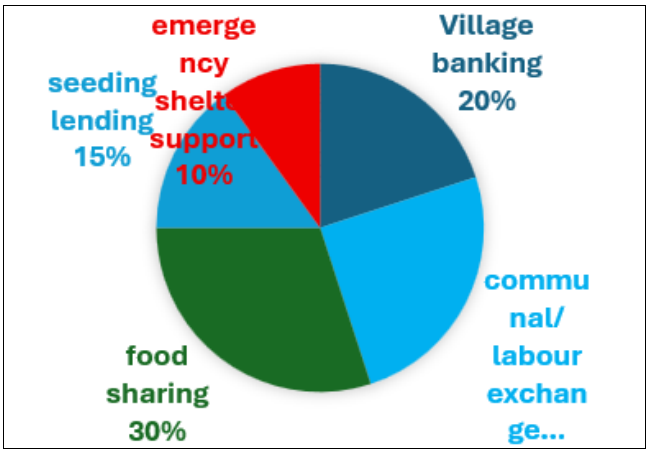

Fig 4.4.3: Shows how the community practiced resource sharing during droughts

In Lukupa Ward, strong social networks and financial inclusion are key to coping with drought. Households rely on neighbours for seed, labour, and food, while informal savings groups provide emergency funds during crop failures. Financial tools like microloans, mobile money, and savings groups enable farmers to invest in drought-resistant seeds, fertilizers, and irrigation, as well as diversify income sources. Together, community support and access to finance help households manage immediate drought impacts and build long-term resilience, showing that effective coping depends on both collective action and individual resource management.

4.5 Barriers to Effective Coping

Despite the various strategies employed, the study identified several barriers that hindered effective coping:

Barriers to effective drought coping in Lukupa Ward include low education and limited climate knowledge, which restrict farmers' ability to adopt climate-smart practices; delayed or insufficient government inputs, forcing reliance on low-yield crops; gender inequality and insecure land rights that limit women's access to resources; weak extension services and poorly coordinated institutions; limited access to credit, with VSLAs only partially filling the gap; inadequate infrastructure such as roads, irrigation, and storage, which reduce market and input access; and dependence on donor funding, which discourages local initiatives and leaves households vulnerable when aid is inconsistent. Strengthening resilience requires improving education, timely input delivery, women's empowerment, extension services, infrastructure, financial inclusion, and locally led programs.

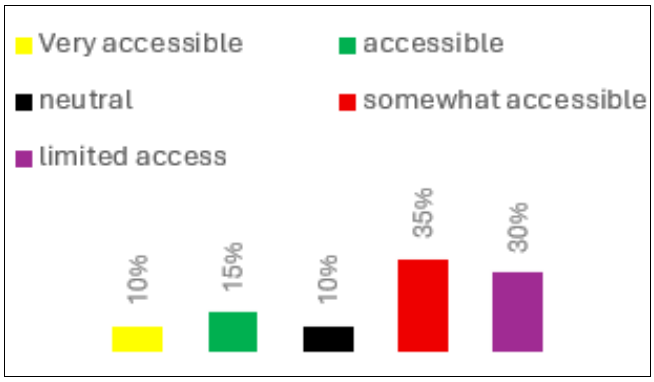

Fig 4.5.1: Illustrates limited access to climate knowledge

4.6 Discussion of Research Findings

Maize-farming households in Lukupa Ward cope with drought using a mix of traditional practices, such as intercropping, mulching, food rationing, and communal labour, alongside modern strategies like staggered planting, drought-tolerant seeds, conservation agriculture, and small-scale irrigation. The effectiveness of these strategies is shaped by access to extension services, timely inputs, institutional support, education, gender, and financial resources, with female-headed and less-educated households facing greater challenges. Infrastructural constraints, weak community coordination, and reliance on donor aid further limit resilience, while participatory monitoring and locally led interventions are critical for improving outcomes. Overall, building long-term drought resilience requires integrated, context-specific approaches that strengthen institutions, empower vulnerable groups, improve infrastructure, and support sustainable, community-driven adaptation.

5. Conclusion

The study found that maize-farming households in Lukupa Ward use both traditional methods, such as intercropping, mulching, and food rationing, and modern practices like staggered planting, drought-tolerant seeds, and conservation agriculture to cope with recurring droughts. The success of these strategies depends on access to information, inputs, and institutional support, with households in well-supported villages like Yumba and Chafwa showing higher resilience compared to more remote areas. Institutional programs, including FISP, are important but often hampered by delays, poor infrastructure, and limited communication, while female-headed households face additional barriers to early warnings and resources. Socio-economic factors education, gender, and financial access strongly influence adaptive capacity, as educated households adopt climate-smart techniques more effectively, and access to mobile money or VSLAs enhances preparedness and recovery. Overall, building sustainable drought resilience requires integrating local knowledge with modern practices, inclusive education, timely extension services, gender equity, financial tools, and improved infrastructure.

5.1 Recommendations

To strengthen drought resilience in Lukupa Ward, interventions should focus on enhancing institutional support through timely weather information, trained extension officers, and agricultural insurance; promoting gender equity by supporting women's cooperatives, input access, and participation in planning; investing in rural infrastructure such as roads, storage, and irrigation; expanding financial access via microfinance, mobile money, and VSLAs; strengthening extension services and demonstration plots to improve climate-smart farming; engaging youth through agribusiness and education initiatives; encouraging community-based resource sharing like labor rotation and seed banks; and implementing participatory monitoring and evaluation to ensure programs are effective, inclusive, and responsive to local needs.

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