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Impacts of climate change on agriculture and livelihoods.

A case study of Wedza district

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ABSTRACT

This study examines the impacts of climate change on agriculture and livelihoods in Wedza District, highlighting the growing vulnerability of rural communities dependent on rain-fed agriculture for food security and income. Guided by the interpretivist paradigm, the study adopted a qualitative research approach and a case study design to capture the lived experiences and perceptions of farmers and households affected by climate variability. Data were collected through semi-structured interviews, focus group discussions, and document analysis, utilizing purposive and snowball sampling techniques to select 30 participants including farmers, community leaders, agricultural extension officers, and NGO representatives. The findings revealed that climate change has significantly reduced crop yields, affected livestock production, and increased food insecurity while exposing farmers to challenges such as water shortages, limited access to inputs, and inadequate climate information. Although some adaptation strategies including crop diversification and drought-resistant varieties are being implemented, their effectiveness remains constrained by resource limitations and weak institutional support. The study concludes that current adaptation policies are inadequately implemented and recommends strengthening climate information services, improving access to farming inputs, investing in irrigation infrastructure, and enhancing community-based adaptation programs to build sustainable livelihoods and resilience in Wedza District.

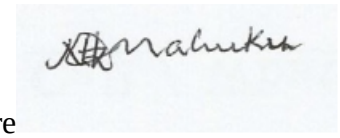
DECLARATION FORM

I, B222123B, hereby declare that this dissertation is a result of my own original work of the study carried out except for the material borrowed from other sources and titles but has been duly acknowledged and references have been included in this work. It has not been submitted fully or in part at any other university.

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DEDICATION

This dissertation is dedicated to my mother Mediate Chikasha, my father Tererai Kavanji and my siblings who stood with me in every step of the way, I am grateful for all the love, sacrifices, support and guidance and thank you for making me see this adventure through the end. To all those that supported me throughout my education this is for you. I dedicate this to all of us and I say Ebenezer thus how far the Lord has taken.

LIST OF ABREVIATION AND ACRONYMS

BUSE	Bindura University of Science Education
FAO	Food and Agriculture Organization
IPPC	Intergovernmental Panel on Climate Change
NGO	Non Governmental Organization
ZIMVAC	Zimbabwe Vulnerability Assessment Committee

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

Despite the fact that agriculture is still the backbone of rural economies throughout sub-Saharan Africa, it is increasingly under pressure from an increasingly volatile climate. Changes in temperature and unpredictable rainfall have led to reductions in productivity in the areas that are almost entirely reliant on seasonal rainfall (Lobell et al.). African communities are disproportionately affected by this burden, because of their high dependence on subsistence farming (Niang et al.). In Zimbabwe, most of the rural population are directly dependent on the land for food and income and the increased occurrences of droughts and extreme heat events are especially harmful for both crops and livestock (Zimbabwe Vulnerability Assessment Committee). This is the situation in Wedza District which has experienced delayed onset of rains, early dry spells and successive poor crops, putting the smallholder farmers on the brink. The water points have dried up and grazing areas have deteriorated, resulting in a significant decrease in maize stands and livestock numbers (Matarira and Mhlanga). The impacts are not just on the field food insecurity is increasing, nutrition is declining and people are moving to unsafe water sources, all of which exacerbate health risks at household level. These pressures together illustrate the magnitude of the impact of climatic changes on the natural resource base and human welfare of communities in Wedza.

1.2 Statement of the Problem

Climate variability has become one of the most critical challenges for rural farming systems and household well being in Zimbabwe as a whole. Notably, Wedza District is especially vulnerable as the vast majority of its farming population relies on rain-fed farming with minimal or no irrigation. The distribution of rainfall has been irregular and temperatures have been increasingly high with a consistent deficit in crop performance, particularly in staple crops such as maize. Loss of livestock also has increased as water supplies have become scarce and land for pasture has decreased. These agricultural losses at the household level result in food deficits, nutritional stress, and economic adjustments like distress livestock sales, or even relying on off-farm income. Despite the apparent magnitude of these impacts, there is a significant gap in research on the local level that documents everyday experiences of climate change and adaptation efforts being used by Wedza communities. This lack of knowledge reduces the resilience of the community, and makes it difficult to create contextually appropriate interventions for sustainable livelihoods.

1.3 Purpose of the Study

This study aims at exploring the link between climate change and agricultural and livelihood outcomes in Wedza District. It seeks to capture the key challenges faced by farming households, assess the resilience of their current adaptation strategies.

1.4 Research Objectives

1. To explore how climate change impacts on agricultural production and rural livelihoods of Wedza District.
2. To find out what are the main challenges facing farmers' households due to changing rainfall patterns and rising temperatures.
3. To assess the effectiveness of existing community-level coping strategies to the pressures of climate change.
4. To suggest feasible interventions that will foster and strengthen sustainable livelihoods and resilience in Wedza District.

1.5 Research Question

1. What is the level of impact of climate change on agricultural production and household livelihoods in Wedza District?
2. What are some of the challenges that farmers' families are facing due to unpredictable rains and temperatures?
3. What are the existing coping mechanisms of communities to the impacts of climate change in Wedza and how adequate are these coping mechanisms?
4. What measures are most likely to improve the resilience and sustainability of household livelihoods in Wedza District?

1.6 Assumptions of the study:

➢ Farmers and households in Wedza District have some level of working knowledge of climate variability and understand how it affects their farming and lives.

➢There has been some adaptation to climate pressures in Wedza communities, although some of these adaptation responses are informal and less resourced.

➢Local governance bodies and supporting organizations are aware of climate-related issues in the district, but may have limited ability to support implementing district-wide solutions at the community level.

1.7 Significance of the study

This study is important in addressing a gap in climate impact studies in Zimbabwe that focus on the lived realities of a particular rural district. The findings have implications for several stakeholders:

1.7.1 To the Researcher

This study will help the researcher to better understand the linkages between climate variability and agricultural systems and rural household welfare. They will develop their analytical skills through engagement with community level data, and provide a better basis for future academic and applied research.

1.7.2 To the University

The research puts the university in the center of climate scholarship that has a direct impact on the community. Such findings can guide institutional action in the form of curriculum development, research focus and outreach programmes on sustainability and rural development.

1.7.3 To Policymakers

The empirical evidence this study will provide will be of benefit to decision-makers at the local and national levels. The recommendations developed can inform the development of specific policies and programmes to enhance food security, increase adaptive capacities and support sustainable rural livelihoods in climate-vulnerable places like Wedza.

1.7.4 To Advocacy Groups

Environmental and community-based advocacy groups will have access to credible, community-sourced information, which will support their advocacy for climate adaptation funding. Such findings can be helpful in building stronger arguments for resource allocation and programmatic interventions that will benefit rural farming populations.

1.7.5 To Community and Development Organizations

Local practitioners will have a more sophisticated awareness of local vulnerabilities and adaptive capacities. This knowledge will help them to plan and implement support programmes that are culturally relevant and effective in strengthening the resilience of communities in the longer term.

1.8 Delimitations

This study is limited to Wedza District in Zimbabwe and in particular, the linkages between climate change, agricultural production and rural livelihoods. Only the impacts of altered rainfall and temperature on crop production, livestock and household food security are analyzed. The scope of the study does not extend to other environmental issues, like deforestation, land degradation or pollution from urban sources. Likewise, this research is limited to current coping mechanisms in Wedza and does not include comparison with other districts or historical climate data.

1.9 Limitations of the Study

Being a geographically localized study, the findings are not necessarily transferable to other districts or regions having other agro-ecological or socioeconomic characteristics. Access to households may be incomplete because of logistical issues accessing households that are dispersed or remote. Moreover, the use of qualitative instruments like interview and observation may have the possibility of subjectivity in the respondents' answers and the researcher's interpretation. Despite these limitations,

the information collected should provide valuable insights that will help guide community-based climate adaptation and livelihood support development.

1.10 Dissertation Outline

Chapter One provides the background of the study by grounding it in the agricultural and livelihood context of Wedza District in the context of climate change. It includes background of the problem, statements of the research problem and purpose, and objectives, questions, assumptions, significance, delimitations and limitations that frame the study.

Chapter Two reviews the existing literature in the fields of climate change, rural livelihoods and community resilience. The review provides an overview of the knowledge available on the impact of climate variability on farming systems and documented coping strategies from global, continental and Zimbabwean perspectives. It also points out the areas where there is a lack of literature that this study aims at filling, especially in the context of Wedza.

The methodological framework for the research is explained in Chapter Three. A mainly qualitative approach is used, with some basic quantitative data where applicable. The chapter provides information regarding the target population, sampling, data collection instruments, and analysis techniques. Ethical guidelines for the involvement of the participants are also discussed.

The empirical findings of the study are presented and interpreted in Chapter Four. The chapter first reviews participant characteristics, then the known impacts of climate change on crops and livestock, the characteristics of the challenges faced at the household level and the extent to which current coping mechanisms are effective. Strategies to make the community more resilient and improve their livelihoods are proposed and placed in the context of the general theoretical and empirical framework developed in the literature review.

The study's main findings and conclusions in relation to each of the research objectives are summarised and synthesised in Chapter Five. Practical recommendations are targeted towards policy makers, community leaders and practitioners to help inform climate adaptation and livelihood strengthening in Wedza. Potential directions for future research are then identified, which might further continue this investigation beyond the district level.

CHAPTER TWO

2.0 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

This chapter builds on the current body of scholarly research relating to climate change and its impacts on agricultural systems and rural livelihoods, specifically communities like those of Wedza District. The review, drawing on global, regional and local views, explores how changes in rainfall and temperature are changing farming conditions and posing a risk to food security. The chapter also examines the policy environment and adaptation strategies for enhancing resilience and maintaining rural livelihoods in Zimbabwe.

2.2 Theoretical Framework

This study is guided by two complementary theories namely Sustainable Livelihoods Framework and Climate Change Adaptation Theory. The Sustainable Livelihoods Framework offers a way to think about how households utilise available resources, including land, water and human resources, to maintain their wellbeing, and how external shocks, like climate variability, can reduce their ability to do so (Chambers and Conway, 1992; Scoones, 1998). It highlights the structural factors that exacerbate vulnerability of rural population groups. Climate Change Adaptation Theory, by contrast, is based on how communities adjust their behaviour and practices to new climate conditions, and the importance of indigenous knowledge and collective action

to limit exposure to harm (Adger et al., 2003; Smit and Wandel, 2006).

2.2.1 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework was developed as an alternative to deficit-based analysis of poverty, and was intended to shed light on how individuals and households in rural areas manage and enhance their livelihoods (Chambers and Conway, 1992). Instead of focusing on what people lack, it highlights the asset base upon which they draw, and includes natural, physical, human, financial and social capital, and how these assets interact with the wider institutional and policy environment (Scoones, 1998). The framework acknowledges that households with limited access to these assets are more vulnerable to external shocks, including shocks from climate variability.

At the heart of the framework is the understanding of how climatic disruptions undermine foundations of livelihood. The lack of rainfall, and the uncertainty of rainfall patterns, combined with prolonged dry spells, reduce agricultural production and deplete the natural resource base on which farming communities rely (Ellis, 2000). Affected households, in turn, try to compensate for shortfalls in their farming through a process of diversification, such as participating in off-farm work or selling distress assets. The framework therefore provides a guide of how to think about vulnerability and the options available to people who are vulnerable.

The Sustainable Livelihoods Framework has been applied to development programmes and policy making in a number of contexts (Scoones, 1998). For the

purposes of Wedza District in particular, it is an important analytical tool to determine where the greatest resource gaps are (access to water, farm inputs, financial services, etc.), and where interventions are most likely to improve household resilience. The framework maps livelihood assets and climate pressures, providing a better understanding of what structural supports are required to help communities remain viable in a changing climate.

2.2.3 Climate Resilience Theory

The focus of Climate Resilience Theory is on the ability of communities to foresee, resist and bounce back from repeated climate events such as droughts, floods and extreme heat events (Folke, 2006). It proposes that resilience is not a static trait, but rather a dynamic process that can be developed over time and influenced by experience, institutional supports, and adaptive learning. The theory transcends the description of the impacts of climate shocks to consider how some communities are better able to absorb and recover from them.

The theory consists of three main components: preparedness, adaptation and recovery. Preparedness is a proactive process of developing plans and protection measures before climate stress begins. Adaptation is the process of continual changes in practice and livelihood strategies to adjust to changing environmental conditions. Recovery is the ability of a community to rebuild normal functioning after a disruptive climate event (Nelson et al., 2007). These dimensions collectively provide a spectrum of resilience along which communities can travel as they have various resources and

knowledge at their disposal.

Its theory is especially compelling in terms of the differential effects of climate change on communities. Households with restricted access to productive resources, limited social networks and weak institutional support are less resilient and will have a harder time recovering from climate shocks (Folke, 2006). In such settings as Wedza, where access to irrigation, agricultural inputs and financial services is still limited, the avenues for recovery are also limited. The theory can be applied as the basis for interventions including livelihood diversification, water harvesting, and community-based early warning systems, which can increase adaptive capacity and decrease vulnerability as time goes on (Nelson et al., 2007).

2.3 Knowledge Synthesis

Climate change, for the purposes of this study, is defined as the longterm transformation of the temperature, precipitation and wider weather patterns caused by natural and anthropogenic processes (IPCC, 2021). In the context of the Wedza study unit, agriculture and livelihoods refer to all activities of crop production, livestock keeping and any other supplementary income generation activities that contribute to household welfare. These activities are also affected by climate change, as it affects the performance of crops, livestock mortality and household food insecurity.

In this study, community resilience is defined as the ability of the households and communities in Wedza to absorb, adapt to, and recover from the effects of climate stressors, such as drought, flooding, and rising temperatures (Adger et al., 2003).

Adaptation strategies are the specific actions taken by farmers and households to cope with climate risks, including changing planting times, using drought-tolerant crops, water conservation practices, and diversifying income sources (Smit and Wandel, 2006).

2.3.1 Agriculture and Livelihoods in Wedza District

Household welfare in Wedza District is closely linked with the functioning of seasonal rains dependent and soil productivity constrained agricultural systems, which are also limited in access to basic farming inputs and water resources (FAO, 2021). Although climate change is a biophysical phenomenon, its impacts on rural communities are most pronounced in the social and economic fabric of rural life, where margins for error are minimal and alternative livelihoods are scarce (IPCC, 2021).

The Sustainable Livelihoods Framework highlights that the ability of a household to cope with climate shocks depends on the diversity and quality of its assets, ranging from access to productive land, labor, social networks and financial resources to the type of crops they are growing and the quality of their livestock. Climate variability and change can lead to increased drought, reduced agricultural productivity that households rely on, and reduced food security and income generation opportunities. This situation reflects the fact that the impacts of climate change in Wedza are not only that of crop failure, but also socially and economically affect the lives of rural people.

2.3.2 Global and Regional Perspectives on Climate Change and Agriculture

Climate change is a global recognised systemic threat to food systems, and the IPCC (2021) reported on the decline of crop yields and food production in various regions. In response, countries with more developed agricultural infrastructure, like the USA, China and India, have increased their investments in irrigation technology, better seed and climate-smart farming practices. Multilateral commitments including the Paris Agreement have set a norm of action for national climate adaptation and mitigation policies, and in higher-income countries, there are generally strong policy frameworks and technological tools that support farmers to cope with climate risks more effectively (FAO, 2021).

These more affluent environments are very different from the African experience. Climate variability has a more immediate and harsh impact on food systems in a continent where most of the land is used for rain-fed farming and where there are structural limits to adaptive capacity. The African Union (2020) has recognized the rise of temperature and the irregularity of rainfall as contributing factors towards the reduction of agricultural production and the worsening of food insecurity in Africa. Drought-tolerant crop programmes, water-saving measures and farmer capacity development have been implemented in countries like South Africa, Kenya and Ethiopia, but poverty, a lack of infrastructure and limited public funds still hamper these responses in terms of the scope and effectiveness of the response (Niang et al., 2014).

In the Southern African Development Community (SADC) region, the adaptation to climate change has been done through collaborative approaches involving sustainable land and water management and strengthening early warning systems. The SADC Climate Change Strategy (2015–2030) has offered a region-wide coordination mechanism, while individual member countries like Zambia and Botswana have developed irrigation support and climate information programmes for smallholder farmers. Despite these, the region still faces several challenges to agricultural resilience, including recurring droughts, insufficient funding, and access to suitable technologies (Mupedziswa and Dhemba, 2022).

These regional dynamics are echoed in Zimbabwe's national experience. Climate change, including frequent droughts, extended dry seasons, and heat stress, is affecting the nation's agriculture, reducing yields and hastening livestock deaths (Zimbabwe Vulnerability Assessment Committee, 2022). There are policy statements, such as the National Climate Policy (2017) and National Development Strategy 1 (2021–2025) that make commitments to climate adaptation and food security, but district implementation in rural districts such as Wedza has been variable. The lack of infrastructure, low levels of extension support, and inadequate resource transfer to the community level are still causing a disconnect between the policy intention and community-level results (Chitin et al., 2022).

2.4 Effect of climate change on Agriculture and Livelihoods in Wedza District

With quantitative analytical methods, Lobell et al. (2011) showed that the relationship between temperature increases, rainfall variability, and crop productivity was evident, especially in rain-fed agricultural systems. The results they found provided an interesting argument for the use of climate-smart agricultural techniques and better agronomic practices. However, due to the study's overarching nature, it was not possible to engage in a detailed study of the localised rural contexts, such as Wedza, and there is a lack of evidence base at the community level.

Based on this, Niang et al. (2014) examined the changing food security in African agricultural systems as a result of climate change. Their research showed that increased frequency and irregularity of droughts and seasonal rains are exacerbating food shortages, and that the majority of smallholder farmers are unable to implement suitable adaptation strategies. While the study contributed immensely at the regional level, it was an aggregated study and hence the dynamics at district level including those of the district of Wedza were under explored.

Previous work by Matarira and Mhlanga (1992) in Zimbabwe itself showed that there were measurable relationships between climate variability and poor crop and livestock production. They recommended improved management practices in water use and more support systems for farmers. The study was based on national level data however, which limited the usefulness of the study in understanding the manifestation of the challenges in localities like Wedza District.

More recently, the Zimbabwe Vulnerability Assessment Committee (2022) generated survey-based findings that indicated a high prevalence of food insecurity within rural households, with limited harvest seasons and drought being the main drivers. The report pointed at the structural vulnerability of rain-fed agriculture system and demanded greater investment in irrigation, provision of inputs and training of farmers. The survey covered several districts and nationally it was an important survey but not Wedza specifically.

2.4.1 The challenges that impact Agriculture and Livelihoods in Wedza District

Niang et al. (2014) reported a variety of interrelated environmental and socioeconomic challenges to agricultural productivity in Africa, such as soil degradation, recurring water shortages, limited access to productive inputs, and limited access to financial services. Their work validated that these structural vulnerabilities exacerbate the impact of climate variability and reduce farmers' ability to continue farming. Like much continental literature however, the analysis was not fine-grained enough to capture the specific conditions of communities such as those in Wedza.

Ncube et al. (2022) undertook mixed methods study in various rural areas of Zimbabwe documenting farmer's adaptation to a mix of infrastructural deficiencies, input shortages and limited market access. Their findings also highlighted the challenges posed by poverty and low awareness levels, which undermined adaptive capacity. Although the study put forward targeted training programmes and access to resources as priority interventions, these were still in a general rural context and lacked

any district specific depth.

In eastern Zimbabwe, Maposa and Sibanda (2023) found water shortages, technological challenges, and inadequate transport connectivity to be ongoing constraints to household production and incomes. Although their advice on infrastructure and access to technology was sound, the study paid scant attention to the role played by local cultural dynamics and community-specific knowledge systems in shaping farmer perceptions and responses to climate-induced challenges, such as those in Wedza.

2.4.2 The Effectiveness of Adaptation Strategies and Policies in supporting Agriculture and Livelihoods in Wedza District

Niang et al. (2014) confirmed that targeted adaptation interventions, including drought-tolerant varieties, water-conservation infrastructure, and organized farmer training, can make a difference in the agricultural performance in climate-stressed areas. They called for such approaches to be integrated into national and subnational policies. However, their findings are not necessarily transferable to small rural communities with a specific geographical location, such as Wedza, so there is a need for more in-depth contextual research.

Ncube et al. (2022) reported that the provision of reliable and localised climate information significantly contributed to enhancing farmers' planning and minimising their vulnerability to drought-induced losses. Their research also showed that organized

institutional support (government or non-governmental organization) had positive impacts on farmer confidence and productivity. These are informative results, however the focus of the study was on more general rural and peri-urban areas and thus the findings had limited relevance for more isolated farming communities in districts like Wedza.

Maposa and Sibanda (2023) showed that increased irrigation access significantly lowered the vulnerability of farmers in eastern Zimbabwe to seasonal rainfall deficits and that subsidized provision of inputs and logistics services contributed to better livelihood outcomes. Their advice to roll out such interventions to less resourced rural areas is directly relevant to Wedza. But their framework failed to consider the importance of social capital, community awareness, and local ecological knowledge, which frequently can be critical in formal adaptation strategies taking hold in rural settings.

International evidence, as presented by Lobell et al. (2011), also validates that conducting a combination of improved agronomic practice, early warning infrastructure, and government support is linked to agricultural resilience. They are well supported with their suggestion of incorporating these measures into long-term development planning. The difficulty is in moving from the lessons learned mostly in better-resourced contexts to action-oriented advice in contexts where resources are limited and conditions vary significantly, such as rural districts like Wedza.

2.4.3 Strategies that improve Agriculture and Livelihoods in Wedza District

Niang et al. (2014) concluded that the more farmers are involved in adaptation programmes, the more they are able to produce food and use resources sustainably. Those communities that were able to combine drought-resistant farming, community-based water management, and peer-to-peer knowledge sharing in their farming practices exhibited better food security outcomes. The study highlighted the need to base adaptation on community engagement but fell short of discussing the role of community engagement in particular rural districts such as Wedza.

Ncube et al. (2022) found that involving farming communities as active partners in the development of programs and decision-making mechanisms boost the adoption of technologies and enhance farming outcomes. They also identified social cohesion as a key protective factor that helps communities to resist the impact of climate variability, and showed how collective action is an important factor in the stability of livelihoods. The research is, however, restricted to the case of Wedza, and there are questions regarding the way these dynamics work in this case.

Maposa and Sibanda (2023) explored economic benefits of the adoption of improved farming practices in eastern Zimbabwe and the results indicated that the farmers who adopted the improved practices had improved food access and income generation opportunities. There was also more efficient resource use and longer-term thinking about livelihoods in the communities. However, the study's narrower economic lens meant that broader social and ecological dimensions, particularly

important to community level resilience in rural settings such as Wedza, were somewhat under-explored.

The international and regional evidence base collectively attests to the benefits of expanding irrigation, disseminating early warning information, and providing government support of agriculture, in the context of enhancing resilience (Lobell et al., 2011). Less clear, however, is how such strategies can be adapted and successfully applied in the unique institutional, social and ecological context of districts such as Wedza, which is a direct target of this study.

2.5 Summary

Chapter Two has reviewed literature that deals with the link between climate change, agricultural systems and rural livelihoods both in the international context and specifically in Wedza District. The concepts of sustainable livelihoods and climate resilience offered a theoretical lens through which to examine the responses of communities to and their transformation by climate pressures. The review confirmed the serious threats that climate change poses to crop production, livestock keeping and household food security and also showed that literature is limited in providing insight into how these play out at the district level in Wedza. This gap highlights the relevance and need of the current study.

CHAPTER 3: METHODOLOGY

3.0 Introduction

The methodological approach used to guide the investigation on the impact of climate change on agriculture and livelihoods in Wedza District was outlined in this chapter. It provides an account of the philosophical position, research approach and design used and the procedures used in selecting the participants, collecting data and analysing the findings. Research objectives and questions stated in Chapter One guided methodological decisions made throughout the study. A methodology should be sufficiently detailed and transparent to be replicated, maintaining the integrity and credibility of the research process, as Creswell and Creswell (2023) point out. The chapter covers the following elements in order: Research philosophy, methodology, research design, target population, sampling, data collection, instruments, pilot testing, data analysis, validity and reliability, ethical considerations, and limitations.

3.1 Research Design

The study was conducted in a case study design where Wedza District was the bounded unit of analysis. Case study designs are especially suitable for investigations aiming to gain a deep understanding of a phenomenon in its natural context (Yin, 2018). The focus on the specific context of a geographical and social area allowed the researcher to use a range of evidence (interviews, focus group discussions and documentary evidence) and to explore the nature of climate change in Wedza's specific context. Using a variety of evidence sources in a case study, as Bryman (2021) suggests,

increases the validity of findings as patterns can be corroborated between data streams. The choice of Wedza as a research site was informed by the site being described as a rain-fed farming community that is exposed to climate related stressors, thus being very relevant and appropriate for this line of enquiry.

3.2 Target Population

The target population of the study were the smallholder farmers, rural households, community leaders and agricultural extension officers in Wedza District. Deliberate inclusion of these groups was based on their first-hand experience with climate-related issues and their long-term experience of the impacts on agricultural production and household wellbeing. This population is also supported by national statistics that show that Zimbabwe's rural communities are over-reliant on agriculture for subsistence and income generation (ZIMSTAT, 2022). These groups of participants provided a multi-perspectival assessment of the changes in both farming systems and livelihood strategies in the district as a result of climate change.

3.3 Sampling Techniques and Sample Size

Purposive and snowball sampling were used as complementary sampling techniques. In the first case, a purposive sampling method was employed to identify and recruit the participants who had knowledge and direct experience of the issues of climate change and agricultural practice in Wedza (Palinkas et al., 2020). This was achieved through 'snowball sampling' where initial participants could recommend others with knowledge. Thirty subjects were selected for the study, consisting of 15

farmers, 5 community leaders, 5 agricultural extension officers and 5 representatives of non-governmental organizations working in the area. This sample size fits the criteria for qualitative research, where the focus is on depth and quality of information rather than on the statistical representativeness of the sample (Guest, Namey and Chen, 2020).

3.4 Data Collection Methods

Data was collected using a variety of data collection techniques that aimed to capture participants' experience and perspectives on multiple dimensions. Semi-structured interviews gave a platform to people to share their personal experiences on the impact of climate change on their farming and household livelihood. The focus group discussions provided an opportunity for collective reflection, allowing participants to delve together into common experiences and community-level issues. These primary sources were complemented by documentary analysis which offered contextual information from policy documents, institutional reports and previous research. The multi-method approach helped ensure comprehensiveness of data and increase the credibility of findings through cross-referencing across the various types of evidence.

3.5Primary Data

The primary data were collected using semi-structured interviews and focus group discussions with the respondents all over Wedza District. The methods were chosen because they enable the participants to express their experiences in their own words and

at their own speed and can yield highly meaningful and contextually rich data (Creswell and Creswell, 2023). One-on-one interviews were held with farmers, community leaders, and agricultural officers, each taking about 15 to 20 minutes, and using open-ended questions that allowed farmers to share their experiences of drought, crop failures, and livestock deaths (Silverman, 2022). Farmer groups participated in focus group discussions (FGDs), each of which lasted about 90 minutes. The group format allowed the participants to discuss and co-construct meaning, which resulted in insights that may not have been achieved in the individual interviewing format. All in all, these approaches produced a wealth of primary data that could be used to explore the effects of climate change on agriculture and livelihoods systems in Wedza.

3.6 Secondary Data

Secondary data was collected by systematically analysing policy documents, governmental records, institutional reports and peer-reviewed academic literature pertinent to the issues of climate change and agricultural development in Zimbabwe. Documentary analysis is a useful complement to the data collection in the field as it can put into perspective the research findings within a wider historical and policy context, and longer-term trends and patterns can be identified (Flick 2019). The key sources studied were the National Climate Policy (2017) of the Republic of Zimbabwe and the IPCC Assessment Reports (2021) which gave a basis of how the climate change was being conceptualised and addressed at the national and international levels respectively.

The use of secondary data also had a valuable comparative function as it enabled

the researcher to determine the extent to which official policy commitments matched those of farmers in the field. The use of documentary evidence and primary data collected from field work makes research more reliable as Bowen (2020) posits, it allows for triangulation between different sources. The secondary data thus obtained gave the research context and provided a foundation for a critical examination of the adequacy of the current responses to climate change in Wedza and other rural areas.

3.6.1 Research Instruments

Two main instruments, namely, a semi-structured interview guide and a focus group discussion guide, were used to assist with data collection. The interview guide included open-ended questions aimed at obtaining detailed personal experiences of the effects of climate change on farming and household livelihoods, and to give the respondents flexibility to steer the discussion towards the aspects of the experience that were most relevant to them (Kumar, 2022). The focus group discussion guide was used in a complementary way to guide the discussion and allow for some flexibility in a group discussion around common challenges including drought, diminished harvests, and livestock losses. Both instruments were designed based on the literature and were clearly related to the research objectives of the study. Before the main data collection period, the instruments were pilot tested to determine if it was clear, logical and appropriate for the target population. The questions were revised to make them more accessible and precise, based on feedback from the pilots, which led to a better-quality data collection process.

3.6.2 Pilot Testing of Instruments.

A pilot test was conducted with a small group of farmers and one agricultural extension officer from neighboring area outside the main study area before main fieldwork was initiated. The aim of the pilot was to determine if there were any ambiguous, weak spots, or points of confusion in the research instruments. Several questions were revised and the order of the questions was adjusted to enhance the coherence and flow of the instrument based on participant feedback. Pre-testing research instruments, as Maxwell (2021) explains, is an essential quality assurance measure that provides insights into the problems that may arise in the actual research process and enhances the validity and reliability of the research instruments.

3.7 Data Analysis

Thematic analysis was used as the main approach to analysis, which has proved useful in identifying, organising and interpreting patterns of meaning within qualitative data (Braun and Clarke, 2019). The analytical process was carried out in phases: the interviews and focus group were fully transcribed; the transcripts were read multiple times to become familiar with the data; initial codes were identified by looking for recurring ideas and significant expressions; related codes were grouped together; and themes emerged such as: impact of climate change on crop systems, impact on livestock, and coping strategies of households. Throughout the interpretation of these themes was directed to the study's research aims, thus giving focus and coherence to the analysis.

3.8 Validity and Reliability

A number of measures were taken to ensure the trustworthiness of the findings of this study. Triangulation was used to check the patterns generated by comparing the data obtained from the interviews, focus group discussions and the documentary sources. Member checking involved the return of preliminary findings to a sample of the participants and asking for comments on the accuracy and adequacy of the interpretations. An extra layer of scrutiny was added through peer review by research supervisor, which helped to ensure consistency in the application of analytical procedures. All these measures together meet the criteria for trustworthiness in qualitative research as stated by Lincoln and Guba (2019) which are credibility, dependability, and confirmability.

3.9 Ethical Considerations

The study was carried out in line with accepted ethical principles such as informed consent, confidentiality, voluntary participation, and respect of the dignity of all the participants. Before fieldwork, approval from Midlands State University Research Ethics Committee was obtained. The purpose and scope of the study were explained to all participants, along with the fact that their participation was voluntary and they could withdraw at any time without penalty. Transparency was used in the explanation of the intended use of the data. The participants' names were coded with pseudonyms to maintain their anonymity in the data collection and reporting. For participants who needed communication support (e.g., sign language interpreter or simplified materials),

appropriate accommodations were made in accordance with international best practices for inclusive research (World Health Organization, 2022).

3.10 Limitations and Contingency Plans.

There were several foreseeable limitations to the study. Access to some households in Wedza District was a challenge due to geographic dispersal and poor road connectivity in some areas. Also, because much of the data used in the study were self-reported, socially desirable or otherwise biased responses could not be completely ruled out. To overcome these difficulties, the researcher connected with local leaders and partner organisations to allow access to more remote participants. Language barriers were overcome by using trained interpreters as needed and the multi-method data collection design allowed for the cross-verification of findings, lessening the need to depend on any one source or participant account.

3.11 Summary

The methodological bases and procedural design of this study on climate change and its implications for agriculture and livelihoods in Wedza District has been outlined in this chapter. An interpretivist philosophy, qualitative methodology, and case study design were identified as being the most suitable to investigate the lived experiences of farming communities in this context. The chapter described how the participants were selected, sampling procedures applied and instruments used in collecting primary and secondary data. Analytical procedures, quality assurance procedures, and ethical safeguards were also described. Chapter Four will then move on to present and analyse

the empirical findings produced in the process of this methodology.

CHAPTER FOUR

4.0 DATA PRESENTATION AND ANALYSIS

4.0 Introduction

This chapter presents and analyses data on the impact of climate change on agriculture and livelihoods in Wedza District. It explains how the findings were collected from the field focusing on how climate change affects crop production livestock and food security. The chapter presents the data using thematic analysis and interprets the findings based on the research objectives and existing literature. It also highlights the main challenges and opportunities faced by farmers in adapting to climate change.

4.1 Demographic Data

This section presents the demographic characteristics of the respondents in Wedza District. The data includes age, gender ,level of education type of farming activities and years of experience in farming. This information helps to give a clear understanding of the background of participants and how their characteristics influence their experiences of climate change and its impact on agriculture and livelihoods.

Table 1.1 Demographic Data of Respondents

Variable	**Category**	**Frequency**	**Percentage(%)**
Gender	Male	18	60.0
	Female	12	40.0

Age distribution	18-25 years 26-35 years 36-45years 46years and above	5 9 8 8	16.7 30.0 26.7 26.7
Farming experience	Less than 5years	6	20.0
	More than 10 years	14	46.7
Type of farming	Crop farming	16	53.3
	Livestock farming	6	20.0
	Mixed farming	8	26.7
Level of education	Primary education	9	30.0
	Secondary education	14	46.7
	Tertiary education	7	23.3

Source : Author (2026)

4.2.1 Gender of Respondents

The findings showed that male respondents were more than female respondents in Wedza District.The difference suggests that men are more involved in farming activities and decision making related to agriculture. Women also take part in farming but their participation is often limited by household responsibilities and cultural expectations.This reduces their involvement in activities that deal with climate change and farming decisions.

Women in rural areas face challenges such as limited access to and resources and information which affects their participation in agriculture FAO 2017.Agarwal 208 also

explains that social and cultural factors often limit women's involvement in decision making.This means that gender differences affects how people experience and respond to climate change.Therefore there is need to support both men and women equally in adapting to climate change in Wedza.

4.2.2 Age Distribution of Respondents

The results showed that most respondents were in the economically active age group in Wedza District. This means that many participants are able to work and take part in farming activities. Their age shows that they have the ability to contribute to agriculture and adapt to climate change. Challenges such as lack of resources and climate shocks can reduce their productivity.

People in the active age group have greater ability to adopt new farming methods and respond to environmental changes(Sen,1999).According to Mitra (2014), participation depends on the opportunities and support available to individuals. This means that when farmers are supported with resources and knowledge they can improve their response to climate change. The findings show that farmers in Wedza can improve agriculture and livelihoods if they are given proper support and opportunities.

4.2.3 Type of Farming Activities

The study showed that respondents were involved in different types of farming activities with crop farming being the most common in Wedza District. This may be because crop farming is the main source of food and income for many households.

Some farmers were also involved in livestock and mixed farming. The lower number of livestock farmers may be due to challenges such as water shortages and lack of grazing land caused by climate change.

Farmers often depend more on crop farming even though it is highly affected by rainfall changes and droughts FAO 2017. Research by Morton 2007 explains that climate change increases risks for farmers who rely on one type of farming. This shows the importance of mixed farming as it can help reduce risk and improve livelihoods. The findings highlight the need to support different farming activities so that farmers in Wedza can better cope with climate change.

4.2.4 Level of Education

The findings showed that most respondents had secondary education while a smaller number had primary or tertiary education in Wedza District. Farmers with higher levels of education showed better understanding of climate change and were more confident in using new farming methods. Education helped them to access information about weather patterns farming techniques and ways to reduce climate risks.

Research shows that education improves knowledge and helps farmers make better decisions about agriculture FAO 2017. Freire 1970 explains that education empowers people to understand challenges and take action. This means that farmers with more education are more likely to adapt to climate change and improve their livelihoods. The findings suggest that improving access to education and training can help farmers in

Wedza respond better to climate change.

4.2.5 Farming Experience in Wedza District

The study found that most respondents had many years of farming experience in Wedza District. This helped them to understand local weather patterns and changes in rainfall over time. Farmers with more experience were more confident in making farming decisions and trying different ways to cope with climate change. They also had better knowledge of traditional farming practices that help during drought periods.

Studies show that experience helps farmers to adapt better to environmental changes and improve decision making FAO 2017According to Putnam (2000),long term involvement in a community helps people build knowledge and strong networks. This means experienced farmers are more likely to share ideas and support each other. The findings show that farming experience is important in helping communities respond to climate change but it should be supported with modern knowledge and resources.

4.3.1 Examining the Impact of Climate Change on Agriculture and Livelihoods in Wedza District

The results revealed that climate change has impacted on agriculture and livelihoods of Wedza District. Many farmers said that the rains have become unpredictable and this has affected the production of crops. One respondent commented “Rain comes late and stops early hence our crops are not growing well” (R1). This shows that changes in

rainfall patterns are affecting farming activities. According to Lobell et al 2011, crop yields are sensitive to temperature and rainfall changes, particularly in regions where rainfall is the primary source of water. The results indicate that farmers of Wedza are suffering serious problems in the production of their crops as a result of the changing climate.

Farmers also reported that drought occurs more frequently than ever before, impacting on crops and livestock. One respondent said: “We lose crops and sometimes our cattle die because there is no water” (R2). This indicates that the lack of water is a significant issue in the region. Niang et al 2014 explain that drought increases food insecurity and reduces agricultural productivity in Africa. The results thus indicate that climate change has an impact on agriculture and food security in Wedza District.

The availability of resources was also recognized as a problem. Some farmers indicated that they have insufficient inputs and equipment including seeds, fertilizers, and irrigation. One participant said “Even if we want to adapt we do not have the resources to do so” (R3). This indicates that limited resources affect farmers' coping capacity to climate change. The challenges for small scale farmers in adapting due to lack of support and technology are highlighted by Morton 2007. The results indicated that there is a need for more support to enable farmers to improve their production.

Knowledge and information on climate change also determined farmers' response to the impact of climate change. One respondent commented “We hear about climate change but we do not always know what to do” (R4). This demonstrates that there is a

lack of knowledge which hinders effective adaptation. According to the research conducted by FAO 2017, farmers are able to make better decisions and improve the farming practices with access to information. The results indicate that training and awareness creation needs to be done in Wedza District.

Some farmers were attempting to adjust by adopting new practices like planting drought resistant crops and adjusting dates. One farmer reported “We now are planting early and using small grains and maize is no longer reliable” (R5). This demonstrates the ability of farmers to adapt to climate change. Research indicates that adaptation measures can lead to greater resilience and lower risks (Lobell et al 2011).

However not all farmers are able to adopt these strategies due to limited resources.

Livelihoods were also affected by climate change. Poor harvests were reported to have led to income losses in some households. One respondent stated “When crops fail we have no money and life becomes difficult” (R6). This indicates that climate change impacts food and livelihoods. Niang et al 2014 explain that climate change makes rural communities poorer. The results indicate that climate change is an environmental issue as well as a social and economic issue in Wedza District.

Social support and community cooperation also played an important role in coping by farmers. One respondent commented: “We support each other with food and farming ideas when times are tough” (R7). This demonstrates community networks' contribution to coping with climate challenges. According to Putnam 2000, social support enables communities to face challenges. The results indicated that there is a

need to enhance cooperation in the community to enhance resilience in Wedza District.

Lastly, there was a strong need for support from government and organisations expressed by farmers. One respondent indicated ‘We need support in water projects and farming inputs to sustain' (R8). That's an indication that farmers are interested in concrete support to be able to adapt to climate change. Based on the findings it is recommended that policies should target the provision of farmers' resource training and infrastructure provision in Wedza District.

4.3.2 The challenges faced by agriculture and livelihoods in Wedza district

The results indicated that farmers are faced with a number of climate change-related problems in Wedza District which impact on farming systems. One respondent said “We depend on rain but now the rain is not reliable” (R1). This indicates that rainfall variations hinder the farmers in planning their farming activities. Lobell et al 2011 studies show that with the change in rainfall, production of the crops is also reduced in the region which relies on rain fed agriculture. Results indicate that one of the major problems that are faced by farmers in Wedza is unreliable rainfall.

Water shortage is another big problem. One respondent replied ‘There is not enough water for crops and animals' (R2).This indicates drought and water scarcity impact both agricultural and animal husbandry. Niang et al 2014 state that scarcity of water contributes to food insecurity and decrease of agricultural productivity. The results indicate that water scarcity is a serious issue in Wedza District.

Access to agricultural inputs was also pointed out as a problem. One farmer said, “We are lacking in seeds fertilizer, equipment” (R3.). This indicates that the farmers are facing the problem of not having resources to be able to increase their production. Small scale farmers have a hard time adapting to climate change due to lack of support and technology as explained by Morton 2007. The results indicate that the farmers lack resources for enhancing their farming.

Negative attitude and beliefs of new farming techniques were also noticed. One respondent said “Some people do not trust new farming methods” (R4). This indicates that there is a poor adoption of new farming practices among some farmers. As stated in FAO 2017, limited adaptation may be caused by lack of awareness and resistance to change. The results indicate that awareness programmes are required in order to educate the farmers with new technique.

Farming was also impacted by lack of knowledge of climate change. One farmer said “We do not have enough information on how to deal with climate change” (R5). This indicates that insufficient knowledge diminishes farmers' capacity to deal with climate challenges. Studies indicate that farmers who have access to information are able to make better decisions and enhance productivity (FAO 2017).

The other challenge was lack of infrastructure. One respondent responded that “Bad roads make it difficult to transport our crops” (R6). This is an indicator of the impact of the lack of road and transport infrastructure on access to markets and on income. Research indicates that inadequate infrastructure is a constraint to agricultural growth

and to the profitability of farmers. The results indicate that infrastructure development can be beneficial to farmers in Wedza District.

Lack of support from government and organizations was also mentioned by some farmers. One respondent stated that they are not supported enough during droughts (R7). This indicates that there is a need for increased support to help farmers adapt to climate change. Support systems play a critical role in farmers' adaptation to climate risks, as Niang et al 2014 describe.

Finally farmers made the point that all these problems are inter-related. “Climate change makes everything difficult for us” (R8) one participant said. This indicates that the impact of climate change is on a lot of the farming and livelihood aspects. The findings indicate that there is a need to tackle the various challenges simultaneously to enhance agriculture and livelihoods in Wedza District.

4.3.3 Effectiveness of Climate Change Adaptation Policies and Support Mechanisms in Wedza District

The results indicate that there are policies and programs for supporting farmers to cope with climate change in Wedza District, but these are not very effective in practice. One respondent said “We hear about the government programs but it is not to all the farmers” (R1.). This indicates a policy disconnect between policy will and policy action. World Bank 2019 is a policy description of what is effective with policies only effective when properly implemented and reaching the intended beneficiaries. The results

indicate that the impact of the climate change policies is less in Wedza District due to weak implementation.

Lack of awareness of climate change programs was also found to be a challenge. One respondent said “Many farmers do not know about available support programs” (R2). This indicates that the lack of communication is a restriction to access to support. Access to information is a key element for farmers to take advantage of agricultural support programs as described in FAO 2017. The results indicate a need for awareness campaigns to enhance the access to interventions for climate change.

Some of the respondents said that there are improvements in support compared with the past. One on one said “We are now getting some training on climate smart agriculture” (R3). This indicates that an attempt is being made to enhance farmer's knowledge. The United Nations (2019) highlights the significance of training and capacity building for communities' adaptation to climate change. But the results indicate that coverage is still limited.

Some farmers also doubted about the effectiveness of support mechanisms. One respondent indicated “We attend meetings but we do not always get the support we are promised” (R4.). This shows that there is a gap between discussions and actual delivery of support. Cornwall 2018 writes that the lack of real benefits in participation leads to a lack of trust in institutions. The results indicate that farmers require practical support in addition to meetings and consultations.

Monitoring and follow up mechanism was also identified as weak. There was a statement from 1 respondent which was “There is no follow up after training or meetings” (R5.). This indicates that without monitoring, programs are less effective. According to OECD 2020, monitoring and evaluation is a key element to enhance service delivery and accountability. The results indicate that there is a need for improved monitoring systems in Wedza District.

Availability of support services was another issue. Some programs are far and we can't easily reach them” (R6) said one farmer. This indicates that distance and transport issues also restrict access to climate change support. WHO 2018 states that accessibility is a key component for good service delivery. The results indicate the need to move support programmes towards rural farmers.

Some respondents pointed to positive changes, despite these challenges. One participant said “We are now learning better farming methods than before” (R7). This indicates that there are some farmers benefiting from the climate change initiatives. FAO 2017 clarifies that better knowledge equips farmers with better adaptation to climate risks. This indicates that there is some improvement but there is still a need for improvement.

At last, the respondents highlighted the need for more government support. One respondent said “We need more assistance on inputs and irrigation to cope with droughts” (R8). This indicates that there is a need for practical support to farmers in response to climate change. The results indicate that for effective climate change

policies in Wedza District, emphasis should be placed on implementation awareness and provision of resources to enhance agriculture and livelihoods.

4.3.4 Strategies towards improving Climate change adaptation in Agriculture and Livelihoods in Wedza District

The study found that adaptation to climate change in Wedza District can be improved with practical adaptation strategies that can help the farmers to adapt to the changing climate. One respondent proposed “The farmers needs to be sensitized periodically to address climate change” (R1). This indicates the need for ongoing training to enhance farming knowledge and skills. According to FAO 2017, capacity building supports farmers to better understand climate risks and to change their farming practices. The results indicate that there is potential for training to enhance agricultural productivity and resilience in Wedza District.

Access to improved farming inputs was also pointed out as an important strategy. A respondent said “We need drought resistant seed and fertilizers to improve harvests” (R2). This demonstrates how the provision of climate smart inputs can support farmers' adaptation to climate change. According to World Bank 2019, access to inputs boosts productivity and lowers vulnerability to climate shocks. The results thus indicate that support from government and partners to farmers should be given in terms of providing resources to the farmers.

Another important measure was the improvement of irrigation systems. One farmer

explained “If we had proper irrigation we would not depend only on rain” (R3). This highlights the importance of water management in coping with drought. According to Niang et al 2014, irrigation lessens the effects of rainfall variability on agriculture. The results indicated that investing in water infrastructure can be used to enhance the farming systems in Wedza District.

Awareness and information sharing were also found to be useful strategies. One respondent said “We need more information about weather patterns and farming methods” (R4). This demonstrates how timely information can aid farmers' decision making. According to FAO 2017, the climate information services help in planning and adaptation. The results indicate that communication systems need to be improved in rural farming communities.

The adoption of new technologies in farming was also referred to. One respondent said “Modern farming techniques can enable us to be productive even in tough times” (R5). This demonstrates how resilience can be enhanced through innovation. According to World Bank 2021, technology contributes to efficiency and climate adaptation in agriculture. The results indicate that farmers should be promoted for adopting modern and climate smart technologies.

Cooperation among the community was also found to be helpful. One responder indicated “We support each other with ideas and resources in bad times” (R6). This indicates that social support networks enable farmers to deal with climate challenges. Putnam 2000 says that "good social networks strengthen community resilience and

collective problem solving. Based on the findings, it was recommended that farmer groups need to be strengthened to enhance the adaptation in Wedza District.

It was also noted that collaboration with government and organizations is a key element. One respondent commented “We need support from government and NGOs to survive climate change” (R7). This indicates the need for external support for successful adaptation. Partnerships are at the heart of United Nations Development Programme 2020 for enhancing resource mobilization and development programme implementation. The results indicate that stakeholder collaboration can enhance the climate resilience of the society.

Respondents highlighted the need for monitoring and evaluation of climate programmes. One respondent commented, “Let's find out if these programs are actually benefitting farmers” (R8).This demonstrates effectiveness of interventions with regular assessment. Monitoring, as explained in Organisation for Economic Co-operation and Development 2020, helps to make development programmes more accountable and improve results. The results indicate that ongoing assessment is needed to enhance the adaptation to climate change in Wedza District.

4.4 Discussion of Findings

4.4.1 Structural and Environmental Challenges Affecting Agriculture and Livelihoods in Wedza District

The study revealed that structural issues like poor farming system and inadequate

support services are significant factors affecting agriculture in Wedza District. The farmers said that they rely primarily on rain-fed farming and they are vulnerable to climate change. One respondent clarified that rainfall is no longer predictable, impacting on crop production. This is corroborated by Morton 2007, who claims that small scale farmers in Africa are very vulnerable because of their reliance on rain fed farming systems. This from the researcher's point of view demonstrates the need to build up more climate adaptation structures in agricultural systems in Wedza to decrease vulnerability.

Another major problem was also the lack of access to farming inputs like seeds, fertilizers and irrigation facilities. Farmers indicated that they are unable to improve production due to limited support. This is in line with World Bank 2019 which mentions that the shortage of agriculture inputs hampers farmers' capacity to adapt to climate change. The results indicate that the productivity of the agriculture sector in the rural communities is still being affected by the lack of resources. The researcher considers this as a great structural constraint in effective climate change adaptation in Wedza District.

Respondents also reported on a range of environmental issues, including drought and irregular rainfall. Farmers said the extended periods of dry weather have affected their crops and livestock production. This is in line with Niang et al 2014 who state that climate variability contributes to an increase in food insecurity and agricultural losses in Sub Saharan Africa. Lack of adaptive capacity compounded by environmental risks,

social model of vulnerability. The researcher thus notes that climate change is a problem not only environmental but also livelihood problem in Wedza District.

Study also found attitudinal and knowledge based challenges. A few farmers reported that they do not have adequate awareness on climate change and its effects. This is consistent with FAO 2017 that limited awareness hinders farmers' capacity to implement climate smart practices. The results indicated that there are gaps in knowledge which affect the effective decision making in the agriculture sector. The researcher has concluded that enhancing climate education and awareness is crucial for boosting farmers' resilience.

Internal capacity constraints were also cited, with some farmers indicating that they were not confident in using the new farming techniques. This is consistent with the results of Moyo and Nhemachena (2020) who state that rural farmers' adaptation is limited due to their lack of skills and exposure. This means people continue to use old farming techniques even if they are no longer viable. The researcher feels that this indicates that empowerment programs are needed to boost the confidence and hands on skills of farmers.

The study identified that the poor institutional support and limited extension services are drivers of poor climate adaptation. Farmers identified that government and support organisations are not always able to effectively reach farmers. This is in the line with the World Bank 2021, which highlights the importance of strong extension systems to climate resilience. The researcher therefore concludes that institutions support and

service delivery is important in improving agricultural sustainability in Wedza District.

4.4.2 Climate Change Adaptation Policies and Mechanisms Effectiveness in Wedza District

The study revealed that although there are climate change policies and programs in Wedza district, their implementation is weak. Farmers indicated that the implementation of many programs is “on paper” and not in practice. One respondent said that although there are plans in the government, these are not fully implemented at the community level. This finding is in line with Banda and Mavunga (2020), who state that the policy implementation process is ineffective due to the gap between the policy and implementation. This indicates that from the researcher's point of view, policies are not sufficient if they are not accompanied by proper implementation and follow up systems.

Additionally, the study found that farmers have low awareness of the policies and support programs related to climate change. A large number of respondents said they are not well-versed in government and NGO initiatives. This aligns with Nyathi and Dube (2021) who identified that awareness has a negative impact on the effectiveness of agricultural support programmes in rural Zimbabwe. The researcher assumes this as a communication gap that hinders the farmers in accessing the benefits from climate change interventions. Farmers need to be well-informed to be able to participate at full length in adaptation programs.

Some said that they do attend meetings and training sessions, but did not have much influence on decisions. One farmer stated that he goes to meetings but that any suggestions he makes are disregarded. This is consistent with Arnstein 1969 notion of tokenism (no real power). Thomas and Devlieger 2020 also state that symbolic participation undermines trust in institutions. The researcher notes that farmers' voice needs to be heard in the decision making process and not merely consulted to achieve meaningful climate adaptation.

Climate change programmes were also found to be a challenge in terms of accessibility. Farmers said that training and support services are rarely available in rural areas and often are not developed to meet the needs of farmers. This is consistent with Mutasa and Chikoko 2022 who point out that lack of communication and access constraints hinder rural development participation. The researcher's point of view is that climate change programs should be developed so that they can be accessible and inclusive to all farmers. Other vulnerable groups continue to be out of key support structures.

Weak monitoring and accountability systems in climate change programs were pointed out by the respondents. Lack of follow up after trainings or resource distribution was reported by farmers. This corroborates the findings of Zinyemba and Moyo (2021) who observe that implementation of rural development programs is less effective when there is weak accountability. The researcher concludes that there is need to have a good monitoring system to ensure that climate change policies are implemented and farmers

in Wedza District are benefiting from the policies.

4.4.3 Recommended Strategies for Agriculture and Livelihoods to Improve Climate Change Adaptation in Wedza District

The results show that regular training of farmers on adaptation to climate change can enhance productivity and resilience in farming. Respondents indicated that training for farmers on how to adapt to drought and shifting rainfall patterns is recommended. This is consistent with Kimani (2020) which states that trainings enhance farmers' decision-making and the adoption of climate smart agriculture. On the researcher's side training assists the farmer to grasp the changes in the environment and react accordingly. Thus, there is a need for continuous education programmes that will support the climate resilience in Wedza District.

Access to improved farming inputs such as drought resistant seeds and fertilizers was also recommended as a key strategy. Farmers reported that improved inputs would help them to withstand the poor rainfall situation. This is corroborated by Ncube and Nyathi 2021 who state that access to agricultural inputs enhances productivity and minimizes vulnerability to climate shocks. The researcher observes that farmers are unable to implement adaptation strategies in full due to lack of resources. Hence, it is important to ensure timely provision of farming inputs to rural farmers by government and partners.

The other highlights were increasing irrigation efficiency. Respondents indicated

that irrigation would have the effect of decreasing reliance on rainwater and enhancing food production. This is in line with United Nations 2020 which emphasizes irrigation systems as vital in the agriculture adaptation to climate change. The researcher reads this as a long-term solution which can help stabilize the farming activities in the context of climate variability. Thus, investment in water infrastructure is required for sustainable agriculture in Wedza District.

The enhancement of access to climate information and awareness was also emphasized. Farmers suggested that farmers should get regular weather forecasts and farm information. This aligns with Mwangi and Achieng (2021) who reported that access to information enhances the adaptation capacity of rural farmers. Information is enabling farmers to make decisions from the researcher's point of view. Thus, improving extension service and communication systems are crucial for climate resilience.

Promotion of modern and climate smart farming technologies was also suggested. Respondents reported that new farming practices can be used to increase yields even in the challenging conditions. This is in line with FAO 2017 which has indicated that technology increases the efficiency and adaptation in agriculture. The researcher thinks that promoting innovation will lessen climate change effects on agriculture. Hence the need to assist the farmers in adopting modern farming practices.

Another recommendation was to improve cooperation within the community. Farmers described how information and sharing of resources is needed for coping in

hard times. These findings are backed by Tendai and Masunda 2022 which state that community networks contribute to resilience against environmental challenges. This is seen by the researcher as a significant social adaptation strategy. Thus, farmer groups and farmer cooperatives should be strengthened for collective action.

Lastly Respondents highlighted the need for increased government and NGO support in climate change programmes. Farmers reported that constant support is required in inputs irrigation and training. This is in line with the World Bank 2019 that emphasizes the need for institutional support for climate adaptation. Successful implementation of climate policies requires good stakeholder collaboration from the researcher's point of view. Hence, there is a need to strengthen partnerships to assist farmers of Wedza District.

4.4.4 Chapter Summary

This section systematic presented and analysed the findings on climate change impacts on agriculture and livelihoods in Wedza District in accordance with the objectives of the study and the research questions. Data were analysed using thematic organisation for easy understanding and interpretation. Qualitative data was analyzed using the method of thematic analysis to form key patterns and experiences of farmers. The results revealed that there was significant evidence of the impact of climate change on crop production, livestock farming and household livelihoods. They also pointed out the key problems that farmers have to deal with and how they cope. In the previous chapter, the chapter has demonstrated how the data addresses the research questions

and serves as a solid foundation for the conclusions and recommendations in the following chapter.

5.0 CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the key conclusions of the study of the impact of climate change on agriculture and rural livelihoods in Wedza District. It brings together the major points and findings from the previous chapters, presents the findings from the empirical evidence and places these findings in the context of the overall problem that has driven the study, namely that changing climatic conditions are threatening the viability of crop production, livestock keeping and household welfare in the district. The chapter also provides a series of concrete recommendations for issues that can be tackled to improve adaptive capacity and promote more resilient rural livelihoods. It concludes with suggestions for future research that will help advance the field and further the understanding of the effects of climate change and the potential for community-level action.

5.2 Summary

This section provides a summary of the study and the key conclusions derived from the study. It restates the purpose and goals of the research and explains how these guided the direction and conduct of the research. The main findings on changing rainfall patterns, increased drought, reduced productivity in agriculture and impacts on household livelihoods are incorporated into the section. It also explores the challenges faced by farmers and the community's response. In so doing, it provides the basis for

the conclusions and recommendations that follow.

5.2.1 Findings

The aim of this study was to find out the extent to which climate change is affecting agricultural production and rural livelihoods in Wedza District. Chapter One provided the general background and showed how an increasing of climate variability, through changing rainfall patterns, more frequent droughts and increased ambient temperature, has increasingly affected smallholder agriculture and household welfare in the district. The chapter also included the research problem, objective and questions, significance of the study, and the conceptual approach that was used to analyse climate variability and vulnerability of livelihoods.

Chapter Two explored the literature related to climate change and its impact on agriculture and livelihoods, both globally, regionally and in Zimbabwe. It explored key theoretical concepts and referred to empirical studies on impacts including livelihood diversification in response to climate change, diminished crop productivity, food insecurity and declining water availability. An observation which was made throughout the review was the lack of scholarly interest on localized climate impacts in the smallholder communities in Zimbabwe and this was the basis for the choice of Wedza District for the focus of this study.

In Chapter Three, the methodological framework that underpins the research was presented and justified, including the qualitative approach adopted, case study design,

selection of the study site and the selection of the participants, data collection instruments used and the data analysis processes adopted. The chapter also included discussion of the ethical issues related to the engagement of the participants and the methods used to assure the credibility and dependability of the research findings.

The empirical results were presented in chapter Four in relation to the research objectives and questions. The evidence validated the fact that climate change has significantly affected the agricultural performance in Wedza with drought conditions, unreliable seasonality of rainfall and heat stress all contributing to reduced agricultural yields and the disruption of livestock systems. The agricultural losses have reduced household incomes and increased food insecurity in rural areas of the district. The chapter also reported the diversity of adaptation responses that are being implemented such as crop diversification, small-scale irrigation and the shift to alternative income activities, and noted that these adaptation responses are limited by resource availability, a lack of access to climate data, and infrastructural gaps.

5.2.2 Summary of Findings

The study yielded clear evidence that climate change is negatively impacting agriculture and livelihoods in Wedza District, with a significant and persistent impact. Consistent reports of reduced harvests due to irregular rainfall, longer dry spells and rising temperatures were reported. The livestock system was also impacted, with decreased pasture cover and water availability leading to reduced productivity and survival. These compounding agricultural losses have resulted in greater food insecurity,

limited income sources and overall vulnerability of rural households, which is backed by existing literature on how smallholder farmers face a disproportionate exposure to climate variability, relying almost entirely on rain-fed farming systems and having limited adaptation resources (IPCC, 2022; Morton, 2007).

The research also identified that the impacts of climate change are not equally shared in the community, and that socioeconomic status and access to adaptive resources have a strong influence on the vulnerability at the household level. Households with relatively high financial and material assets had better capacity to adopt mitigation measures such as additional irrigation, livestock management, and livelihood diversification, while households with low financial and material resources had limited ability to continue farming despite the climate pressures. This finding is in line with the prevailing academic view that climatic exposure vulnerability is shaped not just by the extent of exposure to climatic hazards, but also by social and economic conditions that affect adaptive capacity (Adger, 2006; Ribot, 2011).

Meanwhile, the research captured various adaptive strategies being adopted by farmers throughout the district. These included the cultivation of drought-tolerant seed varieties, the cultivation of different crop varieties to diversify risks, small scale irrigation and diversification into non-farm activities like seasonal labor migration and informal trading. Although these answers are clearly ingenious, they are limited by ongoing financial constraints, lack of access to timely and relevant climate information, and lack of irrigation infrastructure development. The overall conclusion is that

although adaptation is actively taking place in Wedza, the adaptation efforts are not yet adequate to fully offset the losses caused by climate variability.

The study also found a clear set of strategic directions that have the potential to significantly enhance adaptive outcomes of farming households in the district. These focus on the mainstreaming of climate-smart agricultural practice (CSA) such as conservation agriculture, drought-tolerant varieties, and water-saving technologies, and on the development of climate information services and early warning systems accessible to farmers and capable of informing decisions on their farms. Access to financial instruments and agricultural inputs support was also identified as a key enabling factor for increasing resilience at the household level. Altogether, these strategies align with adaptation priorities highlighted in international development agendas, such as the need to decrease structural vulnerabilities, increase adaptive capacity and embed livelihood resilience in smallholder communities (IPCC, 2022; FAO, 2019). Evidence clearly indicates the need for a coordinated and multi-stakeholder involvement to minimise the impact of climate change on agricultural and livelihood activities in Wedza.

5.3 Conclusions

This section summarizes the conclusions based on the results of the study as they relate directly to each of the research questions that guided the study.The evidence is clear and the conclusion is that there has been measurable loss of productivity in agriculture in Wedza District due to climate change. Seasonal rains have been erratic,

dry spells have been more frequent and temperatures have been higher, which has reduced yields and production rates for crops and livestock, leading to a decline in household livelihoods and food security in the district. The data clearly show that local agriculture is very vulnerable to climate variability, and that this vulnerability has significant implications for rural household welfare.

Another finding is that vulnerability to climate change in Wedza is not equal. Households without productive resources, such as irrigation, quality inputs and diversified sources of income are far more vulnerable to the negative impacts of climate change than those with more material resources and social assets. This difference highlights the social nature of adaptive capacity and the impact of socioeconomic inequality on climate resilience.

The study also finds that although farmers in Wedza are adapting (adopting drought-tolerant varieties, small-scale irrigation, and pursuing other livelihoods), they are doing so under the threat of resource depletion, lack of access to climate information and weak institutional support. The consequence is that adaptation is still incomplete and inadequate to make up for the agricultural losses that are being caused by climate change.

The findings validate that a coordinated and sustained package of interventions will be needed in order to meaningfully tackle the effects of climate change in Wedza. They should involve increased access to climate information services; more rapid uptake of climate-smart agricultural practices; investment in irrigation infrastructure; and

increased institutional support of the smallholder farmers. Without such interventions, the district's agricultural systems and rural livelihoods are likely to keep declining over time.

5.4 Recommendations

The recommendations in this section are based on the findings and conclusions of the study, and are directed toward each specific research question that guided the study. Their overall goal is to enhance climate resilience and boost agricultural outcomes for the rural farming communities of Wedza District.

Considering the observed effects of climate change on agricultural crops and livestock, the study suggests that there is a need for systematic promotion of climate-smart agricultural practices in this district. The extension and adoption of drought-tolerant crop varieties, the scale up of conservation agriculture and farm-level soil and water management should be given priority. Agricultural extension services need to be strengthened and reoriented for these practices, so that farmers can have hands-on knowledge and skills to continue producing in a context of increasingly variable climatic conditions.

Targeted support to the resource-poor smallholder farmers is recommended to meet the unequal exposure to vulnerability among households. There is need to include concrete measures such as provision of agricultural inputs at subsidized rates, increase access to irrigation infrastructure, and creation of climate adaptation financing mechanisms accessible to low income farming households. Such interventions would

help to level the playing field and help more of the farm population access and adopt effective adaptation strategies.

The study calls for substantial investments in accessible and reliable delivery of climate information to enhance the practical effectiveness of adaptation strategies. Early warning systems should be strengthened, and their messages should be communicated to the rural communities via community radio, mobile phone platforms, agricultural extension networks, etc. Better access to actionable climate information would provide farmers with more informed choices on planting dates, crop choices, and livestock management to minimize losses from climate.

The study suggests more coordinated and continuous efforts from the government institutions, non-governmental organizations and local community organizations to tackle the effects of climate change in the district. Development of irrigation infrastructure, integrated rural livelihoods, and support for livelihood diversification, especially for households with the most severely affected agricultural base, should be priorities for investment. Building up these systems in a coherent and sustained way is crucial if Wedza communities are to gain the adaptive capacity they need to cope with present and future climate pressures.

5.4.5 Recommendations for further research

Future studies should expand the study of the impact of climate change on agricultural systems and rural livelihoods to other agro-ecological zones in Zimbabwe

to determine how far the Wedza results are representative of the impact of CC on agriculture and rural livelihoods in Zimbabwe or are specific to the agro-ecological and social context of Wedza. Longitudinal research designs would be particularly beneficial as they would enable to trace changes in agricultural productivity, household resilience and the development of adaptation strategies over longer periods of time in a context of growing climate variability. This would give better evidence for evidence-informed policy and programmatic responses to climate change in a range of rural contexts in Zimbabwe.

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APPENDICES

Appendix 1

Hello, my name is Kavanji Privilege M and l am conducting a research study on “The impacts of climate change on Agriculture and Livelihoods : A Case Study of Wedza District.”These instruments are aligned with the study of objectives and qualitative methodology to collect rich abd reliable data.Thank you for agreeing to take part in this interview.

1. Interview Guide (for farmers ,Households,Extension Officers and Key informants)

The interview guide is intended to gather in-depth qualitative data from participants including farmers, households, agricultural extension officers, community leaders, and relevant stakeholders in Wedza District. The guide contains open-ended questions designed to explore experiences of climate change, its impacts, and adaptation strategies.

Section A: Demographic Information

Gender:

Age:

Level of education:

Type of farming activity:

Years of farming experience:

Location (Ward/Village):

Section B: Interview Questions

1. How has climate change affected agriculture and livelihoods in your area?

2. What changes have you observed in rainfall patterns and temperature over the years?

3. How have these climate changes affected crop production and livestock farming?

4. What challenges do farmers and households face as a result of climate change?

5. What coping or adaptation strategies are being used by farmers in your community?

6. How effective are these adaptation strategies in reducing the impacts of climate change?

7. What support (government, NGOs, or community) is available to help farmers deal with climate change?

8. What measures do you think should be taken to improve resilience and sustainable livelihoods in Wedza District?

Purpose of the Instrument

To collect rich, descriptive data reflecting the experiences of farmers and stakeholders on how climate change is affecting agriculture and livelihoods in Wedza District, as well as to identify challenges and possible adaptation strategies.

Appendix 2

Focus Group Discussion (FGD) Guide (for Farmers and Community Members)

The focus group discussion (FGD) guide facilitates group interactions among farmers and community members to explore shared experiences and collective perceptions regarding the impacts of climate change on agriculture and livelihoods in Wedza District.

Opening Questions

9. What does “climate change” mean to you in the context of your community in Wedza District?

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10. What changes in rainfall patterns and temperatures have you observed over the years in your area?

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Discussion Questions

11. How has climate change affected crop production and livestock farming in your community?

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12. What challenges do households face because of droughts, water shortages, or poor harvests?

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13. Can you share examples of how farmers and households are coping with the effects of climate change in Wedza District?

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14. How do you think community adaptation strategies to climate change can be improved in Wedza District?

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15. What kind of support (government assistance, NGO programmes, training, irrigation schemes, or farming inputs) would help farmers strengthen their livelihoods and resilience?

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16. Do you think current community and government interventions are effectively helping farmers deal with climate change? Why or why not?

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Closing Question:

If you could suggest one key measure to reduce the impacts of climate change on agriculture and livelihoods in Wedza District, what would it be?

Purpose:

To capture interactive group perspectives, identify shared themes, and generate ideas for improving

community resilience, sustainable agriculture, and livelihood adaptation strategies in Wedza District.

3. Document Review Checklist

This instrument is used to analyze agricultural reports, climate policies, development plans, and related documents from government departments, NGOs, and community organizations concerning climate change, agriculture, and livelihoods in Wedza District.

● Evidence of climate change impacts on agricultural production and rural livelihoods.

● Records of drought occurrences, rainfall variability, and temperature changes in Wedza District.

● Existing climate adaptation and resilience-building programmes for farmers and rural households.

● Availability of government or NGO support programmes such as irrigation schemes, farming inputs, or training initiatives.

● Evidence of food security challenges, livestock losses, or water shortages affecting communities.

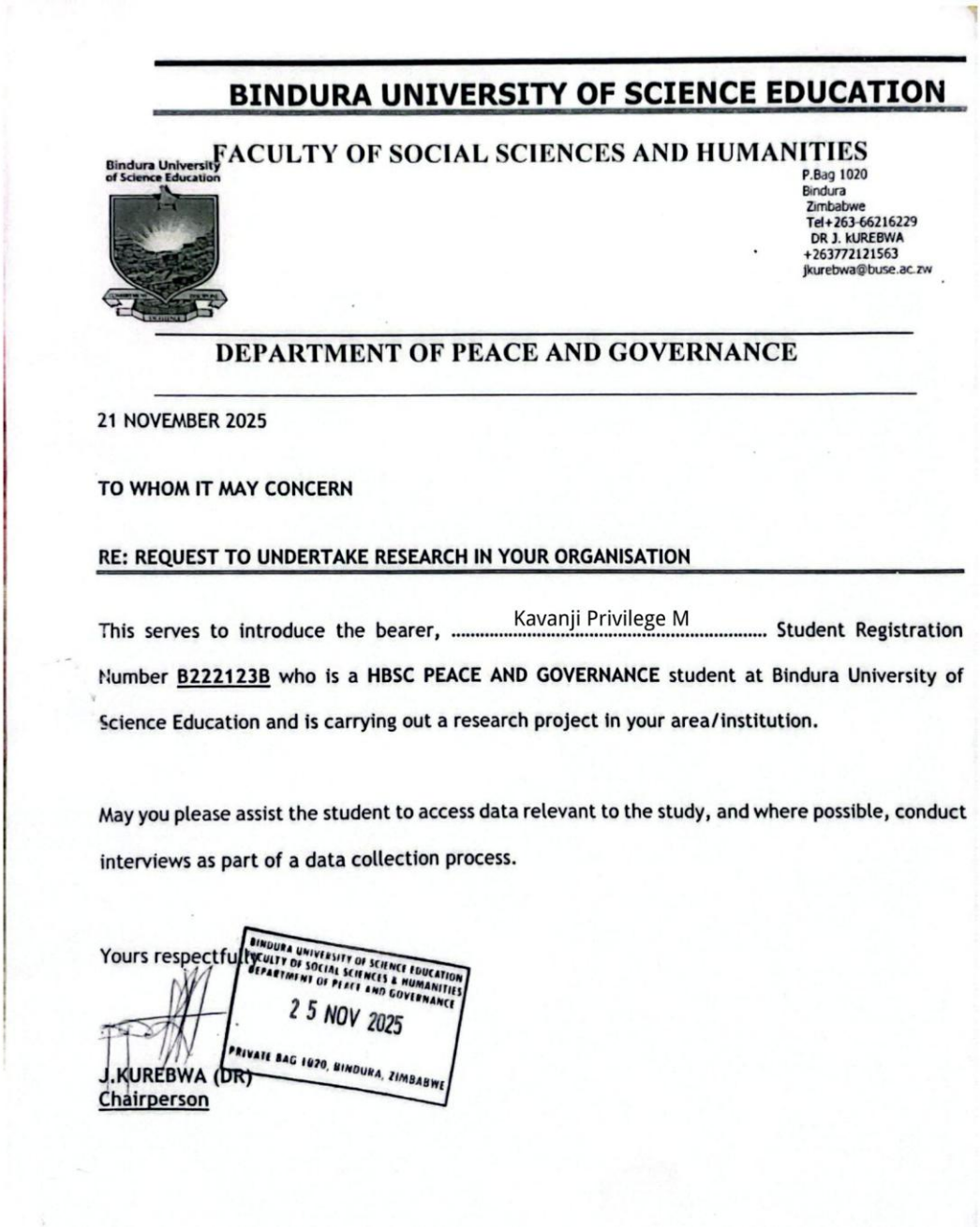
● Community-based coping strategies and sustainable livelihood interventions documented in reports or policy documents.

● References to climate change adaptation, sustainable agriculture, and rural development in district or national strategic plans.

Purpose:

To corroborate interview and focus group discussion findings by assessing documentary evidence related to climate change impacts, agricultural challenges, and adaptation strategies in Wedza District.

BUSE Research Letter



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DEPARTMENT OF PEACE AND GOVERNANCE

21 NOVEMBER 2025

TO WHOM IT MAY CONCERN

RE: REQUEST TO UNDERTAKE RESEARCH IN YOUR ORGANISATION

This serves to introduce the bearer, Kavanji Privilege M Student Registration Number **B222123B** who is a **HBSC PEACE AND GOVERNANCE** student at Bindura University of Science Education and is carrying out a research project in your area/institution.

May you please assist the student to access data relevant to the study, and where possible, conduct interviews as part of a data collection process.

Yours respectfully

BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SOCIAL SCIENCES & HUMANITIES
DEPARTMENT OF PEACE AND GOVERNANCE
25 NOV 2025
PRIVATE BAG 1020, BINDURA, ZIMBABWE

J.KUREBWA (DR)
Chairperson

Field Approval Letter

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25 March 2026

HWEDZA RURAL DISTRICT COUNCIL

TO WHOM IT MAY CONCERN

RE: PERMISSION TO CONDUCT RESEARCH

This serves to confirm that the Wedza Rural District Council, grants permission to **Privilege M Kavanji (B222123B)**, a 4.2 student pursuing a Bachelor of Science Honours Degree in Peace and Governance, to conduct her research within the district.

This letter grants permission to **Privilege M Kavanji** to conduct her research on the impacts of climate change on agriculture and livelihoods.

She is authorized to access data relevant to the study, and where possible, engage with staff and stakeholders as part of the data collection process.

This permission is granted on the understanding that the information obtained will be used for academic purposes and that confidentiality and ethical standards will be upheld.

We wish her every success in her research.

Yours faithfully

Mr B Maduveko
Superintendent
Wedza District Council
Wedza

HWEDZA RURAL DISTRICT COUNCIL
25 MAR 2026
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