

**BINDURA UNIVERSITY OF SCIENCE EDUCATION**  
**FACULTY OF SOCIAL SCIENCES AND HUMANITIES**  
**DEPARTMENT OF PEACE AND GOVERNANCE**



**RESILIENCE AND ADAPTATION STRATEGIES TO CLIMATE CHANGE**  
**IMPACTS: A CASE STUDY OF MUTOKO SMALLHOLDER FARMERS**

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### **ABSTRACT**

Climate change among small-holder farmers has become a global concern, having devastating impacts on food insecurity, loss of livelihoods, increased diseases and pest, changes in growing seasons as well as decreased crop yields. This research study therefore investigates the impact of climate change on small-holder farmers in Mutoko, in Zimbabwe. The research study takes into consideration the global, regional, national as well as local impacts of climate change on small-holder farmers. The basic strategies used by and challenges of climate change to smallholder farmers were also discussed. The research used a qualitative research design and non-random sampling techniques. The study used surveys, focus groups discussions, interview guide and document to gather reliable data which was presented and analyzed through the use of tables, pie charts and graphs. Content data analysis was used by the researcher to analyze data from focus group discussion documents and interviews. The researcher collected data which was used to draw conclusion on how climate change affected small-holder farmers. The study findings showed that many small-holder farmers indicated notable challenges in weather conditions, with most of them suffering from political and economic challenges, water scarcity, droughts, increased pest and diseases. However, the study highlighted several strategies that small-holder employed and advocated by key stakeholders in order to adapt to climate related challenges. The research finally recommends small-holder farmers and key stakeholders to promote climate-smart agriculture, invest in climate resilience infrastructure and ensure equal distribution of inputs.

## DECLARATION FORM

I B210479B, hereby declare and sign that this dissertation I have submitted is entirely my own work and it has not yet been submitted elsewhere before in any academic institution for evaluation and I properly acknowledges and cites all sources used in this study.

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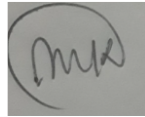
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### **DEDICATION**

This research work is dedicated to my beloved family members Mr. and Mrs. Chagwena as well as my brother and sister whose support and encouragement have been invaluable throughout the learning and discovery time.

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First and foremost, I would like to extend my deepest gratitude to the almighty God for protecting and guiding through this research as well as granting me wisdom and strength to complete this research. I extend my deepest heartfelt to my supervisor for the guidance he gave me throughout this study. I also appreciate the work of academic staff of Bindura University of Science Education for their knowledge, guidance on professionalism and encouragement support which made my research process a success. I would like to express my deepest gratitude to my whole family especially my father and my sister who supported and stood by me both spiritual and financially throughout the research process. I acknowledge with the gratitude the help of respondents and participants who engage with me and provided valuable assistance in the data collection process. I am forever thankful for their time, and effort they invested into my practical learning.

## **LIST OF ABBREVIATIONS AND ACRONYMS**

C C. .... Climate change

C S A..... Climate-Smart Agriculture

CIMMYT. .... International Maize and Wheat Improvement

FAO.....Food Agriculture Organization

IPPC. .... International Plant Protection Convention

SES..... Social ecological system theory

UNDP..... United Nations Development Program

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## CHAPTER ONE

### INTRODUCTION

#### 1.0 Background of the study

Climate change effects have threatened the global environment and sustainable development. The climate variability has negative impacts on environment, human and animals' health and the global economy at large. Calzadilla et al (2014), articulated that the continuity of weather conditions negatively affected the sustainable agricultural production and poverty resolution strategies which resulted on negative impacts on agriculture productivity and food production. The world has faced continuous series of harsh climate related events such as excessive rainfall, scarcity and high records of temperature during 2020 to 2022. FAO (2020), emphasize on the fact that rising temperature due to climate change have exacerbate water scarcity by 50%, ultimately affecting the production of crops and livestock. 75% of climate financing goes to mitigation as compared to helping people adapt to the climate changes that they are already baked in.

The African continent mainly encounters with climate-related challenges such as increased temperature, changes in rainfall patterns and they have implemented climate change resolution such as climate smart agriculture, ecosystem-based adaptation measures to mitigate impacts. According to Niang et al (2014), African small-scale farmers are particularly exposed to climate change conditions and they can be helped to minimize risks and enhance resilience through adaptation strategies such as climate smart agriculture and ecosystem-based adaptation. Surveys have shown that across six Central American landscapes about 860 smallholder coffee as well as basic grain for example maize and beans. Farmers understand perceptions of effects of climate changes and the impacts they are experiencing, how they are changing their agricultural systems in response to climate change, and their adaptation needs.

African smaller-holder farmers are facing many challenges of climate change. This is caused by geographical characteristics where there are projected changes in the rainy seasons and failure to implement adaptation programs due to constrained technology. In Africa the agricultural sector contributed to about 20% of greenhouse emission which resulted in negative effect of crop yield and livestock production (Thaddaeus et al, 2022). In the West and Central Africa, small-holder farmers assumed that rising temperatures, shifting rainfall patterns may reduce the crop production by 13%. The east and southern Africa mostly experienced worst droughts which are followed by floods and landslides.

Adaptation, on the other hand, involves adjusting practices and systems in response to changing environmental conditions to enhance adaptive capacity and mitigate risk. In Zimbabwean, small-holder farmers faced several climate changes which need various adaptation plans to solve the specific challenges, for instance, shifting period of planting season, diversifying crops, improving water management practices, adopting to different crops which are drought-tolerant, implement soil conservation techniques, integrating agroforestry as well as livestock production into their farming systems. FAO (2020), states that about 75% of smallholder farmers in Zimbabwe are lacking access to irrigation schemes and their crop production had reduced by 40% due to the climate-related stressed. However, the study will focus on investigating and addressing climate change challenges so as to provide insights adaptation strategies to small-holder farmers and, to enhance resilience and sustainability in Zimbabwe's agricultural sector.

### **1.1\_Purpose of study**

The aim of this study is to assess resilience and the adaptation strategies used by smaller- holder farmers in Mutoko.

## **1.2 Statement of the problem**

The effects of global warming is a serious and continuous issues with negative impacts on Zimbabweans socio-economic development. The outcome of changing climate mainly affected small-holder farmers, local community, national government and international organization at large. The impact of climatic changes as a result of rising temperatures, cyclones and changes in rainfall patterns hence it is a crucial concern which requires enough research in order to understand the problem. This research builds upon existing researches on climate variability and building resilience as articulated by Celia et al (2018), small-holder farmers are susceptible to climate-related stressors, however efforts for farmer's to improve adaptation are impeded by lack of knowledge on how they experience and addresses effects of climate change. The existing studies has focused mainly on the global and national scale of the climate change, undermining the local-scale impact. This lack of research creates problem in understanding proposed strategies and some of strategies are not applicable to challenges faced by local communities, hence limits the ability to address it effectively.

## **1.3 Objectives of the study**

1. To evaluate the effects of climate change on small-scale farmers
2. To examine current resilience and adaptation practices employed by subsistence farmers.
3. To analyze challenges in the existing practice.
4. To explore sustainable strategies that farmers may employ.

## **1.4 Research question**

1. What are the climate change impacts affecting small-holder farmers?

2. What resilience and adaptation strategies are currently being utilized by smallholder farmers to address climate-related changes?
3. Examine key challenges and limitations encountered by smallholder farmers in their current resilience and strategies for adjusting to climate change?
4. How well do current approaches work, and what alternative method could smallholder farmers use?

### **1.5 Assumption of the study**

1. Methodologies such as key interview guides, focus groups and secondary sources will be effective in collecting data on the resilience and adaptation approaches employed by smallholder farmers.
2. Farmers in Mutoko district have developed deep understanding of climate change and its effect.
3. Small-holder farmers have developed practical strategies to adapt and cope with these changes.

### **1.6 Significance of the study**

#### **1.6.1 Smallholder farmers**

This research will directly benefit the small-holder farmers in Mutoko district through effective insights to the resilience that may help them to cope with climate change. For example, effective intervention for droughts, cyclones as well as changing rain patterns. Small-holder farmers may also improve livelihoods and agricultural productivity through climate resilience farming techniques and adaptive practices to ensure stable food supply.

#### **1.6.2 National and local government**

The study will benefit the local government in Mutoko district such as Ministry of Environment, Climate Change, Tourism and Hospitality Industry to inform climate change adaptation policies and programs through enhancing farmers to adapt to the climate change,

improving economic stability, food security which leads to an increase of the availability of nutritious food for the community. The study's findings can inform sustainable agricultural development policies and programs in Zimbabwe. This study may help to identify the opportunities for income diversification such as growing drought resistance crops for example millet, rapoko and sorghum as well as value added products which may benefited the local economy. Hence this can promote sustainable livelihood and reduce vulnerability to climate change. This research will enable the national government of Zimbabwe to gain the knowledge in order. The study results may enhance development of targeted interventions for instance climate change-resilient agriculture programs, early warning system.

### **1.6.3 International organizations**

To the international organizations such as Adventist and Relief Agency (ADRA) as well as Food Agriculture Organization (FAO), this study will provide an insight of best practices and lessons learned from the Mutoko region case study. These findings can inform global initiatives and policy decisions on climate change and adaptation. It can also help to highlight opportunities for supporting resilience-building initiatives and sustainable agricultural development.

### **1.7 Delimitations of the study:**

This study explores how smallholder farmers build resilience and adaptation strategies on impacts of climate change to smallholder agricultural producers. This research covered the period from 2023-2024 agricultural season, without examining other seasons or years. Mutoko District will be the specific area of the study. The timeframe of this research is limited to the current resilience and adaptation strategies employed by smallholder farmers in Mutoko District, without examining historical or future climate change impacts. In terms of population, the study will only consider smallholder farmers who have been farming in Mutoko

District for at least five years, excluding commercial farmers. Additionally, the study will emphasize on changes in climate condition on agricultural productivity, food security, and livelihoods, excluding other climate change impacts such as health or infrastructure. Methodologically, the study will use qualitative approach, in-depth interviews and focus group discussions to gather data. This approach will not cover quantitative data collection and analysis methods, such as surveys, experiments, or statistical modeling, which may provide additional insights into the research. This study will be conducted in English and Shona, the local language spoken in Mutoko District, excluding other languages spoken in the area.

### **1.8 Limitations of the study:**

Limitations of the research on resilience and adaptation strategies towards challenges faced by smallholder agriculturalist in addressing effects of climate change includes potential for biased data collection and analysis, subjective nature of self-reported information from farmers. However, the study will use stratified sampling so as to ensure representatives samples. The study used also structured questionnaires to minimize the variation. Additionally, limitations could arise from the complexity and variability of climate change impacts, making it challenging to generalize findings across different agricultural systems or regions. However, the researcher will conduct in-depth research in specific agro-ecological engage local stakeholders in order to develop complex-specific solution. Another limitation could be the lack of longitudinal data to track the effectiveness of adaptation strategies over time, hindering the ability to draw robust conclusions on the sustainable resilience of small-scale farmers to effects of climate change. However, attempts to utilize baselines data and conduct so as to track changes.

### **Definition of keywords**

Folke et al (2010) defines resilience as the ability of a system to absorb and recover from

disturbances, while maintaining its essential functions and identity.

IPCC (2013), articulated that adaptation refers to the adjustments in human and natural systems adjusting to climatic factors, reducing negative impacts.

Smallholder farmers are defined as agricultural producers who cultivate small plots of land about 2 hectares or less and rely on family labor for farming operations (FAO, 2017).

Climate change impacts according to IPCC (2013), climate change is an increased temperature, changing rainfall patterns, and increased frequency of extreme weather events

Vulnerability is defined by Füssel (2007), as the extent to which a system is affected by and struggles to manage adverse climate change effects.

## **1.9 \_Dissertation outline:**

### **1.9.1 Chapter 1: Introduction**

The chapter present a contextual background of the research study, identifying key problem that it seeks to address. It will also articulate the importance of the study, purpose of research, research objectives and questions that the study aims to solve.

### **1.9.2 Chapter 2: Literature review and theoretical framework**

Chapter two will highlight an in-depth examination of existing studies and scholarly work related to the research topic topic. It will analyze previous research findings and present theoretical framework guiding the study. Strengths and weakness of the theoretical framework is going to be discussed. The chapter will explore the significant gaps and limitations in the existing literature.

### **1.9.3 Chapter 3: Research methodology and design**

This chapter will present the research design and approach used to conduct the study. It



describes targeted population, sample size and sampling techniques, identifying the data collection methodology for instance focus groups, key informant interview guide and documentary sources. The chapter will also present and analyze data.

#### **1.9.4 Chapter 4: Data presentation, analysis and discussion of findings**

This chapter will highlight the findings of the study, analyze the results in relation to the research study questions, objectives as well as interpret the meaning and significance of the data collected then link the existing literature and new finding. The chapter will also demonstrate how these findings will address gaps and imitations identified in the chapter two.

#### **1.9.5 Chapter 5: Summary, conclusions, recommendations and areas for further research**

Chapter five will summarize the main findings of the study outlining the findings discovered in relation to the research topic. It will also provide practical recommendations for stakeholders and practitioners.

## **CHAPTER TWO**

### **LITERATURE REVIEW AND THEORATICAL FRAMEWORK**

#### **2.1 Introduction**

The section presents the existing literature review on effects of climate-related changes to smallholder farmers. The research study includes research on effects of climate change, how small-scale farmers cope with current approaches to build capacity to withstand and adjust to climate change, risks which farmers faced in adopting to current policies and practices as well as sustainable strategies that may be employed by farmers. The research will also review the theoretical framework, empirical literature review on changes in climate conditions in Zimbabwe and gaps of the current studies.

#### **2.2 Theoretical framework**

This study is anchored on theory that is Social ecological system theory.

##### **2.2.1 Social ecological system theory**

The research is based on the Social ecological system theory, first coined by Elinor Ostrom (2007), which articulated that there is interconnected and interdependence between ecosystem and the humanity. The theory recognized that human decision shapes and is shaped by environment. According to Floke et al (1998), the patterns of production, consumption and well-being develop not only from economic and social relation within and between regions but it depends also on the capacity of how other factors such as ecosystem sustained them. However, to curb the negative consequences of a changing climate, researchers are advocating for strategies to ensure a sufficient dependable and equitable flow of essential ecosystem services (IPCC, 2014).

In the context of SES theory, changes of climate-related condition are defined as a complex and multifaceted issue that affects the nature, livelihood of individual and communities, and economic environment which led to negative impacts such as water scarcity, displacement and migration loss of livestock and crops. The theory emphasized on importance of understanding the outcomes of climate change. Amin et al (2023), suggest that adaptation to climate change requires an understanding of complex SES in which dynamics arise from the interaction and feedbacks between socio-ecological systems.

The SES are referred to a complex dynamic system which includes the link between human beings and nature as well as frequent changes in addressing internal or external pressures (Schlüter et al., 2014). In Mutoko district, climate change had led to an increased risks of heat waves, El-Nino and floods which had a negative outcome on agricultural production, food security and livelihoods. The social ecological systems theory helps to explain and understand consequences of climate change to smallholder farmers and also local community. Social ecological theory also enlightened the local community on the importance of considering the resilience and adaptation strategies.

## **2.3 Literature review**

### **2.3.1 The impact of climate change on smallholder farmers**

#### **2.3.2 Weather related impacts**

Rising temperature and drought conditions is one of the main impacts that is affecting farmers in Southern Africa, Zimbabwe at large. These impacts cause plant to wilt as a result of heat waves and in some areas crop productions are destroyed by floods for instance tropical cyclone Freddy. Eitzen et al (2019), emphasized that high temperatures and drought conditions have negative impact on biomass production of maize and beans. Most small scale

farmers in developing countries depended much on agriculture which rely much on rainfall and they are prone to droughts risks, floods and irregular rainfall patterns. For example, in Zimbabwe from 2022 to 2024, the country experienced continuous drought and floods which affected both the yields and livestock production.

Eitzen et al (2019), also mentioned that by 2025 climate change will cause a reduction in agricultural production especially beans production. Persistent droughts and other shocks resulting from climate variability have impacted heavily on indigenous farming methods for instance extensive cattle ranching, semi-pastoralism, cultivating of crops which rely of rainfall such as maize, millet and sorghum, rotating crops and inter-cropping, minimum utilization or no usage of commercial inputs. In the past two decades (1990–2010) agricultural production in Matabeleland South Province have faced challenges such as water scarcity which resulted from climate change (Musarurwa & Lunga., 2012)

Climate change has worsened the magnitude of Tropical Cyclones. Farmers indicated that tropical storms caused dam wall to be destroyed, which caused livestock lack access to drinking water, resulting in increased losses of animals. Climate change-induced natural disasters (such as flood, cyclone and natural veiled fires) have significant effects on the agricultural production which directly caused damages on crops, supply chains as well as agriculture-supporting ecosystems leading to challenges on livelihoods, food insecurity, and nutrition. Large-scale irrigation systems also face water shortages as a result of dam breach due to cyclones. The destruction of dip-tanks complicated livestock tick-borne disease surveillance, and many cattle succumbed to water- related diseases. Power for the running of engines in irrigation schemes was curtailed, as electricity pylons were uprooted.

## **2.4 Current resilience and adaptation strategies employed by smallholder farmers**

### **2.4.1 Climate-resilience irrigation system.**

The impact of climate change gave an insight for the need to adopt resilience and adaptation strategies. Kurgat et al (2020), states that irrigation during the absence or the reduction of rainfall to have reliable access to water to harvest crops through giving relief for them during environmental stresses. Resilience irrigation schemes are one of techniques used by farmers which has a positive impact on smallholder farmers for example improving efficiency, crop yields, reduce water losses increased water productivity. Akinagbe & Irohibe (2015) suggested that, different types of irrigation systems are used as water conservation approaches that are employed by smallholder farmers required to increase the water use efficiency because climate changes have results in reduction of surface water and underground water availability. The system also helped farmers to manage impacts of climate related shocks. The strategy used innovative technologies for instance drip irrigation, precision sprinkler irrigation and center pivot irrigation which is used to optimize the use of water, minimize water losses and enhance crop yields.

#### **2.4.2 Water harvesting structures**

Small-holders in different parts of the world have embarked on numerous waters harvesting structures in their farms such as water tanks, roof top, open earth dams, boreholes, and ponds to enhance their domestic and productive water demands (Ogada et al., 2020). Improved water source which are frequently maintained could assist in improving agricultural productivity and reduce production variability resulting enhanced small-holders' resilience (Lankoski., 2018).

#### **2.4.3 Diversification of crops and livestock**

Small-scale farmers employed a strategy of diversification of crops and livestock to mitigate the effects of climatic condition. Crop diversification strategy enables smallholder farmers to engage variety of crops in their farming activities and undermines dependence of single cropping. Nessary et al (2013), articulated that, crop diversification involves crop rotation,

Inter-cropping for example like legumes bean cow peas, soya-beans and may increase the utilization of limited resources. They further noted that, inter-cropping which smallholder farmers used may improve the amount of depleted soil nitrogen. This strategy helps farmers to enhance the food security and improve resilience to climate related shocks. Segnon et al (2015), noted that smallholder farmers who implemented inter-cropping farming systems cultivate and harvest more than one output from the same piece of land and can reduce distribution risks over space of time and attain adequate yield and secure their food requirements.

Small-holders' livestock rearing has a paramount advantage to increase productivity because it used organic manure, thereby reducing the cost of production while lower level of chemical fertilizer application since organic manure can be used as a substitute (Wainaina et al., 2016). Gebul (2021), argues that the application of manure from livestock waste serves to improve soil fertility and soil organic matter, enhance soil water holding capacity, and also increase carbon sequestration. Small-holders agricultural producers use of traction power besides livestock products to improve the food insecurity status, social status which increased income and serve as a collateral to obtain credit as a buffer during CC-induced risks (Tarfa et al., 2019). Climate change effects go beyond affecting crop productivity, rather it stretches to livestock in affecting productivity through re-emerging diseases, limiting access of water and forage availability, excessive temperature on livestock. Lankoski (2018), asserted that the due to indirect effect of climate change caused by increased heat stress caused livestock vulnerability and minimized milk productivity and fertility. Therefore, small-holders adopt to climate-resistance species, adjusting utilization rate of pasture productivity, enhancing animal nutrition, establishing livestock insurance, and maintaining high animal health and husbandry as their primary CC adaption methods (Princess et al., 2021).

#### **2.4.4 Access to information**

Resilience and adaptation strategies enables smallholder farmers to improve their decision making and how the mitigate changing climate's effects. Access to information regarding climate change shocks such as cyclone, heat waves and outbreak of diseases enlightened farmers on how they cope and address challenges caused by climate related shocks. Dube & Phiri (2013), states that through drought response planning and mitigation through appropriate strategies for example the use of remote sensing, local weather forecasting, drought tolerant crops, early warning information systems, irrigation systems and building of resilience in rural communities are essential strategies.

#### **2.4.5 Mulching**

Mulching is defined as a cost-effective and short-term climate adaptation methods which assists in minimizing soil, water evaporation and maintaining crop yield during higher temperatures (Kiboi et al., 2017). Mulching is also a layer of compost on the soil surface which protect soil moisture, reduce the growth of weeds, and improve soil fertility (Agula et al., 2019). Through mulching, the soil maintains suitable temperature and organic material which create a favorable environment for microbial processes (Peter, 2018). Therefore, such microbial activities enhance the physical soil structure, and nutrient cycling as well as improves the availability of soil organic matter and protect the soil from erosion (Peter, 2018). The simulation result conducted by Fraga & Santos (2018) in Portugal indicated that mulching decreases the gradual fall of yield by 10 to 25%.

### **2.5 Challenges and limitations faced by smallholder farmers in their current resilience and adaptation practices to climate change**

#### **2.5.1 Weak Policy and Regulatory Frameworks**

Weak policy and regulatory frameworks are other challenges faced by smallholder farmers in trying to address stresses caused by climate change. Shaping the agricultural sector and

influencing the adoption of climate-resilient agricultural practices are roles played by policies and regulatory frameworks. However, in Zimbabwe, policies and regulations are often weak, inconsistent, or poorly enforced. The narrow capacity for climate change policy analysis, implementation and limited resources to fund climate change adaptation and mitigation programs (Ndebele & Mubaya 2015). The key areas in which respondents cited was lack of support for instance food security, irrigation supported agriculture, improved water sources, improved distribution of small-grain crops and climate change education. This as a result created an uncertain and unstable environment for farmers, making it difficult for them to adapt to climate-resilient agricultural practices.

### **2.5.2 Limited Access to Finance**

Smallholder farmers faced challenge of limited access to finance and is mostly common in developing countries. Farmers used finance in climate-resilient agricultural strategies, for example irrigation systems and drought-resistance crops. In developing countries such as Zimbabwe, farmers lack access to financial support as a result of limited collateral, limited credit history as well as high interest rates. This therefore cause farmers to fail to adopt climate-resilient agricultural practices, and increased their vulnerability to climate change. Ndaki (2014), indicates that financing climate shifts remains a major problem for developing countries, who has economies and livelihoods are so vulnerable to outcomes of climate change.

In addition, high costs of climate-resilient agricultural practices for instance climate resilience technologies are challenging that smallholder farmers in Zimbabwe faced. Irrigation systems, drought-tolerant crops, making them inaccessible to many smallholder farmers. This can limit their ability to adopt climate-resilient agricultural practices, and can exacerbate their vulnerability to climate change. This is supported by Brooks and Loevinson (2011), indicated



that the most significance ways to help rural poor people adapt to climate change is to address rural poverty.

Ndaki (2014), emphasized that knowledge level regarding global warming adaptation in some regions has remains low. In addition, the role of information and skills in explaining adaptive capacity cannot be overemphasized. Limited knowledge and skills paper significant challenges facing smallholder farmers in Zimbabwe. Climate-resilient agricultural practices require specialized knowledge and skills, such as the ability to use drought-tolerant crops and irrigation systems. However, many smallholder farmers in Zimbabwe lack the expertise needed to adopt these practices, due to reasons like limited ability to get education and training, and lack of exposure to innovative technologies and methods. This can limit farmers ability to adopt climate-resilient agricultural practices, and can exacerbate their vulnerability to climate change.

### **2.5.3 Limited Access to Climate-Resilient Technologies**

Limited access to climate-resilient technologies is a significant challenge facing smallholder farmers in Zimbabwe. Climate-resilient technologies, among them drought-tolerant crops and irrigation systems, can support farmers to adapting to climate change. However, many smallholder farmers in Zimbabwe lack access to these technologies. Most rural communities in Zimbabwe are under-resourced in terms of technology and rely heavily on basic tools; their agricultural capital is limited (Mutekwa, 2009).

In Zimbabwe, small-scale farmers faced several challenges in adapting to climate change strategies. Accessing reliable and weather-related information is one of the main strategies. The lack of access to reliable information makes smallholder farmers to make poor decisions on their agricultural practices, for instance, planting and harvesting times. As a result, they

are often forced to rely on traditional methods of forecasting, which can be inaccurate and lead to crop failures.

#### **2.5.4 Inadequate Extension Services**

Inadequate extension services pose significant challenge to smallholder farmers in Zimbabwe. Extension services provide farmers with the information and skills which helps to adopt new technologies and practices. However, in countries extension services are often inadequate, caused farmers with too few extension agents and limited resources. This can cause difficulties for farmers to access the information as well as support their need to improve their agricultural productivity and adaptability to climate change.

### **2.6 Effectiveness of current strategies employed by small-holder farmers**

#### **2.6.1 Climate-resilient irrigation**

Smallholder farmers employed variety strategies which has positive impacts in address challenges imposed by climate change. Climate-resilient irrigation schemes is one of the effective strategies. Climate-resilient irrigation systems have been shown to be effective in improving crop yields and reducing water losses (Kumar et al., 2018). For example, a study in Zimbabwe found that the use of drip irrigation method increased crop yields by 30% and minimize water losses by 50% (Moyo et al., 2017). In addition, the adoption of conservation agriculture by farmers has also a positive effect which enhanced soil health, reduce soil erosion, and promote biodiversity.

#### **2.6.2 Climate information**

Farmers used climate information strategy which has also been an effective strategy in helping small-scale farmers to make informed decisions about their agricultural practices. From current studies in Zimbabwe, research found that farmers who received climate-related

information was able to adjust their planting dates and crop varieties, for instance in dry area they implemented use of growing small grain crops resulting in enhanced crop yields and reduced crop failures. However, the effectiveness of climate information is often limited by factors such as limited access to mobile phones and internet, and limited literacy and numeracy skills. Patt et al (2010), emphasized that climate information has been shown to be effective in helping smallholder farmers make informed decisions about their agricultural practices. A current study in Kenya found that farmers who received climate information were able to adjust their planting dates and crop varieties, resulting in improved harvests and reduced crop losses (Ogada et al., 2017).

### **2.6.3 Agroforestry**

Effective strategies that smallholder farmers employed for adjusting to climate change include agroforestry. This strategy includes merging trees into farming systems in order to promote ecological relations and synergies. Agroforestry has been shown to improve soil fertility, reduce soil erosion, while also providing farmers with additional income streams from tree products such as fruits, nuts, and timber. Agroforestry has been found to be effective in improving soil health, reducing soil erosion, and promoting biodiversity (Nair et al., 2009). For example, a study in Rwanda found that agroforestry improved soil organic matter by 25% and reduced soil erosion by 40%.

### **2.6.4 The climate-smart agriculture**

Research indicates that climate-smart agriculture has been shown to be effective in improving crop yields, reducing greenhouse gas emissions, and promoting ecosystem services (Lipper et al., 2014). For example, a study in Malawi found that climate-smart agriculture improved crop yields by 20% and reduced greenhouse gas emissions by 15% (Kanyanga et al., 2018). Another strategy that may be employed by smallholder farmers is climate-smart agriculture, which

involves the use of agricultural practices and technologies that take into account the projected effects of climate change. Climate-smart agriculture had been shown to improve crop yields, reduce greenhouse gas emissions, and promote ecosystem services, while also improving the resilience and adaptability of small-holder farmers to cope with climate change. The adoption of conservation agriculture has also been found to be effective in improving soil health, reducing soil erosion, and promoting biodiversity (Hobbs et al., 2008). For example, a study in Zambia found that conservation agriculture improved soil organic matter by 20% and reduced soil erosion by 30%.

### **2.7.5 Crop insurance**

In addition, smallholder farmers may also employ strategies such as crop insurance, which provides financial protection against crop failures and other climate-related challenges. Crop insurance caused improvements to the resilience and adaptability of smallholder farmers to climate change, while also promoting sustainable agricultural practices and reducing poverty. Crop insurance has been found to be effective in providing financial protection against crop failures and other climate-related risks (Greatrex et al., 2015). A study in India found out that crop insurance reduced the financial losses of farmers by 30% and improved their resilience to climate-related risks (Pandey et al., 2017).

## **2.8 Gaps in current research**

Despite the growing body of research on resilience and adaptation strategies among smallholder farmers, there are still significant gaps in current research. One major gap is the lack of context-specific studies that take into account the unique socio-economic and environmental conditions faced by smallholder farmers in different regions (Makurumidze, 2019). Most studies have focused on general adaptation strategies, without considering the specific needs and constraints of smallholder farmers in particular contexts. Additionally,

there is a need for more longitudinal studies that examine the long-term effectiveness of adaptation strategies, rather than just focusing on short-term responses to climate-related shocks.

Current research also showed that limited attention given to the role of social and institutional factors in shaping smallholder farmers' resilience and adaptation to climate change (Chikanda, 2020). While the growing recognition of the importance of social capital and institutional support, more research is needed to understand how other factors can be leveraged to enhance smallholder farmers' resilience. Furthermore, there is a need for more research on the gender dimensions of resilience and adaptation, as women smallholder farmers often face unique challenges and constraints in responding to climate change (Eriksen, 2013). Addressing these gaps is critical to developing approaches building resilience and adaptation that meet needs of smallholder farmers.

## **Conclusion**

This chapter provided a detailed comprehensive of the consequences of climate change to smallholder farmers in Mutoko. The chapter compiled relevant literature review from previous studies, which includes the theoretical framework which supported the adaptation of climate change strategies. Other subjects covered were literature review which explore the effects of climatic conditions on smallholder farmers, current resilience and adaptation approaches employed by smallholder farmers, challenges and limitations faced by smallholder farmers in their current resilience and modifying practices under climate change, the effectiveness pertaining to the current strategies employed by small-holder farmers. This chapter also drew some attention to gaps of current research studies.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY AND DESIGN**

#### **3.1 Introduction**

The research study analyzed the impact of climate change on agricultural farmers in Mutoko district. The chapter presented an overview of research approach that will be used to collect data, assess and address the problem being studied and the study employed qualitative as research approach. The research also presented research designs, population sample and sampling techniques, data collection methods, data presentation and analysis. It also delved into validity and reliability as well as ethical issues.

#### **3.2 Research approach**

According to Cresswell (2014), research approach is the overall strategy on perspective used to conduct research for instance methods used to collect data. The research played a pivotal role in research study because it ensures an organized and it provides a framework which outlines the stages and methods used in research study. This study will use qualitative research approach to collect data. Qualitative data is unstructured approach which consist more in-depth which enables researcher to answer questions and it helps to formulate hypothesis as well as build understanding. Patton (2015), states that qualitative research is used for exploring complex, nuanced, and context-dependent phenomena. The researcher used qualitative research methodology because it provides a detailed understanding of resilience and adaptation strategies utilized by small-scale farmers in adjusting to climate shifts. I also used qualitative methodology because the study will be focusing on exploring rather than testing hypotheses

### **3.3 Research design**

Research methodology is defined as strategies and approaches used to conduct the research study effectively (Bloomfield & Fisher, 2019). The research plan is used to generate relevant information which is also used to solve the research problem. According to Fisher (2019), research design can effectively address the problem statement. This study was guided by case study. This case study helped to select a bounded system for instance the unit of analysis for this research is smallholder farmers in Mutoko. Case study research design is used to explore the experiences, perceptions, and strategies used by small-scale farmers used to cope with effects of climate change. It also allowed the researcher to collect and contextualized information through method for example key interviews guide, and focus group discussions.

### **3.4 Targeted population**

In the paradigm of research methodology, population a group of units in which findings of the research are extracted from particular area. As noted also by Ayiro (2012), Population is defined as group of observations for instance individuals, institutions, social relations and events while research population is a specific group of observations of interest to the researcher. Cresswell (2014), noted the significance of identifying the specific group or units that the research aims to study and generalize. He states that, the target population are specific group of people or individuals that a researcher aims to study, describe or generalize findings to. The targeted population are smallholder farmers in Mutoko and organizations which works with them as key informants. The study selected a total number of 40 respondents, including 10 key informants and 30 smallholder farmers.

### **3.5 Sample of the study**

Creswell (2014), defines sample as a fraction of people or case selection from the targeted population represented to the population, intended to represent the population of the study. The fundamental reasons for selecting a sample are neither practical nor possible to seek the interest

of the whole researcher's population. The researcher therefore identifies a sample that indicates the views of the population, enabling the study to draw conclusions that can be applied to the broader targeted groups population. Sample size may not represent entire population considering the sufficient for the study purpose which priorities in-depth understanding over broader representativeness. This view is supported by Silverman (2016), who argued that the nature of qualitative research methodology does not solely dependent on the same size, but on the depth and richness of the data collected. The researcher seeks to understand adaptation methods used by smallholder farmers to deal with climate changing conditions such as weather patterns, pest and diseases outbreaks from the sample size of 30 farmers and 10 key informants in Mutoko. This study aimed to understand the information on experiences and challenges faced by small-scale farmers in changing of climate conditions. The sample size was also manageable for the researcher to gather and examine the data within available timeframe and resources.

### **3.6 Purposive Sampling techniques**

The research will utilize non-random sampling method, specifically purposive sampling in order to select participants based on their characteristics, expertise rather than randomly chosen to the sampling is relevant and informative. This study will use purposive sampling because it focuses on gathering in-depth data and also on specific are of interest. Sampling refers to the inclusive efforts that is used to select a sample that assemble the research findings validity and credible. According to Touvila (2024), sampling is defined as process in which statistics are analyzed, where researchers take a predetermined number of observations from a large population. The researcher selected a sample drawn from smallholder farmers and organization that work around agricultural production. The sampling technique helps researcher to select targeted groups that are directly affected by effects of climate change and selects participants that had experiences in adapting and being resilient to these impacts.



The study also used a purposive sampling technique to select key informants (organizations such as AGRITEX) and stakeholders (smallholder farmers) who have a clear understanding of climate change impacts. Heath (2023), states that a purposive sampling technique is used in qualitative methodology to select a specific population or units for analysis. The researcher adopted purposive sampling because it allows researchers on particular area of interest and collects detailed data on those topics.

### **3.7 Data collection methods**

The research employed multiple data collection, aiming to obtain a comprehensive knowledge of the respondents' views. This research utilized both primary sources and secondary sources for data collection. For example, researcher used focus group, key informant interview guide as well as documents as tools for collecting data. This approach gives the researcher power to act effectively so as to enhance the overall quality of data. Few (2015), articulated that the effective visualization techniques facilitate understanding and interpretation of complex information.

#### **3.7.1 Primary data collection**

The analysis employed interview transcript and focus groups in collecting data. Yin (2014), views primary data collection is a tool used to gather evidence for the research study. He also noted that primary data collection enables researchers to gather relevant, reliable, and valid data. Basri (2014), emphasized that the use of primary data enables the researcher to be in control during the data collection, this will help to address the specific problem of the study.

##### **3.7.1.1 Focus group discussion**

The research used focus group interviews to interview small holder farmers. Focus group discussions is defined as planned interviews by researchers organized to information from the respondents. A focus group is also a small, structured discussion led by a moderator, where a

diverse group of participants share their thoughts, experiences, and opinions on a specific topic. Encourages group dynamics and interactions, providing rich and nuanced data. Allows for exploration of complex issues and themes. Enables researchers to observe nonverbal cues and body language.

### **3.7.1.2 Key informant interview guide:**

The research was guided by information deduced from participants such as government official and participants from ARGITEX organization. The study allowed the key informant to express their perceptions freely. The researcher therefore used interviews which allows respondents to express their views on the impact of climate change. Abiwi (2013), notes that it is important to interviewing people who have some knowledge of the research study because it will enrich the research. A key informant interview guide is a semi-structured or structured tool utilized for conduct in-depth interviews with individuals who possess specialized knowledge or expertise on the research topic. Key informants interview involves in-depth discussions with individuals possessing specialized knowledge or expertise (Bernard & Ryan, 2017). The key informant interviews will help the researcher to identify disparity between different respondent's perceptions.

### **3.7. 2 Secondary data collection**

Wickham (2019), defines secondary data as information gathered by other researchers to tackle distinct inquiries. Researcher need to possess expertise in their research field to recognize relevant datasets. This data enables comparison of the results from various studies and time periods facilitating comparative analysis and broader insights. Furthermore, secondary data as pre-existing and readily accessible, saving time compared to the process of collecting primary data which required planning, implementation and analysis.

### **3.7. 2.1 Documentary source**

Documentary sources refer to existing documents, records, or archives that contain relevant information for the research studies. The researcher used Government reports as secondary source such as annual reports on agricultural productivity in Zimbabwe which provide agricultural productivity, challenges and opportunities in the sector. Documentary sources provide objective, historical, or contextual information. Offers a wealth of data without the need for direct participant involvement. Flick (2018), articulated that documentary sources involve analyzing existing documents to gather data, providing insight into organizational practices and policies.

### **3.8 Data analysis to Data presentation**

The effective presentation of research data is important for enabled researcher to understood and interpreted findings. There is a significance of using appropriate and relevant techniques for data analysis and presentation. Due to language diverse the data from respondents was collected both in English and Shona. The researcher was converted into English language for easy data analysis. Effective visualization techniques facilitate understanding and interpretation of complex data (Few, 2015). The researcher will use Microsoft excel to convert data into graphical representation such as pie charts and graphs. To add on thematic analysis will be employed in order to identify code and patterns within respondent data.

### **3.9 Reliability**

Reliability refers to the consistency and dependability of a research instrument or method in producing stable and accurate results, even when repeated or used by different researchers. Ensures that the research findings are consistent and dependable, reducing errors and biases. Allows for replication and verification of the findings by other researchers. Ensuring data accurately measures the intended concept, through techniques like triangulation and member

checking (Creswell, 2014).

### **3.10 Validity**

Validity is the degree to which a research tool or method accurately measures the concept it is intended to measure. Ensures that the research measures the intended concept, reducing errors and biases. Helps to establish a strong foundation for theory development and testing. Ensures that the research findings are consistent and dependable, reducing errors and biases. Allows for replication and verification of the findings by other researchers. Ensuring data accurately measures the intended concept, through techniques like triangulation and member checking (Creswell, 2014).

### **3.11 Ethical Considerations**

The researcher obtained necessary approvals and permits from local authorities such as Ministry of local government and public works as prior to data collection, ensuring compliance with regulatory requirements. Additionally, the researcher prioritized and respect the ethical considerations by maintaining confidentiality and obtaining informed consent from participants, guaranteeing their privacy and autonomy are respected throughout the research process. To ensure participants confidentiality, participants are exempted to give their names.

### **3.12 Chapter summary**

The chapter explored processes of data collection for the research study, which involves the sampling technical methods to ensure that the sample size selected were accurate and can represent the overall population. The chapter also discussed the research instruments which will be applied by the researcher. The researcher also acknowledged the importance of ethical consideration through maintaining confidentiality and privacy when collecting data from respondents.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND DISCUSION OF FINDINGS

#### 4.1 Introduction

The chapter presents the discoveries of the study which are relevant to the objectives of the study. The results are presented into four categories which are changes and impacts of climate-related conditions on small-scale farmers, techniques that was employed by smallholder farmers and advocated by key informant, support that famers' need and that may be provided by key informant as well as recommendations from both policy makers and smallholder farmers. Qualitative research method will be used to present the data which was collected.

#### 4.2 Data presentation

During data collection I used 40 questionnaires which was successfully completed, 3 focus groups with 8 participants (smallholder farmers), 6 in-depth interviews with smallholder farmers which gives a total number 30 participants as well as 10 in-depth interviews with key informants. The researcher also consulted two secondary sources.

##### 4.2. 1Respond rate

| Instrument    | Response receives | Response % |
|---------------|-------------------|------------|
| Questionnaire | 40                | 100        |
| Focus groups  | 24                | 100        |

|                                     |    |     |
|-------------------------------------|----|-----|
|                                     |    |     |
| Interviews with key informant       | 10 | 100 |
| Interviews with smallholder farmers | 6  | 100 |

Table 1.1; Response rate, number of respondents and their percentage.

#### 4.2.2 Classification of respondents' age

The table below present the classification of age of participants that responded to questionnaires during the data collection. Smallholder farmer with 35 to 44 years held the highest percentage and this shows that most farmer are active between the age of 35 and 44.

The table did not present the age group of key informants because it was not collected.

| Age     | Frequency | Percentage |
|---------|-----------|------------|
| 25 – 34 | 8         | 27 %       |
| 35 – 44 | 10        | 33 %       |
| 45 – 54 | 6         | 20 %       |
| 55 – 64 | 4         | 13 %       |

|         |   |     |
|---------|---|-----|
|         |   |     |
| 65 – 74 | 2 | 7 % |

Table 1.2; Age of respondents, frequency and percentages.

#### 4.2.3 Classification of respondents by gender

| Participants        | Females   |            | Males     |            |
|---------------------|-----------|------------|-----------|------------|
|                     | Frequency | Percentage | Frequency | Percentage |
| Smallholder farmers | 18        | 60 %       | 12        | 40 %       |
| Key informants      | 4         | 40 %       | 6         | 60 %       |

Table 1.3; gender of smallholder farmers and key informants.

The table above presents number of participants who participate in the data collection in term of sex (female and males). It shows that there were 18 female and 12 male of smallholder farmers who participated during data collection and the total number of participants were 30 smallholder farmers. A total 10 key informants participated in the data collection and there were 4 females and 6 males.

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### 4.3 Analysis and interpretation of data

#### 4.3.1 Changes and impacts of climate change on smallholder farmers

The respondents who responded to questionnaires indicated that there were some changes in climate patterns and they highlighted several impacts of climate changes in Mutoko

district. Most of respondents indicated that they have received unpredictable rainfall patterns, prolonged dry spells. During a focus group, a smallholder farmer from Hunhu village gave the following statement.

#### **4.3.1.1 Unpredictable rainfall patterns**

During data collection both smallholder farmers and key informants indicated that they have received unpredictable rainfall pattern in the past seasons. They also mentioned that there are changes pertaining to rainfall which are rainfall distribution, adequacy as well as quality an extreme rainfall according to Archer (2016), the sociological perspective indicates that there is a crisis regarding to the rainfall patterns.

*“As a smallholder some of changes I have noticed changes in rainy season. We used to receive rainfall in October but last year we received the rain in end of December and this has made it difficult for us to predict the patterns of rainfall. I have also noticed that extreme weather events such as droughts and heat waves.”*

*“The climate change pattern that I notice is changes in rainfall. From previous seasons we used to predict the rain before it falls but the rainfall patterns have become unpredictable.”*

#### **4.3.1.2 Increase in temperature**

The rising of temperature is another change noted by both smallholder farmers and key informants. They highlighted that they have noticed heat-waves and continuous dry spells.

*“I have notice frequent increase in temperature over the past season, which has cause rise of diseases and has affected the agricultural production as well as the district development.”*



The following respondents indicated impacts of climate change to their agricultural activities during focus group discussion.

*“The climate change has greater impact in my farming activities. The rise of temperature has increased pest and diseases which increased due to high temperatures such as nematodes which damage crop roots and bollworm which damage crops such as maize and vegetables.”*

*“Due to heat waves and water scarcity has caused crop failure and livestock deaths. These problems have reduced our incomes because we are failing to meet the demand of the markets.”*

The results above revealed that participants have noticed several changes in climate-related patterns. Some of the respondents indicate some non-climate conditions that have caused challenges in agricultural production and development of the district.

#### **4.1.1 Challenges of climate change to smallholder farmers.**

##### **4.1.1.1 Water scarcity and droughts**

The collected findings also indicated challenges faced by smallholder farmers in their agricultural activities and their livelihoods is water scarcity. These challenges were food insecurity which emerged as a result of water scarcity and droughts due to changes in climate conditions. According to Faisal et al (2020), farmers in rural areas mostly lack ex-ante risk management and ex-post coping are the most vulnerable.

*“Challenges that we faced as farmers from climate-related conditions are water scarcity due to frequent drought occurrence. The limited availability of rainfall has caused several conflicts among farmers for example clashing over water*

*sources.”*

*‘The challenge that I have faced as a smallholder farmer who specialized in livestock production is cattle losses due to drought and high temperatures. This have prompted me to adopt to stress-tolerant breeds which reduced future losses of my livestock.’*

#### **4.1.1.2 Political and economic challenges**

Climate related challenge according to the data collected has caused social challenges to smallholder farmers such as increased conflicts due to competition over resources and land disputes. Smallholders also indicate political challenges they faced which were corruption, limited access to resources which hinders their agricultural development. The respondents shows that changes in climate change caused economic issues including restricted access to funding.

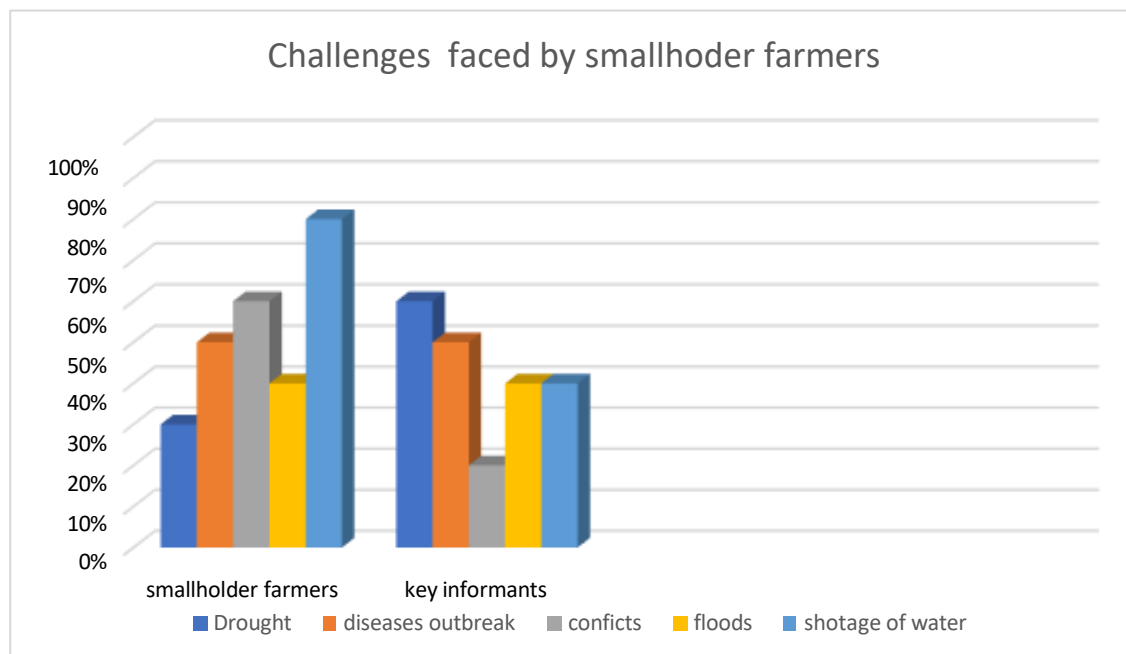
*“The challenge that we face as smallholder farmers is that we have limited participation in the decision-making pertaining to climate change. Those in power make their own decision on climate change adaptation strategies without consulting us farmers who are on the ground.*

*“As a farmer the challenge I faced is lack of access to climate related finance which will help in adapting to those climate related strategies. And also lack of knowledge as smallholder farmers of some climate finance mechanisms that were put in place by the government.”*

#### **4.1.1.3 Increased pest and diseases**

Climate change has caused challenges of pest and diseases to agricultural production of smallholders in Mutoko. Respondents have indicated that due to climate change conditions it

led to an increase in pest and diseases. They also highlighted that, pests and diseases such as armyworm, malaria and tick-borne have affected both agricultural production and their livelihood which hinders the development of the district.



The chart above highlighted some of challenges of climate change that was identified by both smallholders and key informant. The graph also shows the percentage of challenges and examples of challenges are drought, diseases outbreaks, conflict between farmers, floods as well as shortage of water.

#### **4.1.2 Strategies that key informant advocated and employed smallholder farmers**

##### **4.1.2.1 Use of irrigation system**

Use of irrigation systems is one of the techniques applied by farmers to respond to climate change conditions. As noted by Kumar (2020), the use of irrigation is vital in adapting to climate change because it provides reliable source of water for crops hence increasing agricultural productivity. Several respondents have indicated that they used irrigation systems

such as boreholes and ware dams in order to fight against climate-related challenges.

One of smallholder farmer's respondents highlighted that:

*“I adopt strategies such as irrigation and crop rotation; this has helped me to protect crops from drought. I used ware dams as source of water for irrigation.”*

During focus group discussion some of respondents highlighted that irrigation systems and ware dams are sources of water for their agricultural production. The following statements are from different respondents:

*“Some of strategies that I used in my farm to overdo the challenges that I faced from climate change is drip irrigation system and mulching. This has helped me to improve my water supply for my agricultural production. The use of drip irrigation and mulching has helped me conserve water because through drip irrigation the water will be supplied directly to the roots of plants and mulching has reduced water loss in the air.” (Participant 02)*

*“The also need support for irrigation and water harvesting technology.”*

#### **4.1.2.2 Mulching and crop diversification**

Mulching is another strategy that was highlighted by smallholder farmers as well as advocated by key informants. They indicated that they used grass, tree leaves and maize residues to cover their fields and plants. They also highlighted that they used mulching so that they conserve moisture which benefited their production. According to FAO (2017), through mulching it helps to promote biodiversity, reduction in soil degradation improving crop yields which can enhance the resilience of agricultural system. Key informant indicated that it is one of the strategies they recommended to smallholder farmers in their district.

One of key informant indicated that crop diversification and agriculture conservation as a

strategy for smallholder farmers:

*“1. Crop diversification -farmers are adapting to diversification strategies to reduce dependence on single crop.*

*2. Conservation agriculture such as mulching and minimum tillage, to reduce soil erosion and improve soil health.”*

The research has also shown that smallholder farmers used crop diversification. The participants indicated that they grow variety of both small grain crops other crops which helps them to improve their ability to cope with climate related shocks. Farmers also indicated that crop rotation is another strategy used to address effects of climate related challenges.

#### **4.1.3 Support that famers’ need and that may be provided by key informant that ensure the effectiveness of strategies.**

The research highlighted that smallholder farmers has indicated how policy makers and stakeholders (key informants) assist them in building resilience to climate change. The also indicate how this support ensures the effectiveness of strategies they used. Some of their responses were trainings on climate-smart agriculture, financial support such as climate resilient agriculture insurance social support for instance climate change awareness.

##### **4.1.3.1 Trainings on Climate-Smart Agriculture**

Training smallholder farmers is one of the supports that was indicated by both key informant and smallholder farmers. They highlighted that it is important for training farmers on C.S.A for instance conservation agriculture, agroforestry and pest management. This is supported by Lipper et al. (2014), who states that Climate-Smart Agriculture trainings help farmers in adopting to climate resilient agricultural practices such as conservation agriculture, soil fertility management. They also highlighted that these trainings were useful and it helped them to enhance their agricultural production as well as adoption of climate resilience strategies.

*“I’m glad to share my experience on one of the trainings I have received. Climate smart agriculture is one of training I had and I learnt about crop diversification, conservation agriculture and this have helped me to improve my crop yields and fight against climate related shocks.”*

*“One thing that I have learnt from trainings that I received from NGOs such as CIMMITY when they came here in Mutoko is how to reduce soil disturbance so that we would preserve soil health through minimum tillage.”*

#### **4.1.3.2 Climate resilient agriculture insurance**

From this research findings, respondents highlighted that they need for financial support that protect farmers against climate related challenges from policy makers and other stakeholders. Climate resilient agriculture is a strategy that helps farmers to manage and reduce the vulnerability to climate related risks. Greatrex et al (2015), notes that climate resilient agriculture is an insurance which protect farmers against yield failure and livestock deaths as a result of extreme weather conditions. Some of small-scale farmers indicate areas that hindered the effective adoption of resilience strategies.

*“The kind of support that I need as a farmer so that I would adapt to climate change are financial support for example loans. These loans will help us to recover from climate related shocks for instance last season here was drought which caused poor yields and outbreak of diseases.” (Participant 07)*

*“As my colleague said, as smallholder farmers we are failing to recover and adapt to climate change, so another request as a farmer are agricultural saving accounts that may help us to store our saving and we may use them after we experience climate related shocks.” (Participant 05)*

#### **4.1.3.3 Climate change awareness**

Climate change awareness is a support that smallholder need so they can adapt to climate change patterns. Some of key informant notes that a communication strategy is an effective way of elaborating and communicating between knowledge providers and stakeholders on climate change risks and adaptation needs, targeting actors ranging from those at the grassroots level to national and regional policymakers, using appropriate language. Smallholder farmers also indicated that through climate change awareness they have manage to adopt to strategies such as Pfumvunza which was strategy to overdo droughts. During focus group discussion with smallholder farmers who responded to questionnaire gave the following statements:

*“Improving public awareness and developing overall communications strategies makes climate change science accessible to the average citizen and can reduce their vulnerability.” (Participant 01)*

The following statements was given by key informants:

*“They need education on the issue of climate change and must be supported in irrigation schemes.”*

*“Smallholder farmers need climate related information and advisory which helps farmers to make informed decisions on how to adapt to climate change.”*

#### **4.2 Recommendations from smallholder farmers.**

The study findings also presented recommendations from smallholder farmers. They indicated areas that key informant may focus so as to improve their capacity to adapt to strategies that already in existence.

*“As a smallholder farmer I recommend that key stakeholder and policy makers should support climate information services such as weather forecast, climate*

*advisory so that they would provide and interpret information concerning season changes.”*

*“I would like to recommend that there must be climate change policies that may help to enhance the ability of us as smallholder farmers to adapt to climate resilience and improve our production. Policies should involve support in agriculture infrastructure development.”*

## **4.5 Chapter summary**

The data presented above shows that participants shed light on several change and challenges of climate related pattern, outlining how climate change affected their production. The findings revealed strategies that key informant advocated and employed smallholder farmers, for example use of irrigation systems, mulching and crop diversification. The study presented Support that farmers need and that may be provided by key informant which involve trainings on Climate-Smart Agriculture, climate resilient agriculture insurance as well as climate change awareness. This chapter also presented recommendations form smallholder farmers.



## **CHAPTER FIVE**

### **5.0 SUMMARY, CONCLUSIONS, RECOMMENDATION AND AREAS FOR FURTHER RESEARCH**

#### **5.1 Introduction**

This chapter provides a summary of the study findings, extracting valuable insights and drawing meaningful conclusions. The chapter highlight the summary of what was discussed in the previously covered chapters. These include the introduction, literature review, research methodology, data presentation and analysis, discussion and the possible conclusion. The conclusion to this study revealed relying on the research results, providing actionable recommendations which identify potential areas for future events.

#### **5.2 Summary**

Chapter one of the research study introduce the background, purpose and significance of the study which aims to assess the resilience and adaptation strategies of smallholder farmers. The study aims to explore the experience and perceptions of smallholder farmers in Mutoko, Zimbabwe. The study also identifies effective strategies for enhancing their ability to withstand climate change. This chapter also highlights limitation, delimitation and scope of the research study.

The chapter two presents a comprehensive existing literature review on climate change impacts, resilience building and adaptation regarding the context of smallholder farming. This review provides conceptual framework for research study informing the research design and methods. The study was guided by Social Ecological System theory (SES) which highlighted the interconnectedness between the ecosystems and humanity. The chapter also identifies gaps in current research and present relevant literature supporting the adopting of climate change

strategies.

In chapter three, the researcher highlighted research methods which was used during fieldwork and these are qualitative research approach and techniques. This study also presented the case study as a research design which was used to explore the experience and perceptions of smallholder farmers in Mutoko. The researcher's sample involved 40 participants who were selected using non-random sampling methods. The researcher also implements both primary and secondary data collection tools. The chapter provides a detailed description of the research design, sampling strategy and collection methods

Chapter four presents the findings of the study, organized around themes that emerged from the data analysis. The research question was answered in this chapter by the responses from participants who participated during data collection. The chapter provides a detailed analysis of data, highlighting the resilience and coping strategies applied by smallholder farmers from Mutoko. The research study was also analyzed and it was linked to the literature review.

Chapter five presents an overview of the study findings extracting valuable insights and drawing meaningful conclusion. The chapter highlighted a summary of what was discussed in the previously covered chapters including the introduction, literature review, research methodology, data presentation and analysis. The primary focus of this chapter was to synthesize the results providing actionable recommendations that identified potential areas of future research contributing to the ongoing discourse concerning climate change adaptation and resilience in agricultural context.

### 5.3 Conclusion

The research findings conclude that climate change has notable effects on smallholder farmers and the district as whole. It is justifiable to conclude that climate change impacts increased pest and diseases which caused crop failure and death of livestock, such as nematodes which damage crop roots and bollworm, and water scarcity has caused livestock deaths, as well as crop failure. This was supported by respondents of the research study who indicate that climate changes are mainly caused by impacts, the changes were caused extreme weather conditions such as rise of temperature, changes in rainfall patterns and droughts. From the research study smallholder farmers indicated that they used to receive first rainfall in October and last year they have received their rains in December.

The research study found that climate change has imposed several challenges on smallholder farmers as well as the entire district. From the research findings participants indicated that water scarcity, drought, pest and diseases are major challenges that affects their agricultural production. These challenges have caused food insecurity to the smallholder farmers as and some residents of Mutoko district, deaths of livestock. The other notable challenge that was outlined by smallholder farmers were conflicts among smallholder farmers due to the scramble for resources such as presidential inputs as well as limited participation in decision making.

This research concludes that there are several strategies that was used by smallholder farmers and that was advocated by key informants. From these findings the research has concluded that smallholder farmers use irrigation systems techniques, crop diversification as well as water harvesting in order to mitigate negative impacts caused by climate change. However, the research also noted that smallholder farmers implemented these strategies on a small scale and this was main focus of the fourth objective. Participants indicated that they have limited resources which hindered them to implement these strategies effectively. From the feedback of key informant participants also highlighted challenges which were lack of funding and the issue

of politicization.

The researcher has noted some of strategies that were effective in adopting to climate change related challenges by smallholder farmers. From the data collected the researcher concluded that the strategies such as training programs, conservation agriculture such as pfumvudza have held smallholder farmers to alleviate their agricultural sector. Response from some of small holders indicates that strategies they implemented were useful because it helps them to enhance their production. However other smallholder farmers indicated that some of strategies are not favorable to some of the challenges they face as small-holder farmers. They indicated that they are not included in policy making.

#### **5.4 Recommendations**

The researcher recommends smallholder farmers in Mutoko should continue implementing Climate- Smart Agriculture and should invests in these practices in order to mitigate the impact from climate change. They need to mainly concentrating on advancing conservation agriculture as well as use of drought-tolerant crops and livestock. They should also embark on using organic manure and soil fertility and structure in order to improve soil fertility.

The government departments including Ministry of Agriculture, Ministry of Environment, non-government and private companies such as We Effect as well as Adventist Development and Relief Agency (ADRA) should invest in climate resilience infrastructures such as water harvest systems and irrigation systems. They should provide funding, technical assistance and policy support in order to adopt to CSA practices. Distributing presidential inputs equally to smallholder farmers is also a recommendation to government stakeholders. The government officials should ensure transparent in ensuring presidential inputs are distributed and avoid politicization of resources.

Inclusion of smallholder farmers in development of climate resilient agricultural policies. From

the above findings smallholder farmers indicated that they are not included in the policy making concerning the issue associated with climate change. This researcher recommendation for government to include participation of smallholder farmers in developing climate related strategies or policies which take into an account the specific climate condition in Mutoko district.

### **5.1 Area of further research**

Other researchers may explore the following various areas of study.

Developing and testing climate information systems to provide smallholder farmers with timely and accurate climate information to inform their agricultural decisions.

Investigating the potential of agro-insurance and other risk management strategies to support smallholder farmers in managing climate-related risks.

Investigating the link between climate change and human migration, including the effects of climate change on migration decisions.

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## **Appendix 1: Interview guide for smallholder farmers in Mutoko**

My name is Locardia Chagwena R and I am an undergraduate student at Bindura University of Science Education. I am studying Bachelor degree of Peace and Governance. I am conducting research on Resilience and adaptation strategies to climate change impacts. A case of Mutoko smallholder farmers.

This questionnaire is designed to assess your view and experiences on the impact of climate change in your agricultural production. Kindly be assured that all the information you provide will be kept confidential. Please note that your participation to complete this questionnaire is voluntary. Your responses will also be combined with other responses to identify broader concept and themes without relying on individual responses to targeted participants.

Questions:

- What are changes have you noticed in weather or climate patterns?
- How have these challenges affected your agricultural activities and livelihood?
- What is the climate-related challenges you have face as a smallholder farmer?
- What are some of the strategies you employ to adapt to climate-related challenges?
- Are there any successful adaptation initiatives you have implemented on your farm?
- Does your traditional practices and knowledge contribute in building resilience to climate?

- As a smallholder farmer what kind of support do you need to adapt to climate change?
- In your own view how may policy makers and stakeholders support smallholder farmers to build resilience to climate change?
- Are there any experiences you may share regarding to climate change
- What is the recommendation you may have for policy-makers other stakeholders and policymaker

## **Appendix 2: Interview guide for DDC Officer, AGRITEX Officer, and government ministries.**

My name is Locardia Chagwena R and I am an undergraduate student at Bindura University of Science Education. I am studying Bachelor degree of Peace and Governance. I am conducting research on Resilience and adaptation strategies to climate change impacts. A case of Mutoko smallholder farmers.

This questionnaire is designed to assess your view and experiences on the impact of climate change in your agricultural production. Kindly be assured that all the information you provide will be kept confidential. Please note that your participation to complete this questionnaire is voluntary. Your responses will also be combined with other responses to identify broader concept and themes without relying on individual responses to targeted participants.

### **Questions:**

- How climate change is affecting your farming activities of smallholder farmers in your district?
- What is specific climate-related challenges you have faced?
- What are the strategies have you used to address effects climate-related challenges.
- What are successful innovations that have assisted you to cope with climate change?
- What are successes and challenges of traditional knowledge and practices in building

resilience to climate change?

- What are some of support do smallholder farmers need to adapt to climate change?
- What are challenges that you face in trying to implement policies of climate change?



## Appendix 3

**BINDURA UNIVERSITY OF SCIENCE EDUCATION**

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**FACULTY OF SOCIAL SCIENCES AND HUMANITIES**



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**DEPARTMENT OF PEACE AND GOVERNANCE**

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28 November 2024

TO WHOM IT MAY CONCERN

**RE: REQUEST TO UNDERTAKE RESEARCH IN YOUR ORGANISATION**

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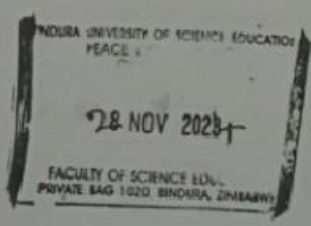
This serves to introduce the bearer, Locardia R Chaywena, Student  
Registration Number 2210479B, who is a HBSC PEACE AND GOVERNANCE  
student at Bindura University of Science Education and is carrying out a research project in your  
area/institution.

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



**J. KUREBWA (DR)**  
**Acting Chairperson**





## Appendix 4

|                                                       |                                                                                                      |                                                      |
|-------------------------------------------------------|------------------------------------------------------------------------------------------------------|------------------------------------------------------|
| Correspondence should not be addressed to individuals | <br><b>ZIMBABWE</b> | <b>MINISTRY OF LOCAL GOVERNMENT AND PUBLIC WORKS</b> |
| Telephone: No(s) (065213) 2326/2373/2874              |                                                                                                      | OFFICE OF THE DISTRICT DEVELOPMENT COORDINATOR       |
| E-mail: damutoko@gmail.com                            |                                                                                                      | P.O. BOX 61                                          |
| Reference:                                            |                                                                                                      | <u>MUTOKO</u>                                        |
|                                                       |                                                                                                      |                                                      |

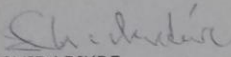
13 January 2025

**TO WHOM IT MAY CONCERN**

**CLEARANCE FOR LOCARDIA CHAGWENA R TO CARRY OUT A RESEACH IN MUTOKO DISTRICT**

Please be advised that Locardia Chagwena R has been cleared to carry out research in Mutoko District. She is a student undertaking a HBSC PEARCE AND GOVERNANCE at Bindura University of Science Education

May you kindly assist her in whatever way possible to carry out the research.

  
 E CHIDARIKRE

For: **DISTRICT DEVELOPMENT COORDINATOR – MUTOKO**



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