Assessing the Effectiveness of Parametric Insurance in Enhancing Food Security among Smallholder Farmers in Chiweshe, Zimbabwe

A dissertation submitted in partial fulfilment of the requirements for the Master of Science Degree in Food Security and Sustainable Agriculture

Bindura University of Science Education

Faculty of Agriculture and Environmental Science

Department of Agricultural Economics, Education and Extension

KELVIN M NDAGURWA

Registration number

B243612B

Name of Supervisor:

DR V. MUNYATI

June 2026

RELEASE FORM

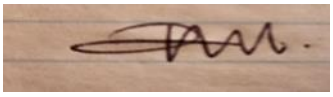
Name of Candidate: Kelvin M Ndagurwa

Reg Number: B243612B

Degree: Master of Science Degree in Food Security and Sustainable Agriculture

Project Title: Assessing the Effectiveness of Parametric Insurance in Enhancing Food Security among Smallholder Farmers in Chiweshe, Zimbabwe

Permission is hereby granted to **Bindura University of Science Education Library** to produce a single copy of this dissertation and lend such copy for private, scholarly or scientific research only.

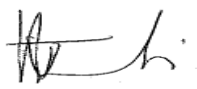
Signed……

Permanent Address: 19442 Damofalls Ruwa

APPROVAL FORM

The undersigned certified that they have supervised and recommended Bindura University of Science Education for acceptance of dissertation entitled '**Assessing the Effectiveness of Parametric Insurance in Enhancing Food Security among Smallholder Farmers in Chiweshe, Zimbabwe'** submitted in partial fulfillment of a Master of Science Degree in Food Security and Sustainable Agriculture.

Name of supervisor: Dr V.T Munyati

Signature: 

Date: 28/08/2026

DECLARATION

I hereby declare that the research project entitled "**Assessing the Effectiveness of Parametric Insurance in Enhancing Food Security among Smallholder Farmers in Chiweshe, Zimbabwe**" submitted to Bindura University of Science Education, Department of Agricultural Economics, Education and Extension is a record of an original work done by me under the guidance and supervision of **Dr V.T Munyati** and this work is submitted in partial fulfilment of the requirements for the award of a Master of Science Degree in Food Security and Sustainable Agriculture. The results embodied in this thesis have not been submitted to any University or Institute for the award of any degree of diploma.

Author: - Kelvin M Ndagurwa

Reg Number: B2z43612B

Signature: 

Date: 25/06/2026

DEDICATION

I would like to dedicate this research to my father Garikai Ndagurwa, Mother Ratidzai Ndagurwa and friends. I hope I made you proud and have set a good example in the family. This research is also dedicated to my girlfriend Zvikomborero Mandudzo. I hope I am making you proud as well. I'm also dedicating this to my mentor Brenda Mandishona I hope this will make you proud.

ACKNOWLEDGEMENTS

I would like to thank God for giving me strength to finish this dissertation and being ever present. Without his guidance, this dissertation would not have been possible.

My utmost gratitude goes to my supervisor DR V. Munyati for his patience and close guidance in the conduct of this research. I simply could not have reached this far without the guidance I received from my supervisor.

My deepest appreciation goes to my beloved parents for their continued support and belief in me.

Lastly, I would like to thank my friends and workmates for the continuous support throughout the duration of the research.

ABSTRACT

The purpose of this study was to evaluate how well parametric insurance improved food security for smallholder farmers in Chiweshe, Zimbabwe. Uncertainty about climate change and frequent natural disasters that impact Zimbabwe as a whole served as the study's backdrop. This study's primary goals were to build a strong foundation for parametric insurance's efficacy and identify unique coverage options that Zimbabwe may adopt in light of its natural disaster history. The studied literature concentrated on the benefits and drawbacks of weather index insurance as well as how low-income nations like Zimbabwe may successfully implement it, providing pertinent examples. The internet, particularly online books, journals, and articles, was the primary source of literature. The Chiweshe community's smallholder farmers made up the research population. Data from the field was gathered through interviews and self-administered questionnaires. Charts, graphs, and tables were used to qualitatively convey and analyze the data. According to the study, parametric insurance can help small-holder farmers ensure their food security amid natural disasters. But the biggest obstacle was a lack of funding. The government and insurance companies were advised to adopt catastrophic bonds and create a disaster risk pool.

LIST OF ACRONYMS AND ABBREVIATIONS

CRF – Catastrophic Risk Facility

ARC – Africa Risk Capacity

FAO - Food and Agriculture Organisation

WFP - World Food Program

IPCC- Intergovernmental Panel on Climate Change

Parametric Insurance- non-traditional model that issues pre-agreed payouts based on specific trigger events

TAM- Technology Accepting Model

PU – Perceived Usefulness

PEOU – Perceived ease of use

ATT – Attitude

BI – Behavioural Intentions

HFIAS – Household Food Insecurity Access Scale

HFSI – Household Food Security Index

Table of Contents

RELEASE FORM 2
APPROVAL FORM 3
DECLARATION 4
CHAPTER 1 14
1.1Background of the study 14
1.2 Problem statement 16
1.3 Objectives 16
1.3.1 Main objective 16
1.3.2 Specific objectives 16
1.4 Research questions 17
1.5 Justification 17
1.6 Limitations and Delimitations 17
1.6.1 Limitations of the Study 18
1.6.2 Delimitations of the Study 19
CHAPTER 2 20
LITERATURE REVIEW 20
2.1 Introduction 20
2.2 Definition of key terms 20
2.2.1 Parametric Insurance: 20
2.2.2 Food Security 20
2.2.3 Rural Resilience 21
2.3 Empirical Evidence 21
2.4 Conceptual Framework 22
2.5 Parametric Insurance, Climate change and Natural disasters 25
2.6 Theoretical framework 26
2.6.1 Technology Acceptance Model 26
2.7 Research Gap 28
CHAPTER 3 30
3.1 Introduction 30
3.2 Study Area 30
3.3 Research Philosophy 31

3.4 Research Approach 31
3.5 Population 32
3.6 Sampling Techniques 32
3.7 Sample Size 32
3.8 Data collection procedure 33
3.9 Analytical Tools 33
3.9.1 To identify parametric insurance policies for climate resilience and food security. 35
3.9.2 To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe. 35
3.9.3 To analyse the relationship between parametric insurance coverage and food security outcomes among participating households 35
3.10 Ethical Considerations 36
CHAPTER 4 38
4.1 Introduction 38
4.2 Demographic Data 38
4.2.1 Age of Household Head 38
4.2.2 Sex of Household Head 39
4.2.3 Educational Level of Household Heads 41
4.3 Resource Endowments 42
4.4 Agricultural Extension 43
4.5 Conclusion 44
CHAPTER 5 45
5.1 Introduction 45
5.2 Methodology 46
5.2.1 Study Area 46
5.2.2 Research Philosophy 46
5.2.3 Research Approach 46
5.2.4 Population 47
5.2.5 Sampling Techniques 47
5.2.6 Data collection procedure 47
5.3 Analytical Tools 47
5.3.1 To identify parametric insurance policies for climate resilience and food security. 47
5.3.2 To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe. 48
5.5 Results and Discussion 48

5.5.1 Parametric Insurance Programmes 48
5.5.2 Understanding Farmers' Perspectives on Parametric Insurance 51
5.5.3 Associations Between Demographics and Uptake of Parametric Insurance 52
5.6 Conclusion 54
Chapter 6 55
6.1 Introduction 55
6.2 Methodology 56
6.2.1 Study Area 56
6.2.2 Research Philosophy 56
6.2.3 Research Approach 56
6.2.4 Population 56
6.2.5 Sampling Techniques 57
6.2.6 Data collection procedure 57
6.2.7 Challenges encountered during data collection 57
6.3 Analytical Tools 57
6.5 Results 58
6.5.1 Household Food Security 58
6.5.2 Effects of Insurance Coverage on Household Food Security 60
6.6 Conclusion 62
Chapter 7 63
7.1 Summary 63
7.2 Conclusion 65
7.3 Recommendations 65
References 66
Questionnaire 69

LIST OF TABLES

Table 1: Analytical tools 34
Table 2: Agricultural Extension..... 43
Table 3: Insurance Types 49
Table 4: Farmers' perspectives..... 51
Table 5: Associations Between Demographics and Uptake of Parametric Insurance 52
Table 6: Effects of Insurance Coverage on Household Food Security 60

LIST OF FIGURES

Figure 1: Conceptual Framework 23
Figure 2: Map for Chiweshe 30
Figure 3: Age of household heads 39
Figure 4: Gender of household heads 40
Figure 5: Marital Status of household heads 40
Figure 6: Educational Level of household heads 41
Figure 7: Resource Endowments 42
Figure 8: Household Food Security 59

CHAPTER 1
INTRODUCTION

1.1Background of the study

Over the past few decades, natural disasters have impacted numerous nations worldwide. Infrastructure, people's personal property, human life, and agricultural produce are all at risk due to the rise in natural disasters. IPCC (2007) claims that such catastrophes have been made worse by global climate change. Natural calamities are unavoidable, and no nation can completely shield itself from them. Natural catastrophes have cost billions of dollars to recover from globally, and despite efforts to do so, they have increased in frequency. Zimbabwe is one of the developing nations that have experienced natural disasters. Because they lack a solid financial foundation, they typically are unable to bear the losses resulting from catastrophic hazards. Most of the time, governments around the world have struggled to raise money to provide disaster relief, and Zimbabwe has been no exception. Risk management technologies are therefore required to finance natural disasters.

Zimbabwe has been among the nation's most severely impacted by natural disasters in recent years. Natural disasters are having an influence all over the nation, endangering sustainable development, resilience, and poverty cycles. These calamities fluctuate between droughts and floods. According to Cardona (2003), a disaster is a process that is brought on by either natural or man-made events and, because of vulnerabilities in the population and infrastructure, results in significant changes and hinders the regular operations of impacted communities to the point where they are unable to manage on their own. The agricultural industry has often been affected by natural disasters, which have put the nation's food security at risk and resulted in large losses for most farmers (The Herald, February 20, 2020). According to the Zimbabwe Independent on March 18, 2016, natural disasters have a detrimental effect on businesses, forcing them to close, which results in unemployment, low living conditions, and food shortages. In addition to implementing climate change mitigation initiatives like Climate Smart Agriculture, the government collaborates with several branches during catastrophes. All of these initiatives demonstrate the commitment to reducing the detrimental effects of natural disasters. In most cases whenever, a natural disaster occurs the government has been found wanting, without any means of disaster relief, the only resort is to call the international community for assistance. The government is the main source of compensation for disaster victims, but it usually takes a long time for them to get aid, and

during that time, poverty cannot be reduced (Daily News, February 19, 2014). Though their efforts are only short-lived, the public stands up to support individuals affected by the government's slow response. The government usually struggles to finance natural disasters and usually fails on its own.

Zimbabwe and other developing nations lack the financial resources to absorb losses brought on by catastrophic threats. Considering the Tokwe-Mukosi Dam floods, which harmed 60,000 people and left roughly 2230 households homeless, the disaster alone cost up to USD 20 million to transfer the victims (Chidoori, 2017). The administration was unable to raise money for disaster aid when the Tokwe Mukosi flood tragedy struck. According to Chidoori (2017), disasters like the Tokwe-Mukosi floods cause communities to pause, and the expenses of recovering, reconstructing, and resuming regular life are quite costly. The Red Cross Society (2017) claims that because the only insurance was unable to provide compensation, the cyclone Dineo floods damaged homes, bridges, property, animals, and the government.

Cyclone Idai was the most recent national disaster, affecting over 1.5 million people in Malawi, Mozambique, and Zimbabwe. More deaths and property destruction were reported in Zimbabwe (CBSNews, March 18, 2019). Millions of dollars' worth of property was damaged, more fatalities were reported, and some persons vanished. One year after Cyclone Idai, the government is still tallying expenses, according to an article published in the Business Times on March 2, 2020. The research continued by determining that infrastructure reconstruction was predicated on government-funded contracts because they lacked insurance. As the rainy season approaches, survivors of Cyclone Idai continue to live in tents (The Herald 04, November 2019). As a result, the victims begged the government to construct homes for them before the rain started. Communities are brought to a complete halt by natural disasters, and they must quickly recover in order to resume normalcy. Thirty percent of the costs resulting from natural disasters are covered by insurance; however, protection gaps continue to occur, and seventy percent of the damages are not covered. The responsibility falls on the government, which raises taxes to cover the costs, which turns out to be an ineffective method of funding disasters (SwissRe, 2016). Insurance does kick in after natural disasters, but it takes a long time to evaluate, handle claims, and pay out. Coverage gaps remain a problem even with extensive coverage on some catastrophic dangers. Chidoori (2017) suggests that the government may not be able to repair and recoup from losses by filling the

coverage gaps created by traditional insurance. According to SwissRe (2016), having parametric insurance cover has become crucial in the event of a natural disaster. The majority of reinsurers have created parametric insurance for both developed and developing nations in collaboration with the World Bank. Governments must protect themselves against the financial effects of natural catastrophes, and robust collaboration between the private and public sectors may enable nations to better finance disasters through parametric protection (Margulescu et al, 2013). According to Scherer (2013), parametric insurance is now the most often used technique and is primarily intended for countries looking to protect themselves from the effects of natural disasters. Most nations that require protection have used parametric insurance through pilot programs like the Caribbean Catastrophic Risk Facility and African Risk Capacity

1.2 Problem statement

In Zimbabwe, food security has been affected by changes in climatic conditions. Food security has been deepened by crop failures and reduced agricultural productivity due to drought occurrences. The reduction in agricultural productivity has been worsened by the limited access of smallholder farmers to insurance and other risk management services. One way to reduce climate-change-related risks and enhance food security is through parametric insurance (Cummins & Mahul, 2009). However, it is still unclear how well parametric insurance would guarantee food security in Zimbabwe. Despite the increased interest in parametric insurance, there is limited empirical information on its impact on food security outcomes in Zimbabwe. This study intends to fill this knowledge gap by examining the efficiency of parametric insurance in ensuring food security in Chiweshe, Zimbabwe.

1.3 Objectives

1.3.1 Main objective

- To evaluate the effectiveness of parametric insurance products in ensuring food security during climate change for smallholder farmers in Chiweshe.

1.3.2 Specific objectives

- To identify parametric insurance policies for climate resilience and food security**.**
- To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe.
- To analyse the relationship between parametric insurance coverage and food security outcomes among participating households.

- To identify challenges and limitations affecting the implementation and effectiveness of parametric insurance in communal areas.

1.4 Research questions

- What are the parametric insurance policies adopted in Chiweshe among small holder farmers?
- How does the level of awareness, uptake, and perception of parametric insurance influence food security among small holder farmers in Chiweshe?
- What is the relationship between parametric insurance and food security?
- What are the challenges and limitations affecting the implementation and effectiveness of parametric insurance in Chiweshe.

1.5 Justification

This study is significant for several reasons, particularly in the context of Zimbabwe's ongoing battle with food security, exacerbated by climate change and recurrent droughts. By assessing the Effectiveness of Parametric Insurance in Enhancing Food Security among Smallholder Farmers in Chiweshe, Zimbabwe, this research will provide critical insights into the effectiveness of community-based approaches in emergency settings. The study will benefit the student by understanding the relationship between parametric insurance and food security. The study will benefit the student as it is a requirement for the partial fulfilment of his studies in food security and sustainable agriculture. The study will be valuable to policymakers on how they can craft policies that can be used to reduce problems of food insecurity using parametric insurance. The study will also benefit the insurance companies of Zimbabwe. The insurance companies in the country can use it as a reference point for future research. The study can guide future research in parametric insurance and food security.

The study will also be beneficial to the government and the smallholder farmers in Chiweshe. The community of Chiweshe can gain insights on how best to mitigate against climate change using parametric insurance. The study will empower the community of Chiweshe, smallholder farmers will have the necessary knowledge on how best to deal with climate change.

1.6 Limitations and Delimitations

1.6.1 Limitations of the Study

Data availability and reliability: Accurate and comprehensive data on farmers' insurance enrolment, payouts, agricultural output, household income, and food-security results may be difficult to obtain for the study. Additionally, some individuals could have trouble accurately recalling prior farming experiences.

Limited generalizability: The study's conclusions might not apply to all smallholder farmers in Zimbabwe because it concentrates on Chiweshe. varied districts may have varied results due to variations in rainfall patterns, agricultural techniques, market access, and insurance availability.

Respondent bias: When discussing the advantages or difficulties of parametric insurance, farmers may give answers they think the researcher will expect. The accuracy of self-reported data may be impacted by this.

Knowledge of parametric insurance: Some farmers might not be well-versed in how parametric insurance operates, especially when it comes to weather triggers, premium payments, and payout procedures. Their opinions of the insurance product's efficacy may be affected by this.

Weather variability: The weather has a direct impact on how successful parametric insurance is. It is challenging to distinguish the impact of insurance from more general climatic conditions since variations in rainfall and drought patterns during the research period may have an impact on insurance payouts and food-security results.

Basis risk: Because reimbursements are based on predetermined weather indications rather than specific farm-level losses, parametric insurance may occasionally fail to reimburse farmers for actual losses. The evaluation of whether the insurance actually increases household food security may be made more difficult by this base risk.

Financial and logistical limitations: The study's geographic reach and sample size may be limited by a lack of funds, difficulties with transportation, and time limits.

Attribution of food-security outcomes: Household income, crop yields, market accessibility, government support, remittances, input availability, and climate all have an impact on food security. As a result, it might be challenging to ascribe improvements in food security to parametric insurance participation alone.

1.6.2 Delimitations of the Study

Geographical boundaries: The study will only be conducted in Chiweshe, Zimbabwe, and will concentrate on a few local communities. The primary study population will not include farmers from outside Chiweshe.

Population delimitation: Rather than large-scale commercial farmers, agricultural firms, or urban households, the study will concentrate exclusively on smallholder farming households.

Subject delimitation: Parametric agriculture insurance and its impact on household food security will be the main focus of the study. Only when comparison or contextual understanding are required will other types of agricultural insurance be taken into account.

Focus on food security: With special attention to indicators pertinent to smallholder farming households, food security will be analyzed in terms of dimensions such food availability, food access, food use, and stability.

Variables of interest: Access to parametric insurance, insurance uptake, cost, comprehension of insurance products, regularity and sufficiency of payouts, farmers' agricultural outcomes, and household food-security status are among the main variables that the study will look at.

Time delimitation: The study will concentrate on a particular agricultural period or recent farming seasons that are pertinent to the evaluation of food-security outcomes and the provision of parametric insurance. Only when context is required will historical data from beyond the chosen time period be utilized.

The smallholder farming household will serve as the primary unit of analysis; however, information may also be gathered from pertinent agricultural extension agents, insurance companies, community leaders, and other important informants to offer contextual viewpoints.

Methodological delimitation: The researcher will choose the research design, sample strategies, data collection tools, and analytical approaches for the study. Therefore, it won't try to look into every aspect that affects Chiweshe farmers' food security.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review section will look at the definition of key terms, the theoretical theories that will guide the research, the empirical framework, and the empirical review. The chapter will also look at the studies on the viability of parametric insurance in Zimbabwe. The chapter will also look at the case studies where parametric insurance was done successfully.

2.2 Definition of key terms

2.2.1 Parametric Insurance:

Parametric insurance is an insurance contract between a farmer and an insurance company in which the insurer compensates the farmer once a specific weather threshold is reached. The weather threshold can be defined as rainfall, temperature, or wind speed being reached, regardless of the actual damage to the farmer's crops or livestock. In other texts, parametric insurance is also referred to as index-based insurance. Other researchers also defined parametric insurance as a risk transfer mechanism by smallholder farmers that provides payouts based on the occurrence of adverse weather conditions. Parametric insurance differs from traditional insurance models in the sense that traditional insurance requires detailed loss verification, which often results in payout delays and higher administrative costs. According to studies, parametric insurance offers faster payouts and is highly transparent.

2.2.2 Food Security

Food security exists when all people, always, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and preferences for an active and healthy life (FAO, 2023). In drought-affected regions, food security is threatened by reduced agricultural productivity, high food prices, and limited access to emergency food aid (WFP, 2023).

2.2.3 Rural Resilience

Rural resilience is the capacity of rural communities to withstand, adapt to, and recover from environmental and socio-economic shocks, ensuring the continuity of livelihoods and social systems. (Poltorak, A., Bodnar, O., Rybachuk, I., & Statsenko, V. , 2024). (Li, 2023) Rural resilient refers to a rural area's ability to cope with its inherent, economic, ecological and cultural vulnerabilities

2.3 Empirical Evidence

In a study by Wang et al. (2023) in South Africa, they examined the demand for weather-based crop insurance among maize farmers. The methodology that was used by Wang et al. (2023) was the expected utility function. The expected utility function evaluated single-variable and multivariate weather indices. The results from the study by Wang et al. (2023) showed that contracts based on combined indices of rainfall and temperature, or rainfall and growing degree days, provided stronger prediction power for the yield variability than single-factor indices. According to Wang et al. (2023), farmers who are risk-averse value contracts that are based on combined indices, especially under actuarially fair premiums.

A similar study was done in Ethiopia using propensity score matching by Gebretsadik and Tesfay (2023). The major objective of the study by Gebretsadik and Tesfay (2023) was to assess the impact of weather index crop insurance on multidimensional food security. Gebretsadik and Tesfay (2023) noted that insured farmers experience significant improvements in food security. The improvements were noted across all the food security pillars, that is, availability, access, utilisation and stability. According to the findings of Gebretsadik and Tesfay (2023), those insured farmers are more food secure than non-insured farmers in Ethiopia. The study also noted that insured farmers tend to use improved seed varieties and fertilisers. Gebretsadik and Tesfay (2023) concluded that weather index crop insurance not only mitigates against the adverse effects of weather but also encourages farmers to use productivity-enhancing technologies.

According to a study published by ISF (2022), it noted that an increase in insurance by 1% reduces disaster recovery burdens by 22% amongst smallholder farmers in sub-Saharan Africa. Insurance uptake remains low in the region, with more than 97% of the farmers not being insured. According to ISF (2022), the key barriers to insurance uptake are low awareness, high basis risk, and affordability. Some of the insurance companies.

In Zimbabwe Hlatshwayo and Mpundu (2025) did a study on the potential of parametric insurance to be resilient and mitigate against the adverse effects of weather-induced crop failure. The major findings of Hlatshwayo and Mpundu (2025) were that parametric insurance offers timely payouts linked to climatic triggers. The findings of Hlatshwayo and Mpundu (2025) concur with those of Wang et al. (2023), who also noted timely payouts to the insured farmers. The challenges of limited awareness, affordability concerns, and mistrust of insurance providers, which were noted by Gebretsadik and Tesfay (2023), were also noted by Hlatshwayo and Mpundu (2025). Hlatshwayo and Mpundu (2025) further noted challenges of skepticism about payout reliability, with 65% of the interviewed farmers citing past negative experience with traditional insurance models. Hlatshwayo and Mpundu (2025) noted that some of the farmers highlighted higher premiums as a major cause of low insurance uptake. Farmers highlighted that if premiums were to be reduced, most of them were willing to take up parametric insurance covers.

Studies were also done in India by Divi et al. (2025) and Nivetha et al. (2025) on the impacts of parametric insurance on sugarcane production. Studies by Divi et al. (2025) and Nivetha et al. (2025) used the Pearson correlation and propensity score matching, and both studies highlighted that demographic factors, income, and risk aversion influenced the uptake of insurance packages by the sugarcane farmers in India. From the studies in India, it was noted that insured farmers receive higher incomes vis-à-vis no-insured farmers. Barriers include lack of awareness, high premiums, delayed claim settlements, and exclusion of tenant farmers. These findings highlight the paradox of crop insurance in India: while it demonstrably stabilizes incomes, systemic inefficiencies erode farmer confidence and participation. A similar study was also conducted in Turkey by Aytop et al. (2025) on apricot farmers. Aytop et al. (2025) assessed the insurance behaviour of apricot farmers using a binary logit model. The major findings of Aytop et al. (2025) were that age, household labour capacity, and non-farm income increase the probability of insurance uptake by apricot farmers.

2.4 Conceptual Framework

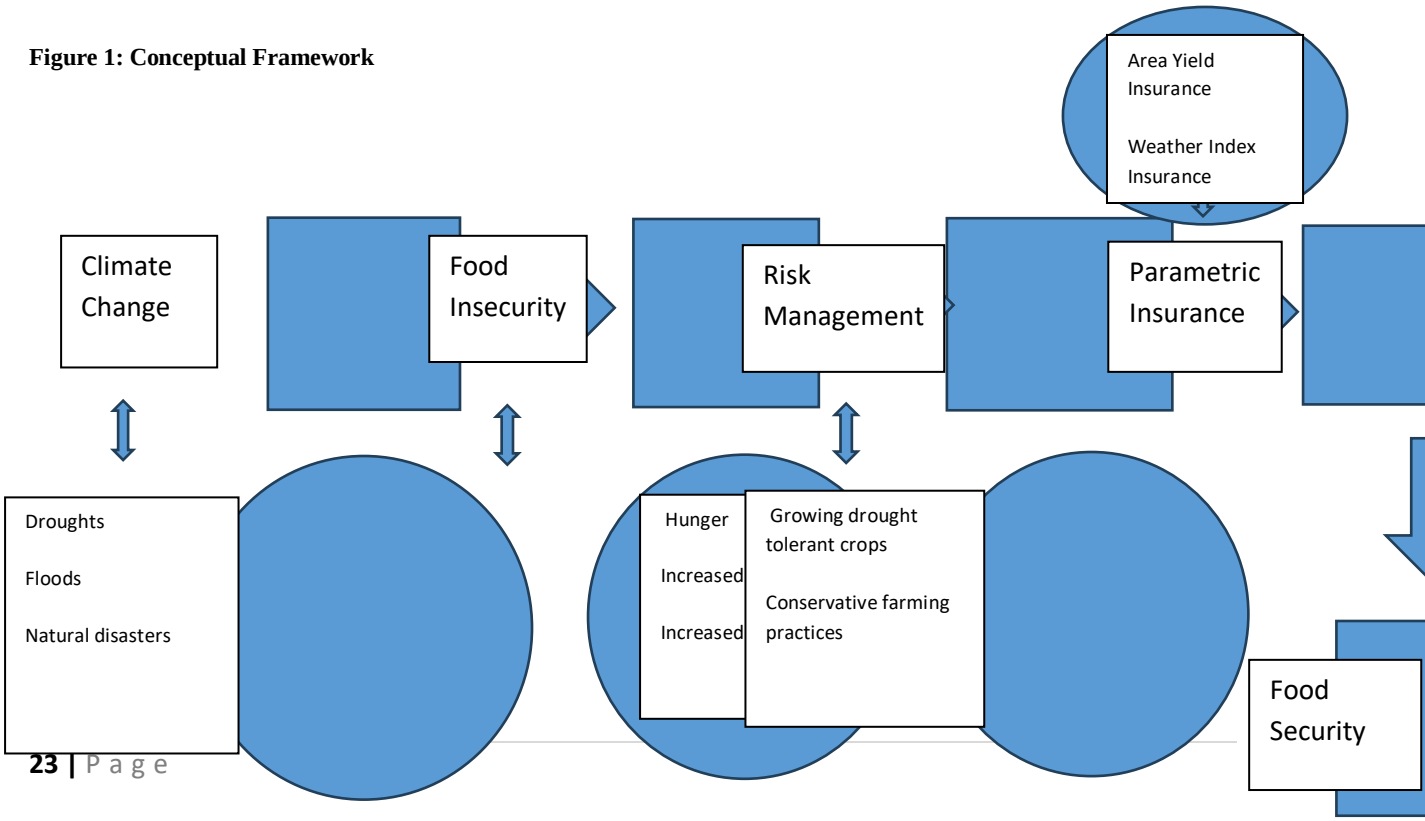
The conceptual framework for this study illustrates the relationships among key variables that shows are parametric insurance can make smallholder farmers resilient to climate change. By exploring the interconnectedness between the variables, researchers can identify the effective

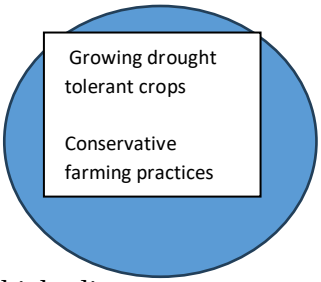
parametric insurance model that can be used by the smallholder farmers to mitigate the negative effects of climate change within the farming community. The study designed a conceptual framework that illustrates the linkages between climate change and food insecurity and how parametric insurance can be used to mitigate against climate change and make households food secure.

According to studies, climate change has been documented as a major drive to food insecurity amongst smallholder farmers. Most of the smallholder farmers are vulnerable to weather shocks such as droughts, floods, and other vagaries of nature that undermine agricultural productivity. According to FAO (2019), these climate shocks have largely contributed to food insecurity amongst the smallholder farmers. When faced with these weather shocks, households mainly mitigate against climate change by growing drought-tolerant varieties or practising conservation farming. According to research, these practices are often not adequate to buffer against the climatic shocks. Greatrex et al. (2015) highlighted that parametric insurance can be a panacea for climate shocks. Parametric insurance offers financial mechanisms that provide rapid payouts to smallholder farmers thereby reducing vulnerability and stabilising livelihoods.

This conceptual framework therefore provides a structured lens through which the study examines the effectiveness of parametric insurance in safeguarding food security among smallholder farmers in Chiweshe, Zimbabwe.

Figure 1: Conceptual Framework





The conceptual framework guiding this study illustrates the pathways through which climate change influences food insecurity, and how risk management strategies—particularly parametric insurance—can mitigate these effects to enhance food security outcomes. At the foundation of the framework, climate change is recognized as a critical driver of vulnerability in semi-arid regions such as Chiweshe, Zimbabwe. Scientific literature emphasizes that climate change manifests through hazards such as droughts, floods, and other natural disasters, which directly undermine agricultural productivity and household food systems (IPCC, 2022). These climatic shocks lead to food insecurity, expressed through hunger, rising food prices, and increased poverty levels. The Food and Agriculture Organization (FAO, 2019) defines food insecurity as the lack of consistent access to sufficient, safe, and nutritious food, highlighting its multidimensional nature across availability, access, utilization, and stability.

To cope with these risks, households often adopt risk management strategies, such as cultivating drought-tolerant crops and practicing conservative farming methods. While these strategies provide some resilience, they are often insufficient to fully protect livelihoods against severe climate shocks. This gap is addressed by parametric insurance, which is increasingly recognized in resilience theory as an innovative financial mechanism that provides rapid payouts based on predefined climate triggers (Greatrex et al., 2015). Unlike traditional indemnity insurance, parametric insurance reduces transaction costs and ensures timely compensation, enabling farmers to recover quickly, purchase inputs, and stabilize household consumption.

The framework positions parametric insurance as a complementary tool to local adaptation practices, enhancing household resilience and contributing to food security. Food security in this context is achieved when households maintain reliable access to adequate food despite climate shocks. By stabilizing income and reducing vulnerability, parametric insurance strengthens all four pillars of food security: availability (through sustained production),

access (through financial capacity to purchase food), utilization (through improved dietary diversity), and stability (through consistent resilience over time).

In summary, the conceptual framework demonstrates a logical flow: climate change induces risks → risks lead to food insecurity → households adopt risk management strategies → parametric insurance enhances resilience → food security is achieved. This framework is grounded in risk management theory, which emphasizes proactive strategies to reduce vulnerability, and resilience theory, which highlights the capacity of households to absorb shocks and maintain function. Together, these theoretical underpinnings provide a robust foundation for analysing the effectiveness of parametric insurance in enhancing food security among smallholder farmers in Chiweshe.

2.5 Parametric Insurance, Climate change and Natural disasters.

Insurance that pays out according to preset criteria, including weather triggers, as opposed to actual losses is known as parametric insurance (Cummins & Mahul, 2009). In recent years, this kind of insurance has become more well-liked as a means of controlling risks associated with climate change and enhancing food security (Linnerooth-Bayer et al., 2011). Food security is seriously threatened by climate change, especially in disadvantaged areas (IPCC, 2014). Crop failures, livestock mortality, and reduced food production can result from rising temperatures, altered precipitation patterns, and an increase in the frequency of extreme weather events (FAO, 2016). For farmers and communities, parametric insurance can be a useful instrument for managing climate-related risks (Hofmann & Brukoff, 2017). Parametric insurance can assist farmers in recovering from crop failures and sustaining their livelihoods by offering prompt and dependable payouts (Suarez & Linnerooth-Bayer, 2016).

A community's ability to cope with the losses caused by calamities is exceeded (International Federation of Red Cross, 2015). According to Jha et al. (200), a disaster occurs when dangerous physical events combine with vulnerable social factors to significantly change a society's regular functioning. It is a dangerous disruption to a particular civilization that results in significant material and human losses (UNISDR, 2009). According to the International Federation of Red Cross and Red Crescent Societies (no date), natural disasters are events that are caused by catastrophic risks, which may be geological, hydrological, or climatological. The dreadful dangers are also known as hazards. ISDR (2004) in Stewart and

Donovan (2008) define natural hazard as a process or phenomena that typically takes place in the biosphere and leads to a hazardous event. This point of view is supported by Bryant, Head, and Morrison (2005), who claim that although it is a dangerous occurrence that can harm people, it is uncontrollable. They continue by saying that if a natural risk has serious repercussions, it may become a natural disaster. They also hint that if the effects of natural hazards are severe enough to surpass the capacity for adaptation and recovery, they may turn into natural catastrophes.

2.6 Theoretical framework

2.6.1 Technology Acceptance Model

It is important to note that a variety of factors, including economic, social, and regulatory ones, have a significant impact on how technology is used (Bush, 2006; Garcia, Perez-Lugo, & Baiges, 2008; Leucht, Kölbel, Laborgne, & Khomenko, 2010). Over the past 20 years, technology acceptability has been one of the key areas of research (Chuttur, 2009). Numerous research in the literature have used TAM, a groundbreaking hypothesis. The TAM was created by Davis (1989) to pinpoint the causes of system and technology failures. According to the theory, consumers' motivation can be explained by two factors: perceived usefulness (PU) and perceived ease of use (PEOU). The two previously mentioned factors are thought to have a significant impact on users' attitudes (ATT) and, ultimately, behavioral intentions (BI), which dictate how the system is actually used. Customers act in accordance with their ideas about the results of their actions and the value associated with those results, according to the Technology Acceptance Model, an adjusted expectation value theory (Jackson, 2005). Over 580 articles have been published using this paradigm in the field of technology adoption over the past 35 years (Chang et al., 2010). For example, it has been demonstrated that the Technology Acceptance Model accurately predicts the adoption of IT, including online banking (Ndubisi, 2007), online shopping (Henderson & Divett, 2003), and health information technology (Holden & Karsh, 2010).

The Technology Adoption Model (TAM) is fundamentally an individual's adoption of particular information systems and technology, according to Davis (1989). Perceived ease of use refers to how comfortable and effortless a person finds using computer-based programs. It was clear that the amount of external elements that could temporarily stop the real system's end-use had an impact on both factors. The myriad external aspects that influence the actual system's use, such as social, cultural, and political factors, were thoroughly covered in the

earlier research (Davis, 1989; Ajzen, 1991; Schmidthuber et al., 2020; Taylor and Todd, 1995; Surendran, 2012; Dwivedi et al., 2019, etc.). TAM seeks to provide a general, theoretically sound, and parsimonious explanation of the antecedents of computer acceptance that can explain user behavior across a wide range of end-user computing technologies and user populations (Davis et al., 1989: 985). According to Venkatesh (2000), TAM's two distinct perspectives—perceived utility and ease of use—determine a person's behavioral intention to employ a technology. The degree to which a person thinks utilizing a technology would be effortless is known as perceived ease of use, or PEOU. According to Venkatesh (2000), it is a concept connected to a person's evaluation of the effort required to use the system. The degree to which the use of the technology in question is thought to improve the accomplishment of valued goals (job performance in Davis's original study) is known as perceived usefulness (Dwivedi et al., 2019; Schmidthuber et al., 2020), and the degree to which the use of the technology in question is thought to be simple and effortless is known as perceived ease-of-use. These beliefs are, in principle, determined by external variables, such as knowledge, experience, demographics, personal characteristics etc.

- Perceived usefulness and perceived ease of use are assumed to determine a person's attitude toward using the technology. If using a new technology is evaluated favourably (i.e., the person's attitude towards doing so is positive), the person is expected to form an intention to use it (when made available to him or her) (Skoulou, 2011; Dwivedi et al., 2019). When an intention to use a new technology is expressed in response to a request to use it, this intention is often referred to as technology acceptance (Huijts et al., 2012). Perceived usefulness has also been found to directly influence acceptance of the technology. If the consumer accepts the technology; the model assumes that this will lead to actual use (i.e., usage behaviour) (Sarakiya, 2015).
- Perceived usefulness (PU) is expressed by Sun and Zhang (2006) as "the degree to which a person believes that using a particular technology will enhance his [or her] performance). Further, Venkatesh (2000) posits that perceived usefulness will be influenced by perceived ease of use in TAM.

The Theory of Reasoned Action (Davis et al., 1989) and the Theory of Planned Behavior (Chau & Hu, 2001, 2002; Mathieson, 1991) have both been shown to explain less variance than the Technology Acceptance Model, which was created specifically for the field of

technology acceptance. Therefore, the necessity to reduce disasters always plays a crucial part in economic activity that would be beneficial. In According to the model, parametric insurance is preferred in order to move closer to a better environment. According to TAM, people will only embrace parametric insurance if they believe it will benefit them and enhance their performance at work—a concept known as perceived usefulness (PU). Davis et al. (1989) summarized this as well, saying that "Computer systems cannot improve performance if they aren't used." Regrettably, managers and professionals' opposition to end-user solutions is a common issue. Additionally, the adoption of parametric insurance technology is influenced by perceived ease of use (PEOU), which measures an individual's perceptions of the system's ease of use, difficulty of learning, and effort requirements (Gounaris and Kortitos, 2008).

2.7 Research Gap

The literature proves the capabilities of parametric insurance as an innovative way of mitigating risk for agriculture producers. It is noted that parametric insurance can provide several benefits such as lower administration costs, faster payouts and increased transparency compared to traditional indemnity-based insurance. Research have proved its ability to assist farmers during climate related shocks such as drought, excessive rains, unpredictability of weather patterns and floods. However there several gaps which need to be addressed. The majority of research focuses on income stabilization, risk reduction, farmer satisfaction, and insurance uptake. The impact of parametric insurance on household food security indices, including food availability, food access, dietary diversity, and nutritional outcomes among smallholder farmers, has been the subject of very few studies. Although parametric insurance has been extensively researched in industrialized agricultural markets, there is still a dearth of empirical data from many developing nations, especially those in sub-Saharan Africa. Therefore, it is unclear how efficient these programs are in various socioeconomic and climatic contexts. Current research frequently uses short-term data that was gathered soon after insurance was put into place. Long-term studies investigating whether parametric insurance supports resilience and sustained food security over several agricultural seasons are scarce. There is no empirical data on how basis risk—the discrepancy between actual farm losses and insurance payouts—affects farmers' trust, participation rates, and food security results, despite the fact that it is acknowledged as a significant concern. Numerous studies concentrate on financial performance metrics and employ quantitative methods. Qualitative study on farmers' attitudes, experiences, and difficulties in obtaining and using parametric

insurance policies is lacking. Parametric insurance has mostly been studied as a stand-alone intervention. How it interacts with other adaptation strategies to improve food security, such as crop diversification, irrigation, savings clubs, government assistance programs, and climate-smart agricultural methods, has received little attention. The impact of variables like premium costs, financial literacy, technological availability, and institutional support on the efficacy of parametric insurance among smallholder farmers with limited resources is not well-documented.

CHAPTER 3
METHODOLOGY

3.1 Introduction

This chapter presents the research methodology that was employed in the study. It outlines the study design, setting, and limitations, as well as the sampling method and sample size determination. Furthermore, the chapter describes the data collection instruments, pilot study, and procedures used to ensure validity and reliability. The methods for data analysis and ethical considerations observed during the study are also discussed.

3.2 Study Area

The study was conducted in Mazowe District. The village that was selected for the study was Chiweshe communal area, which is located at the heart of the Mazowe district. The area is predominantly rural, and the major economic activity is farming. Chiweshe communal area is well known for its agricultural base, rich indigenous culture, and its significant role in the liberation struggle of the country. Chiweshe communal area stretches to Centenary and Muzarabani districts and is closer to Glendale.

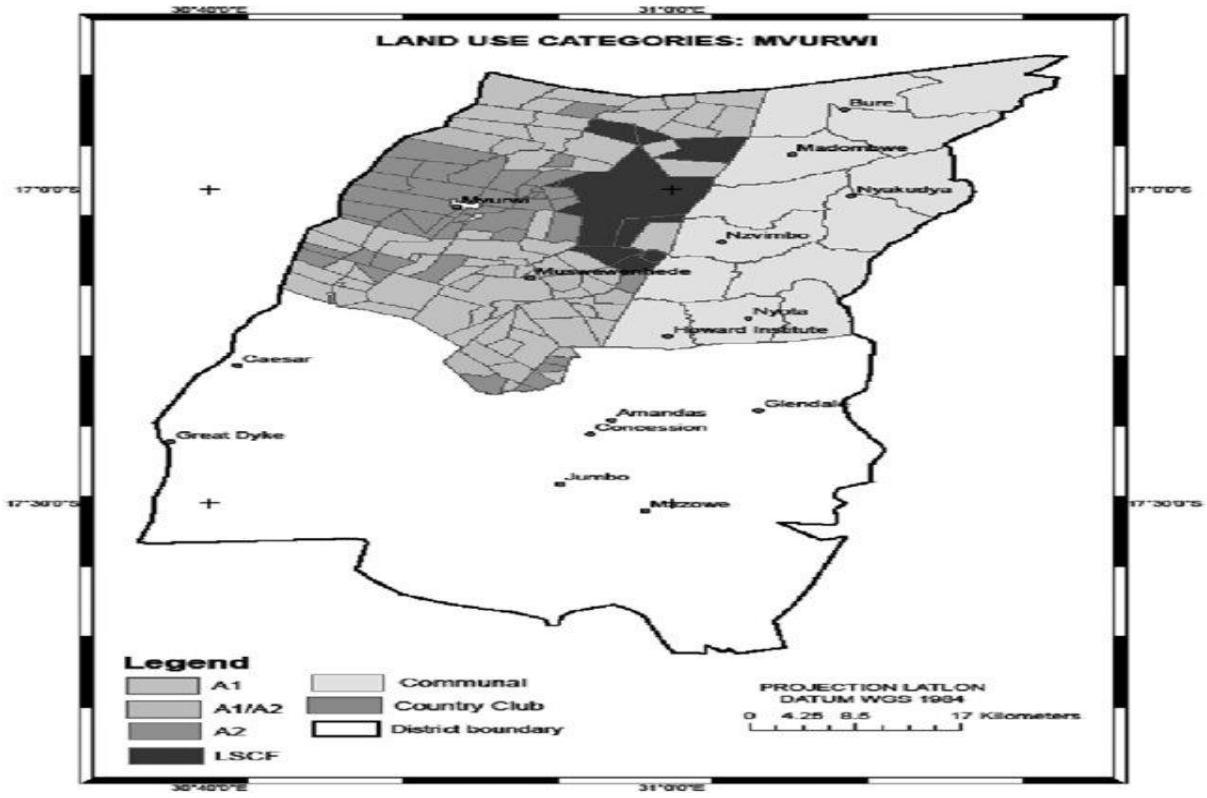


Figure 2: Map for Chiweshe

In terms of traditional governance, the area has three chiefs: Chief Negomo, Chief Chiweshe, and Chief Makope. The area is under Mazowe Rural District Council, and some of the notable places in Chiweshe are: Gweshe, Nyachuru, Kanyemba, Bare, Chaona, Rosa, and Howard. Most of the households survive on farming since the area is in Agroecological region 2, which is ideal for agricultural activities. The soils are fertile, and the rainfall is reliable. Harare provides a ready market for the produce from the area. Some of the largest citrus plants and farms are in Chiweshe communal area. The area also has successful irrigation schemes such as the Negomo irrigation scheme, which supports more than 500 households in the area.

Chiweshe communal area is also well known for its deeply rooted traditional customs. The traditional customs cover all aspects such as agriculture and social norms and values that have been passed from generation to generation using oral tradition. The ecological sustainability and cultural beliefs in Chiweshe depend on the indigenous knowledge systems. The traditional leadership plays a key role in preserving the norms and values of the people of Chiweshe.

3.3 Research Philosophy

The research philosophy that was used for the study was the pragmatism research philosophy. The pragmatism research philosophy offers the foundation for our study. This philosophy offers a flexible and problem-centred framework for examining intricate socio-environmental concerns. According to the pragmatism research philosophy, reality is influenced by human experiences, perceptions, and behaviours as well as other external factors. The external factors include resource limitations, droughts, and other vagaries of nature. The pragmatism research philosophy is ideal for studying interventions like parametric insurance, which function at the nexus of technological design and community adoption of the insurance scheme.

3.4 Research Approach

The study adopted an analytic cross-sectional study design using a mixed-methods approach, which incorporated both quantitative and qualitative data collection methods. The choice of this design was based on its ability to provide a comprehensive understanding of the role of parametric insurance in mitigating the effects of adverse weather conditions. The structured questionnaire was used to collect quantitative data on the uptake of parametric insurance by

the farmers in Chiweshe. Focus group discussions and key informant interviews were used to gather qualitative data for the study.

3.5 Population

The smallholder farmers in Chiweshe formed the nucleus of the population as they are the direct beneficiaries of the insurance packages in Chiweshe. The farmers are also being affected by the adverse effects of climate change. The household questionnaire was administered to them. For the key informants the researcher spoke to the village heads, ward councillors, and the representative of community-based organisations that are into climate change mitigation and also those that have adopted insurance.

3.6 Sampling Techniques

In this research, the researcher opted for the multi-staged sampling technique to select samples, considering the challenges of a geographically dispersed population of smallholder farmers. The multi-staged sampling techniques employed were as follows: First, Mazowe District was purposively sampled because it was convenient to the researcher and it would mean cheaper operating costs. Chiweshe was purposively chosen because that's where the intended target population (smallholder farmers) would be found. Then, within Chiweshe, the simple random sampling technique would be utilized to select the households.

3.7 Sample Size

The sample size was calculated using the slovin, which considers the desired margin of error, confidence level, and the population standard deviation, if it is known. This method ensures the reliability and representativeness of the study results. The calculations involved the following steps:

1. **Determine Margin of Error (e):**
    - A margin of error (e) of ±3 percentage points was chosen, and this reflected the precision level for the study.
2. **Determine Confidence Level (C):**
    - 95% ($\alpha = 0.05$) was selected as the confidence level, and this represented the probability that the true population value is within the calculated interval.
3. **Determine Population Standard Deviation (σ):**
4. **Calculate Sample Size (n):**

- The formula $n = \frac{(Z^2\sigma^2)}{\varepsilon^2}$ was applied, considering the Z-score for a 95% confidence level (approximately 1.96). The values were plugged into the formula to determine the required sample size.

For the qualitative component, a non-probability sampling approach was used, and data saturation will guide the sample size. Typically, between 10 to 15 participants for in-depth interviews were sufficient for reaching saturation, depending on the availability and willingness of participants.

3.8 Data collection procedure

The questionnaires were administered to farmers in Chiweshe who have insured or partially insured their crops and those who have not taken up insurance. The reason of inclusion of the two groups was to assess their knowledge and attitude towards the insurance packages being offered. The questionnaire was assessed by the supervisor before commencement of data collection. The supervisor checked on relevance and clarity. The instrument was also piloted to some selected respondents. The main reason was also to check the clarity and consistency of the instrument. The researcher also consulted the local extension officers and some insurance brokers. This was done to improve the clarity of the questionnaire. The study used both primary and secondary data.

The secondary data were retrieved from Insurance companies such as Minerva, Zimbabwe Vulnerability Assessment Committee, World Food Programme publications, and Zimbabwe National Statistics Agency.

3.9 Analytical Tools

Table 1: Analytical tools

Research Objective	**Type of data**	**Method of Data Collection**	**Method of Analysis**
To identify parametric insurance policies for climate resilience and food security**.**	Qualitative and Quantitative Data	In-depth Interviews and Household Questionnaire	Content Analysis Document Analysis
To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe.	Quantitative Data	Household Questionnaire	Likert Scale Analysis Chi-square tests Descriptive Statistics
To analyse the relationship between parametric insurance coverage and food security outcomes among participating households.	Qualitative and Quantitative Data	In-depth Interviews and Household Questionnaire	Household Food Security Index (HFSI): Regression Analysis
To identify challenges and limitations affecting the implementation and effectiveness of parametric insurance in communal areas.	Qualitative Data	In-depth Interviews	Thematic Analysis

3.9.1 To identify parametric insurance policies for climate resilience and food security.

To identify the parametric insurance models available for smallholder farmers, the researcher used document analysis. Document analysis involves a thorough literature review of insurance policy documents, reports by different government departments, and product brochures of different insurance companies to identify the insurance models available in the country. The document analysis allowed the researcher to extract key features such as insurance coverage in the country, payout mechanisms, eligibility criteria, and target beneficiaries. Document analysis is important because it assists in establishing the institutional and policy landscape within which parametric insurance operates.

3.9.2 To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe.

Descriptive Statistics: Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise participant responses. This method was appropriate to provide a general overview of the data, such as farmers' awareness levels of insurance packages available, insurance uptake rates, and farmers' perceptions of insurance. The farmers' perception of insurance will be assessed using Likert scale questions. The Likert scale quantifies attitudes towards parametric insurance. This method allowed the researcher to determine whether perceptions are generally positive, negative, or neutral. The Likert scale was also used to make comparisons between different wards and demographic groups in Chiweshe.

Non-Parametric Statistical Test: The non-parametric test that was used in the research was the chi-square test. The chi-square was used to examine the associations between demographic characteristics such as age, education, and gender with parametric insurance awareness and level of uptake of the insurance by the smallholder farmers in Chiweshe communal areas.

3.9.3 To analyse the relationship between parametric insurance coverage and food security outcomes among participating households

Nine items from the HFIAS models underwent an exploratory factor analysis, a multivariate dimension reduction technique. This was done in order to extract the primary components from the model, after which a multi-linear regression model was applied. The output variables were extracted, and the eigenvalue, or quality score, was assigned to each component. The components most likely to represent actual underlying factors were only those with high eigenvalues of at least 1. The HFIAS model was also used to compare food security status between insured and non-insured households in Chiweshe. The researcher also used the Pearson correlation to measure the strength and assess the direction of the relationship between parametric insurance and food security scores.

The study also used a multiple regression model to assess the predictive influence of parametric insurance usage on household food security ceteris paribus. Multiple regression was used because it can isolate the effects of parametric insurance on household food security. In the study, multiple regression was used to assess the influence of parametric insurance on household food security. The dependent variable was the HFIAS, which is used to measure household food security. Parametric insurance was the main explanatory variable, whilst controlling for other socioeconomic variables, demographic variables, and climate-related variables. In the model, some of the explanatory variables included parametric insurance coverage, which was measured as a dummy variable indicating whether the farmer is insured or otherwise, household size, household income, and the years of schooling of the household head.

3.10 Ethical Considerations

Informed consent

The researcher made sure that they educated the participants on the scope of the research, including the potential risks and benefits of the study. By so doing, they obtained informed consent from all the participants. Culturally acceptable methods were used to obtain consent, as well as to address any language barriers and literacy issues.

Privacy and Confidentiality

Data was stored securely to prevent unauthorized access so as to maintain the participants' privacy and confidentiality. All published results and reports were presented in aggregate form to avoid identifying individual participants.

Fairness and Equity

Biases and discrimination in the selection of participants and the distribution of benefits like refreshments during interviews and focus group discussions were eliminated, and it was ensured that the study design and implementation were fair and equitable.

Collaboration and Community

The researcher made sure that community leaders and other relevant stakeholders were involved during the research process. Community leaders were consulted before major activities were done so that their authority would not be undermined. This approach enabled mutual respect, cultural sensitivity, and a sense of ownership over the research outcomes.

Institutional Review

The researcher obtained approval from relevant institutional review boards and ethics committees. The institutional review bodies reviewed the research proposal to ensure compliance with ethical guidelines and principles, and they provided oversight throughout the research process.

CHAPTER 4

HOUSEHOLD ACCESS TO KEY ASSETS AND INFRASTRUCTURE

4.1 Introduction

The household demographic characteristics and ownership of key assets play a key role in the uptake of insurance packages by the smallholder farmers. According to studies, farmers who have assets with higher market values tend to insure their produce as compared to farmers with assets with lower market values. The distribution of household assets plays a fundamental role in the decision-making process of a household. To understand the farmers' uptake of insurance, there is a need to understand the resource endowments of the farmers and the demographic setups.

4.2 Demographic Data

In the survey, the researcher assessed the demographic characteristics of each household. The demographic data that was analysed includes age of the household head, marital status of the household head, highest level of education of the household head, and the major sources of income of the household,

4.2.1 Age of Household Head

From the respondents, it was noted that the youngest farmer was 20 years of age and the oldest farmer was 79 years of age. Most of the farmers who were interviewed were between 50 and 54 years of age, and the second largest group of the farmers were between 45 and 49 years of age. The age range of the farmers shows that most of the respondents were still active in agricultural activities and would comprehend information without challenges.

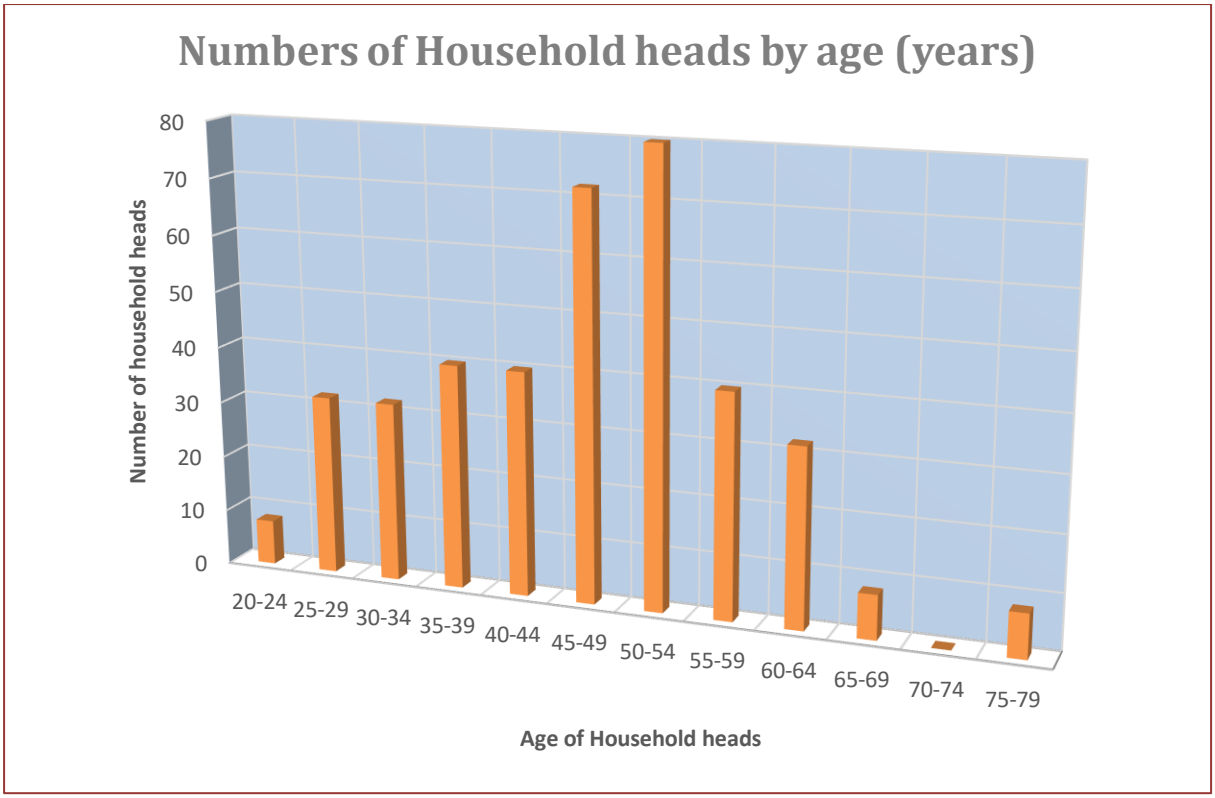


Figure 3: Age of household heads

Source: Survey Data (2026)

Both food consumption and productivity are impacted by an individual's age. The degree of productivity and efficiency can be explained by age (Basnayake et al. 2002). An individual's age may have an impact on how well they succeed economically. Compared to people in the Middle Ages, children and the elderly are typically less engaged in economic activities (Rutasitara, 2002). People in their middle years are highly energetic, aggressive, and driven by their families' needs. As a result, the age distribution of the participants in this study was crucial.

4.2.2 Sex of Household Head

Of the homes that took part in the study, 54% were headed by women and 46% by men. The percentage of households headed by men and women among those surveyed is displayed in Figure 4.2 below. According to a study done in Nigeria by Edem and Ekwere (2014), women were more interested in farming than men. When it came to farming, women made up a higher proportion than men.

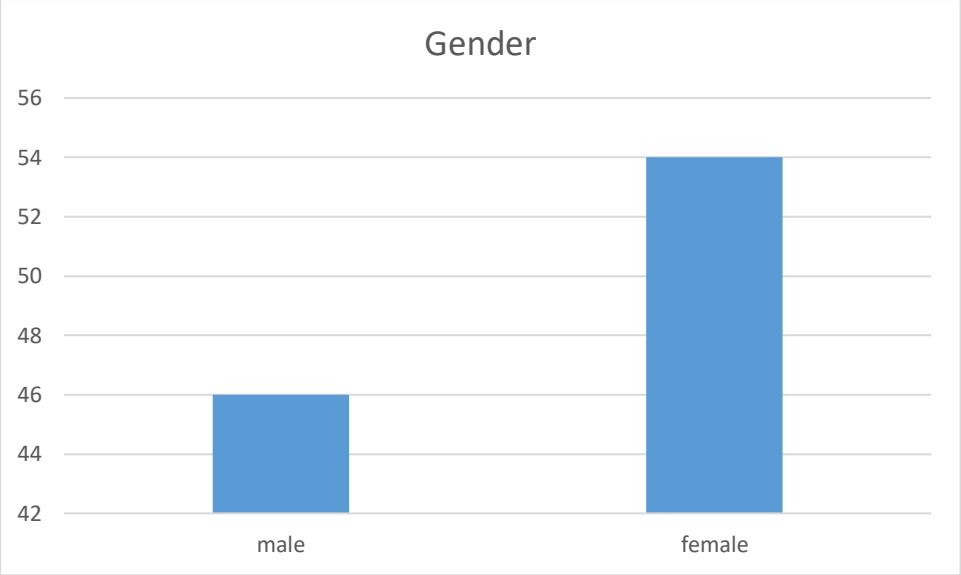


Figure 4: Gender of household heads

Source: Survey Data (2026)

The results demonstrate a gender imbalance in favour of females, with women comprising most of the study population. According to studies, gender often influences decision-making and access to resources.

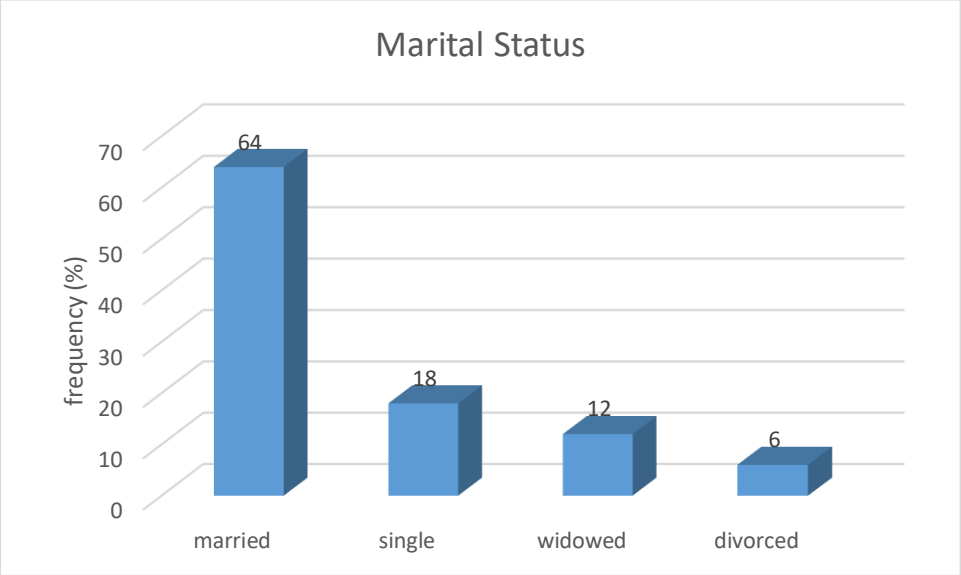


Figure 5: Marital Status of household heads

Source: Survey Data (2026)

From the survey results, it was noted that 64% of the respondents were married. Marriage was the most common marital status in Chiweshe communal areas. According to studies, married households share resources differently. Most households that are married suggest robustness in household structures and possible consequences for social and economic processes. 12% of the households were widowed, and this usually affects labour availability in times of agricultural production and economic processes. Chiweshe area is one of the few areas with strong cultural norms and values, and this can be ascertained by the lower proportion of households that are divorced, which was 6%

4.2.3 Educational Level of Household Heads

Studies such as Wang et al. (2023) highlighted that educational level plays a significant role in the uptake of insurance by the smallholder farmers. Figure 4.4 shows the educational level of the respondents.

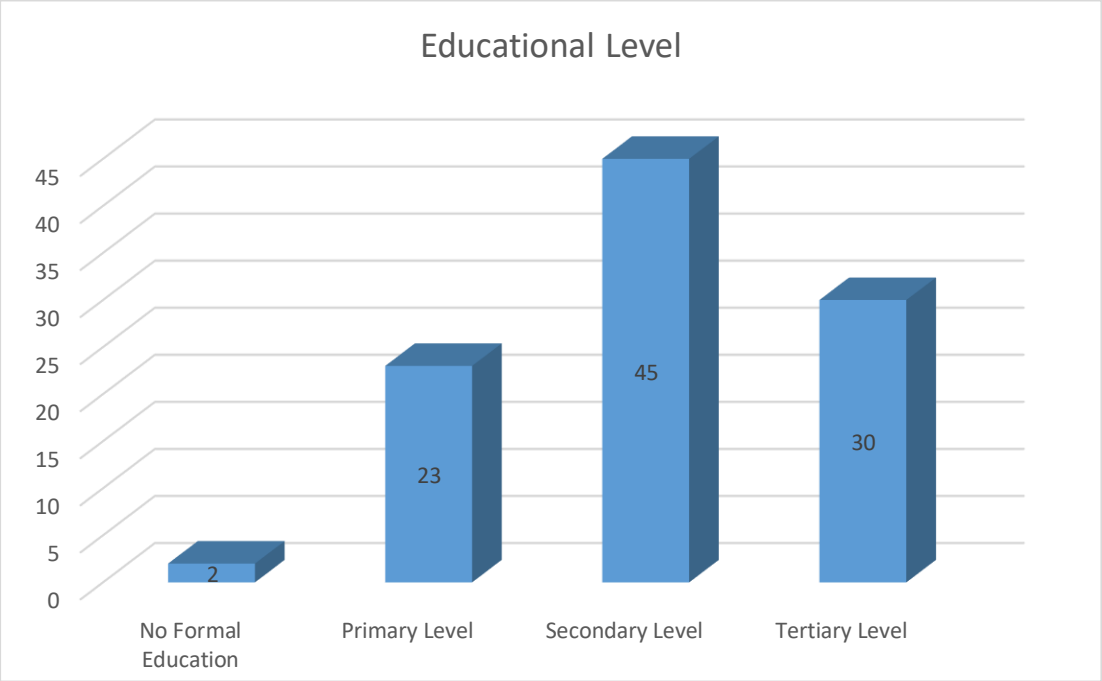


Figure 6: Educational Level of household heads

Source: Survey Data (2026)

The survey found that 45% of respondents had attained secondary education. This may also be due to the many government and mission schools in the district, such as Howard High School and Langham Girls High. According to Zimstat reports, the radius between schools in the district 9s less than 5km, which shows that most households can access schools within the

district. 30% of the respondents had tertiary level as the highest level of education within the district. Only 5% of the respondents had no formal education, showing a high literacy rate in the district.

4.3 Resource Endowments

In order to determine the endowment of home resources, households were asked if they owned any common productive equipment, such as an ox-drawn plough, wheelbarrow, pushcart, sickle, spade and axe, hoe, knapsack sprayer, or water pump. Additionally, this household trait was evaluated by examining the possession of additional household items that affect communication and transportation, such as a cell phone, a bicycle, a television, and a radio.

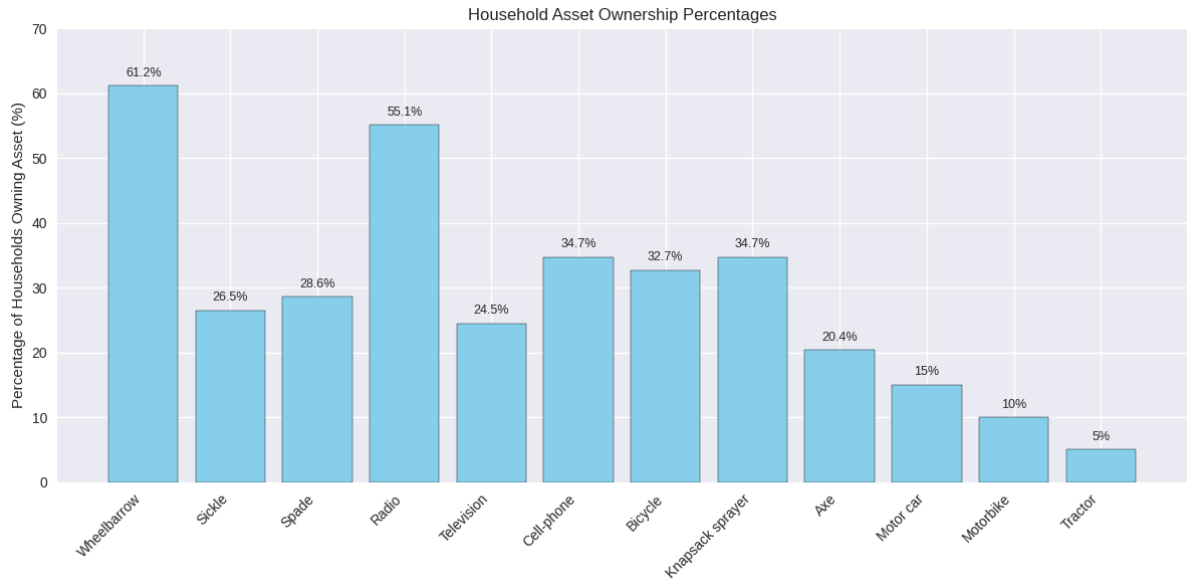


Figure 7: Resource Endowments

Source: Survey Data (2026)

Survey results show low levels of asset ownership amongst the respondents in Chiweshe. Most of the tool's farmers have been low-cost and do not add much value to the household's net worth. The most widely owned tools by the farmers in Chiweshe were wheelbarrows, which were owned by 61.2% of the respondents, and radios, which were owned by 55.1% of the respondents. From the KII with the ward extension officers, it was highlighted that the farmers mainly use the radios to get farming and marketing information. Other popular assets owned by the farmers were cell phones (34.7%), knapsack sprays (34.7%), and bicycles (32,7%). From the focus group discussions, it was highlighted that the bicycles help the farmers be mobile.

Ownership of high-value assets was very low amongst the respondents. Only 15% of the respondents owned motor cars, 10% owned motorbikes, and 5% owned tractors. The ownership of these high-value assets shows that some farmers are now overcoming capital barriers, potentially improving mobility, market access, and farming efficiency.

4.4 Agricultural Extension

The number of times extension officers visited houses during the production year was recorded as a continuous variable that represented access to agricultural extension. The primary source of agricultural data in the study region is the agricultural extension services offered by AGRITEX members. Frequent interaction with extension agents is thought to boost Chiweshe farmers' propensity to use insurance services. The table below shows the relationship between access to extension services and insurance coverage, average yields, and food security in the district. The comparison shows the effects of agricultural extension services on different welfare outcomes.

Table 2: Agricultural Extension

Framer Group	Access to extension (%)	Insurance Coverage (%)	Average yield (kg/ha)	Food Insecurity Reduction (%)
Regular Extension Users	42	35	1400	28
Sporadic Extension Users	30	14	1200	13
No Extension Access	28	1	800	7

Source: Survey Data (2026)

The survey results show that 42% of the farmers had regular access to extension, and of those farmers, 35% had insurance coverage of their production. The average yields of the farmers who had regular access to extension services was 1400kg/ha, which was greater than the national average. The farmers who had regular extension coverage reduced their food insecurity by 28%. The results show that there is a strong correlation between regular extension services and insurance coverage, food insecurity reduction, and the average yields per hectare.

The survey results also show that 30% of the farmers had sporadic extension visits. Of the farmers with sporadic extension visits, 14% had adopted insurance, their average yield was

1200kg/ha, and they had managed to reduce food insecurity by 13%. In the study area, 28% of the farmers had no extension access, and of those farmers without extension access, only 15 had insurance coverage, and their average yield was 800kg/ha. The absence of insurance coverage for the 28% of the farmers shows that they won't have access to the latest agricultural technology, modern farming techniques, and knowledge about insurance products which are being offered by organisations such as Manerva. The farmers without access to extension services are more vulnerable to production-associated risks and food insecurity. The research findings support the notion that access to extension services plays a crucial role not only in improving farm productivity but also in strengthening farmers' resilience to the adverse effects of climatic change through greater uptake of insurance services.

4.5 Conclusion

The researcher analysed the household demographic characteristics. Most households that are married suggest robustness in household structures and possible consequences for social and economic processes. 12% of the households were widowed, and this usually affects labour availability in times of agricultural production and economic processes. Chiweshe area is one of the few areas with strong cultural norms, and this is the reason why divorce rates are very low in the area. Ownership of high-value assets was very low amongst the respondents. Only 15% of the respondents owned motor cars, 10% owned motorbikes, and 5% owned tractors. The ownership of these high-value assets shows that some farmers are now overcoming capital barriers, potentially improving mobility, market access, and farming efficiency. The research findings support the notion that access to extension services plays a crucial role not only in improving farm productivity but also in strengthening farmers' resilience to the adverse effects of climatic change through greater uptake of insurance services.

CHAPTER 5

Parametric Insurance and Food Security: Awareness, Uptake, and Perceptions among Smallholder Farmers in Chiweshe

5.1 Introduction

Food security has remained as one of the most pressing issues affecting countries in Africa, Zimbabwe included, which mainly depend on rain-fed agriculture. The African continent has also been affected by the adverse effects of climate change. In Zimbabwe, most of the agroecological regions have been affected by erratic rainfall, which is below average, and extreme weather events. These climatic shocks not only affect agricultural productivity but also have consequences for access to food and food availability by smallholder farmers in the country.

Parametric insurance has emerged as a panacea to cushion smallholder farmers against the adverse effects of climate change, which is being experienced across the country. Most of the farmers are taking up parametric insurance because of its ability to provide payouts to farmers based on predefined triggers such as erratic rainfall or temperature thresholds, unlike traditional insurance coverages that provide payouts after actual loss assessment(Hlatshwayo and Mpundu, 2025). This insurance package is ideal for farmers because it offers speed, transparency, and efficiency to the insurance market. Parametric insurance is strengthening climatic resilience and reducing food insecurity by offering timely financial support to smallholder farmers.

Inasmuch as parametric insurance is offering timely payouts, its effectiveness depends on farmers' awareness, uptake, and perceptions. According to studies, most of the farmers have limited to no knowledge of parametric insurance and how it works. Mistrust and affordability concerns also hinder the adoption of parametric insurance (Hlatshwayo and Mpundu, 2025). In the Chiweshe area where farmers face the adverse effects of climate change daily, it is important to explore the role of parametric insurance in promoting climate resilience and food security. The study will investigate how levels of awareness, uptake, and perception influence the effectiveness of parametric insurance in addressing food insecurity.

5.2 Methodology

5.2.1 Study Area

The study was conducted in Mazowe District. The village that was selected for the study was Chiweshe communal area, which is located at the heart of the Mazowe district. The area is predominantly rural, and the major economic activity is farming. Chiweshe communal area is well known for its agricultural base, rich indigenous culture, and its significant role in the liberation struggle of the country. Chiweshe communal area stretches to Centenary and Muzarabani districts and is closer to Glendale (Refer to section 3.2).

5.2.2 Research Philosophy

The research philosophy that was used for the study was the pragmatism research philosophy. The pragmatism research philosophy offers the foundation for our study. This philosophy offers a flexible and problem-centred framework for examining intricate socio-environmental concerns. According to the pragmatism research philosophy, reality is influenced by human experiences, perceptions, and behaviours as well as other external factors. The external factors include resource limitations, droughts, and other vagaries of nature. The pragmatism research philosophy is ideal for studying interventions like parametric insurance, which function at the nexus of technological design and community adoption of the insurance scheme.

5.2.3 Research Approach

The study adopted an analytic cross-sectional study design using a mixed-methods approach, which incorporated both quantitative and qualitative data collection methods. The choice of this design was based on its ability to provide a comprehensive understanding of the role of parametric insurance in mitigating the effects of adverse weather conditions. The structured questionnaire was used to collect quantitative data on the uptake of parametric insurance by the farmers in Chiweshe. Focus group discussions and key informant interviews were used to gather qualitative data for the study.

5.2.4 Population

The smallholder farmers in Chiweshe formed the nucleus of the population as they are the direct beneficiaries of the insurance packages in Chiweshe. The farmers are also being affected by the adverse effects of climate change. The household questionnaire was administered to them. For the key informants the researcher spoke to the village heads, ward councillors, and the representative of community-based organisations that are into climate change mitigation and also those that have adopted insurance.

5.2.5 Sampling Techniques

In this research, the researcher opted for the multi-staged sampling technique to select samples, considering the challenges of a geographically dispersed population of smallholder farmers. The multi-staged sampling techniques employed were as follows: First, Mazowe District was purposively sampled because it was convenient for the researcher and it would mean cheaper operating costs. Chiweshe was purposively chosen because that's where the intended target population (smallholder farmers) would be found. Then, within Chiweshe, the simple random sampling technique would be utilized to select the households.

5.2.6 Data collection procedure

The questionnaires were administered to farmers in Chiweshe who have insured or partially insured their crops and those who have not taken up insurance. The reason of inclusion of the two groups was to assess their knowledge and attitude towards the insurance packages being offered. The questionnaire was assessed by the supervisor before commencement of data collection. The supervisor checked on relevance and clarity. The instrument was also piloted to some selected respondents. The main reason was also to check the clarity and consistency of the instrument. The researcher also consulted the local extension officers and some insurance brokers. This was done to improve the clarity of the questionnaire. The study used both primary and secondary data.

The secondary data were retrieved from Insurance companies such as Minerva, Zimbabwe Vulnerability Assessment Committee, World Food Programme publications, and Zimbabwe National Statistics Agency.

5.3 Analytical Tools

5.3.1 To identify parametric insurance policies for climate resilience and food security.

To identify the parametric insurance models available for smallholder farmers, the researcher used document analysis. Document analysis involves a thorough literature review of insurance policy documents, reports by different government departments, and product

brochures of different insurance companies to identify the insurance models available in the country. The document analysis allowed the researcher to extract key features such as insurance coverage in the country, payout mechanisms, eligibility criteria, and target beneficiaries. Document analysis is important because it assists in establishing the institutional and policy landscape within which parametric insurance operates.

5.3.2 To assess how the level of awareness, uptake, and perception of parametric insurance influence food security among smallholder farmers in Chiweshe.

Descriptive Statistics: Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarise participant responses. This method was appropriate to provide a general overview of the data, such as farmers' awareness levels of insurance packages available, insurance uptake rates, and farmers' perceptions of insurance. The farmers' perception of insurance will be assessed using Likert scale questions. The Likert scale quantifies attitudes towards parametric insurance. This method allowed the researcher to determine whether perceptions are generally positive, negative, or neutral. The Likert scale was also used to make comparisons between different wards and demographic groups in Chiweshe.

Non-Parametric Statistical Test: The non-parametric test that was used in the research was the chi-square test. The chi-square was used to examine the associations between demographic characteristics such as age, education, and gender with parametric insurance awareness and level of uptake of the insurance by the smallholder farmers in Chiweshe communal areas.

5.5 Results and Discussion

5.5.1 Parametric Insurance Programmes

The results in Table 5.1 show the type of insurance available for the smallholder farmers. Document analysis was used to identify parametric insurance policies for climate resilience and food security. Document analysis involves a thorough literature review of insurance policy documents, reports by different government departments, and product brochures of different insurance companies to identify the insurance models available in the country.

Table 3: Insurance Types

Policy	Trigger Mechanism	Target Group	Food security Impact
Index-Based Livestock Insurance	Forage availability and drought indices	Smallholders & emerging farmers	Helps maintain livestock herds, ensuring food and income security in arid regions
Smallholder Parametric Insurance	Weather-based indices	Smallholders & emerging farmers	Supports rural economies and women-led farms, protecting household food security
Santam Weather Index Insurance	Rainfall and temperature thresholds	Smallholders & emerging farmers	Offers direct payouts to farmers to stabilize income and reduce vulnerability to crop failure
African Risk Capacity	Rainfall and temperature thresholds	Smallholders & emerging farmers	Provides rapid payouts to governments for disaster response, safeguarding food supplies and farmer livelihoods

Source: Survey Data (2026)

From the document analysis that was done, the following parametric insurance packages were identified: Index-Based Livestock Insurance, Smallholder Parametric Insurance, Santam Weather Index Insurance and African Risk Capacity.

The African Risk Capacity is a continental insurance package that insures central governments against weather-related shocks. The central governments receive some payouts when rainfall and other climatic indices fall short of the thresholds (Hlatshwayo and Mpundu, 2025). The African Risk Capacity allows central governments to cushion their citizens against climate-induced food insecurity. The package allows the government to provide food aid, cash transfers, or agricultural inputs to the households that will be affected by weather-related risks. The intervention by the government will make the national food system stable and ensure emergency support reaches communities faster (Addey & Jatoe, 2024).

The other insurance package that was identified through document analysis was Santam Weather Index Insurance. The Santam Weather Index Insurance is mainly focused on smallholder and emerging farmers in the country. Like the African Risk Capacity, Santam Weather Index Insurance also uses rainfall and temperature thresholds to determine payouts. The Santam Weather Index Insurance ensures that affected farmers receive payouts when the thresholds are reached. The index will allow smallholder farmers to receive payouts as soon as thresholds are reached, and the farmers will be able to recover from crop losses without waiting for lengthy assessments associated with traditional insurance packages. This allows smallholder farmers to purchase food and to make necessary adjustments in their fields.

Parametric insurance was the other insurance package that was identified. The parametric insurance was designed by Minerva, targeting smallholder farmers. It also uses weather indices to determine payouts (Hlatshwayo and Mpundu 2025). Parametric insurance ensures that the affected farmers receive timely financial support(Mayer-Bosse & Drewes, n.d.). The insurance package protects rural farmers, and it helps farmers maintain food supplies and prevents them from sliding into poverty. The major advantage of parametric insurance is that its gender inclusive.

From the document analysis, another insurance package that was identified was the index-based livestock insurance. The index-based livestock insurance mainly targets pastoral farmers. Farmers with the primary source of food being livestock. This insurance package is triggered by the unavailability of fodder for livestock and drought indices. The index-based livestock insurance helps prevent large-scale livestock losses.

5.5.2 Understanding Farmers' Perspectives on Parametric Insurance

The researcher assessed the knowledge, attitude, and perceptions of parametric insurance among smallholder farmers in Chiweshe. The KAP analysis was used to assess the knowledge, attitude, and perceptions. The results of the KAP analysis are shown in Table 5.2.

Table 4: Farmers' perspectives

Dimension	Statement	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
Knowledge	I understand how parametric insurance works	20%	25%	30%	20%	5%
Attitude	Insurance can protect my household from climate shocks	10%	15%	25%	35%	15%
Perception	Parametric insurance payouts are fair and timely	15%	20%	30%	25%	10%

Source: Survey Data (2026)

The analysis of farmers' knowledge reveals that understanding of parametric insurance remains limited among smallholder farmers in Chiweshe. Only 25 percent of respondents indicated that they either agreed or strongly agreed with the statement "I understand how parametric insurance works." In contrast, 45 percent disagreed or strongly disagreed, while 30 percent remained neutral. From the FDGs, it was noted that most of the farmers who are not insured lack clear knowledge of how the parametric insurance functions. The farmers were not aware of when they would be compensated since they are used to the traditional insurance models. The information asymmetry demonstrated by the farmers is a significant barrier to the adoption of parametric insurance amongst the smallholder farmers. This concurs with (Patt et al., 2010) who noted that farmers who better understood how insurance operated were more likely to express a preference for it. This was also supported by

(Hlatshwayo and Mpundu, 2025) who noted that among the respondents, 40% had prior knowledge of parametric insurance, with 60% admitting they had never heard of it.

The researcher also assessed the attitude of the farmers towards parametric insurance. A larger portion of the smallholder farmers had positive attitudes towards the insurance package. The farmers agreed that by adopting insurance, they would be protecting their households from the adverse effects of climate change. 25% of the farmers were neutral, and this shows that the farmers were uncertain about the insurance packages. The other 25% of the respondents were sceptical toward insurance organisations. These findings highlight that while many farmers see the potential value of insurance, there are still underlying concerns that must be addressed to translate positive attitudes into actual uptake (Tsay & Paulson, 2025).

The researcher assessed the perceptions of the farmers towards parametric insurance using KAP analysis. From the results, it was noted that 35% of the farmers agreed that payouts are fair and in time. 35% of the farmers disagreed with the notion that payouts are fair and always on time. The remaining 30% of the farmers were neutral, suggesting uncertainty or lack of direct experience with parametric insurance payouts.

5.5.3 Associations Between Demographics and Uptake of Parametric Insurance

Non-parametric tests were conducted to assess whether demographic characteristics such as educational level, gender, and age influence the awareness, uptake, and perceptions of the farmers towards parametric insurance. The results are shown in Table 5.3 below.

Table 5: Associations Between Demographics and Uptake of Parametric Insurance

Variable Tested	χ^2 Value	Degrees of freedom	p-value	Interpretation
Education Level × Awareness	12.45	3	0.01	Significant association – higher education is linked to greater awareness
Gender × Uptake	2.31	1	0.13	Not significant – uptake levels similar across male and female farmers
Age Category × Perceptions	6.78	2	0.04	Significant association – younger farmers are more likely to perceive payouts as fair

Education Level × Uptake	9.62	3	0.02	Significant association – education influences the likelihood of adopting insurance
Gender × Perceptions	1.89	1	0.17	Not significant – perceptions of fairness do not differ significantly by gender

Source: Survey Data (2026)

The chi-square test was conducted to assess whether demographic characteristics such as educational level, gender, and age influence the awareness, uptake, and perceptions of the farmers towards parametric insurance. The results provide important information into the understanding of the factors affecting adoption and uptake of parametric insurance amongst the smallholder farmers in Chiweshe.

From the chi-square results, it was noted that the level of education was a significant factor in both awareness and insurance uptake by the smallholder farmers in Chiweshe. Educated farmers can easily understand how insurance works, and they can easily adopt it. This was confirmed in the results, which were statistically significant. The values were as follows: $\chi^2 = 12.45$, $df = 3$, $p < 0.01$ for awareness; $\chi^2 = 9.62$, $df = 3$, $p < 0.02$ for uptake. The results also concur with other findings in the literature of (Patt et al., 2010), which highlight the roles of education in making farmers make informed decisions. To increase the uptake of the insurance package, there is a need for targeted training and extension services (Blackmore et al., 2025).

Another significant factor that was noted from the results was age. The results show that age is a significant factor that influences perceptions of fairness and timeliness of payouts. Younger farmers below the age of 35 were more likely to perceive parametric insurance as fair as compared to older farmers. This association was statistically significant ($\chi^2 = 6.78$, $df = 2$, $p < 0.05$). From other studies, it was noted that younger farmers are more receptive to parametric insurance as compared to older farmers.

The chi-square results show that gender was an insignificant variable in both insurance uptake ($\chi^2 = 2.31$, $df = 1$, $p > 0.05$) and perception ($\chi^2 = 1.89$, $df = 1$, $p > 0.17$). The insignificant results can be explained by noting that both males and females in Chiweshe demonstrate similar levels of participation and trust in parametric insurance. From the focus group discussions, it was highlighted that women farmers in Chiweshe face additional

barriers such as limited access to financial resources and decision-making power within households. This is supported by the findings of (Blackmore et al., 2025) who noted that women account for nearly half of the world's small-scale farmers but are typically unsupported by formal financial and non-financial services that could help to manage climate risk, including insurance. In studies like (Wassie et al. 2025), it was noted that male-headed households are more inclined to support the establishment of crop insurance as a policy.

The results have shown that parametric insurance can be a panacea to food insecurity challenges caused by climate change. It has the potential to stabilise income and protect the farmers from the adverse effects of climate change. By addressing the demographic characteristics that influence the uptake of insurance, parametric insurance can be a cornerstone of climate resilience in Chiweshe. As alluded to (Rajeev & Nagendran, 2023), the focus of policy should rest on extending insurance coverage to the previously uninsured to reap the greatest welfare gains. Uptake of crop insurance by small-scale farmers is constrained by several factors, including low awareness of the existence of suitable insurance products, a lack of understanding of the benefits of insurance as a risk-management tool, and low trust in the insurance provider to deliver payouts(Blackmore et al., 2025) & (Hlatshwayo and Mpundu, 2025)

5.6 Conclusion

The objective of the chapter was to assess the knowledge, attitude, and perception of the farmers towards parametric insurance. The results show that the farmers' attitude towards parametric insurance was positive, significant knowledge gaps persist, and the farmers' perceptions of fairness and timeliness remain mixed. The researcher concludes that there is a need for organisations and the government to build insurance awareness and for the farmers to develop insurance trust. If the farmers can build trust and awareness, this will enable parametric insurance to be a viable risk management tool (Hlatshwayo and Mpundu, 2025). The chi-square test was done to identify any association between some selected demographic data and awareness and uptake of parametric insurance. From the chi-square test, the researcher can conclude that educated farmers demonstrated higher levels of awareness and adoption of parametric insurance compared to those farmers with little to no education. The results of the chi-square tests underscore the need for tailored strategies that address demographic disparities. The effectiveness of parametric insurance is not determined solely by its technical design but also by the social and demographic contexts in which it was designed.

Chapter 6

Evaluating the Impact of Parametric Insurance on Household Food Security in Communal Farming Systems: Evidence from Zimbabwe

6.1 Introduction

Climate change is associated with a lot of risks such as droughts, floods, and erratic rainfall patterns. These climate change-induced risks have adversely affected agricultural productivity and food security in Zimbabwe. The smallholder farmers who produce more than 70% of the grains supplied to the Grain Marketing Board have not been spared from the climate-induced risks. In response to the climate-induced risks, parametric insurance has emerged as an innovative risk transfer tool designed to provide timely payouts to the smallholder farmers based on predefined weather indices rather than actual losses (Hlatshwayo and Mpundu, 2025). Parametric insurance has helped farmers to be resilient to climate change.

A few studies have explored the practical effectiveness of parametric insurance in the Zimbabwean context. A lot of grey areas remain regarding its accessibility, affordability, and alignment with the communal setups in the country. Research that was conducted to assess the effectiveness of parametric insurance has noted some implementation challenges ranging from low awareness and mistrust issues. This study investigates the relationship between

parametric insurance coverage and food security outcomes amongst the smallholder farmers in Zimbabwe.

6.2 Methodology

6.2.1 Study Area

The study was conducted in Mazowe District. The village that was selected for the study was Chiweshe communal area, which is located at the heart of the Mazowe district. The area is predominantly rural, and the major economic activity is farming. Chiweshe communal area is well known for its agricultural base, rich indigenous culture, and its significant role in the liberation struggle of the country. Chiweshe communal area stretches to Centenary and Muzarabani districts and is closer to Glendale (Refer to section 3.2).

6.2.2 Research Philosophy

The research philosophy that was used for the study was the pragmatism research philosophy. The pragmatism research philosophy offers the foundation for our study. This philosophy offers a flexible and problem-centred framework for examining intricate socio-environmental concerns. According to the pragmatism research philosophy, reality is influenced by human experiences, perceptions, and behaviours as well as other external factors. The external factors include resource limitations, droughts, and other vagaries of nature. The pragmatism research philosophy is ideal for studying interventions like parametric insurance, which function at the nexus of technological design and community adoption of the insurance scheme.

6.2.3 Research Approach

The study adopted an analytic cross-sectional study design using a mixed-methods approach, which incorporated both quantitative and qualitative data collection methods. The choice of this design was based on its ability to provide a comprehensive understanding of the role of parametric insurance in mitigating the effects of adverse weather conditions. The structured questionnaire was used to collect quantitative data on the uptake of parametric insurance by the farmers in Chiweshe. Focus group discussions and key informant interviews were used to gather qualitative data for the study.

6.2.4 Population

The smallholder farmers in Chiweshe formed the nucleus of the population as they are the direct beneficiaries of the insurance packages in Chiweshe. The farmers are also being affected by the adverse effects of climate change. The household questionnaire was administered to them. For the key informants, the researcher spoke to the village heads, ward

councillors, and the representative of community-based organisations that are into climate change mitigation and those that have adopted insurance.

6.2.5 Sampling Techniques

In this research, the researcher opted for the multi-staged sampling technique to select samples, considering the challenges of a geographically dispersed population of smallholder farmers. The multi-staged sampling techniques employed were as follows: First, Mazowe District was purposively sampled because it was convenient for the researcher and it would mean cheaper operating costs. Chiweshe was purposively chosen because that's where the intended target population (smallholder farmers) would be found. Then, within Chiweshe, the simple random sampling technique would be utilized to select the households.

6.2.6 Data collection procedure

The questionnaires were administered to farmers in Chiweshe who have insured or partially insured their crops and those who have not taken up insurance. The reason of inclusion of the two groups was to assess their knowledge and attitude towards the insurance packages being offered. The questionnaire was assessed by the supervisor before commencement of data collection. The supervisor checked on relevance and clarity. The instrument was also piloted to some selected respondents. The main reason was also to check the clarity and consistency of the instrument. The researcher also consulted the local extension officers and some insurance brokers. This was done to improve the clarity of the questionnaire. The study used both primary and secondary data.

The secondary data were retrieved from Insurance companies such as Minerva, Zimbabwe Vulnerability Assessment Committee, World Food Programme publications, and Zimbabwe National Statistics Agency.

6.2.7 Challenges encountered during data collection

The questionnaire that was used required the household respondents to remember some of the experiences that took place over 30 days. This was dealt with by allowing some of the household members to be close to chip in whenever necessary.

6.3 Analytical Tools

Household Food Security Index (HFSI): This composite measure captures food availability, access, and utilization at household level. It provides a standardized way to assess food security outcomes among insured and uninsured households. The index allows for

comparison across households and helps quantify the impact of insurance coverage on food security.

Correlation Analysis (Pearson's r): This tool measures the strength and direction of the relationship between parametric insurance coverage and food security scores. For example, a positive correlation would suggest that households with insurance coverage experience better food security outcomes. Correlation analysis provides insight into the degree of association between variables.

Regression Analysis: Multiple regression models will be employed to assess the predictive influence of parametric insurance coverage on food security indicators, while controlling for other variables such as income, farm size, and education. Regression analysis is particularly powerful because it isolates the specific effect of insurance coverage, distinguishing it from other factors that may also influence food security. In this study, regression analysis was used to examine the predictive influence of parametric insurance coverage on household food security outcomes, while controlling for a range of socioeconomic, demographic, and climate-related variables. The dependent variable was household food security, measured using indicators of food availability, access, utilization, and dietary diversity. The independent variables included parametric insurance coverage (whether a household was enrolled and the extent of coverage), household income, farm size, and the education level of the household head. Additional independent variables were incorporated to strengthen the model, including livelihood diversification (number of income sources beyond farming), household size, age and gender of the household head, access to extension services, membership in farmer cooperatives, and access to credit facilities. Climate risk exposure variables, such as frequency of droughts experienced and perceived vulnerability to climate shocks, were also included. By integrating these diverse predictors, the regression model isolated the specific effect of parametric insurance coverage on food security while accounting for other factors that could influence household resilience. This comprehensive approach ensured that the analysis provided a robust understanding of the role of parametric insurance in enhancing food security among smallholder farmers in Chiweshe.

6.5 Results

6.5.1 Household Food Security

The researcher used the Household Food Security Index to assess the relationship between parametric insurance and household food security outcomes. The Household Food Security Index was compared between insured households and uninsured households in Chiweshe. The results are in Fig 6.1

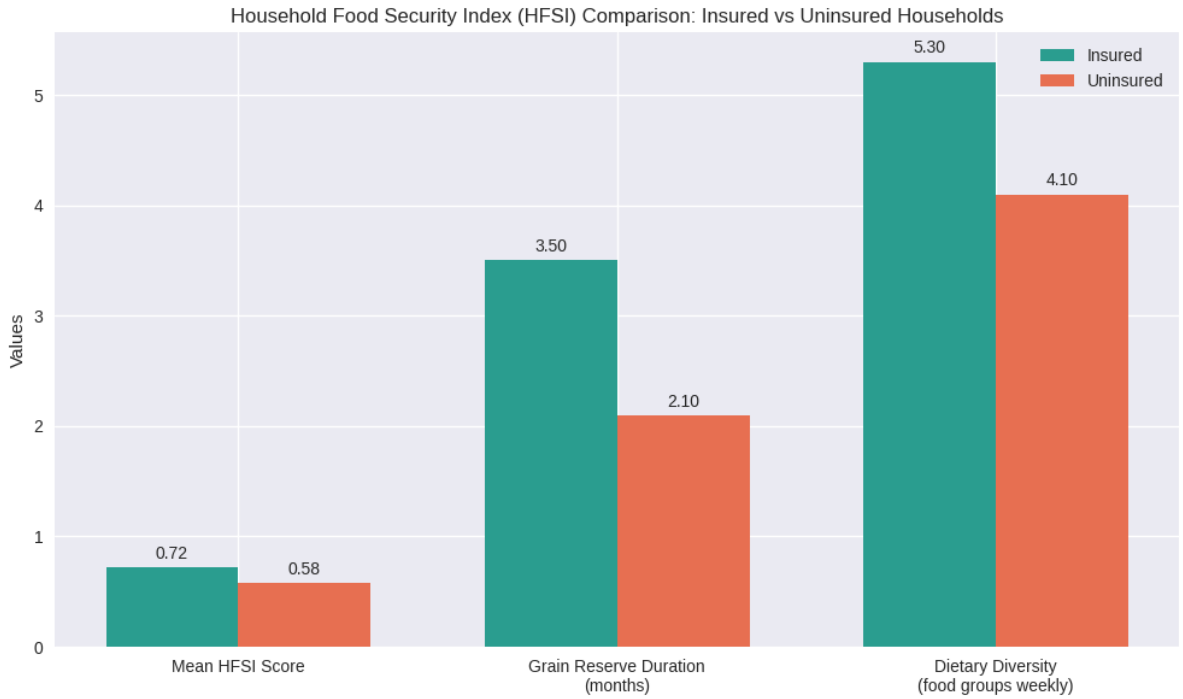


Figure 8: Household Food Security

Source: Survey Data (2026)

To assess household food security, three key dimensions were measured, which are: the mean Household Food Security Index score, grain reserve duration, and household dietary diversity.

The mean Household Food Security Index score was significantly higher among the insured households. The mean Household Food Security Index score for the insured households was 0.72, and that for the uninsured households was 0.58. The difference in the mean score shows that parametric insurance is playing a major role in climate change mitigation and is contributing positively to household food security(Gebretsadik & Tesfay, 2023). The higher mean score value of 0.72 indicates that insurance payouts are acting as a financial buffer to the affected households in Chiweshe. Those households that are not insured are vulnerable to the adverse effects of climate change (Blackmore et al., 2025).

Another key dimension that was used to measure food security was the grain reserve duration. The survey results show that the duration of grain reserves for insured households was 3.5 months and that for uninsured 2.1 months from the time of harvest. From studies, grain reserve durations serve as the primary safeguard against hunger. If households are

insured, they will also be able to increase the duration of the grain reserve for their households. This is because they can purchase supplementary grains or reduce the need to sell their harvest soon after harvesting. This concurs with(Duchoslav & Van Asseldonk, 2018) who noted that crop insurance reduces the probability of food and money shortages in times of drought

Another key dimension that was used to measure food security was the dietary diversity score. From the figure, it can be noted that insured households consume an average of 5.3 food groups weekly, whilst uninsured households consume an average of 4.1 food groups weekly. From the survey, the researcher can safely conclude that parametric insurance will enhance households' ability to diverse its diet. A higher dietary diversity score is associated with improved nutritional outcomes, especially for children under the age of 5 and vulnerable household members like those suffering from chronic illness.

Parametric Insurance can be a panacea for household food insecurity caused by climate change in Zimbabwe. Farmers must uptake parametric insurance to enhance household resilience to climate change(Blackmore et al., 2025). The insurance package can assist households to stabilise consumption, extend grain reserves, and improve household dietary diversity (Mayer-Bosse & Drewes, n.d.).

6.5.2 Effects of Insurance Coverage on Household Food Security

Multiple regression models were employed to assess the predictive influence of parametric insurance coverage on food security indicators, while controlling for other variables such as income, farm size, and education. The results of the regression analysis are shown in Table 6.1.

Table 6: Effects of Insurance Coverage on Household Food Security

Variable	Coefficient	Std. Error	p-value
Constant	0.37	0.06	0.00
Insurance Coverage	0.10	0.03	0.01
Household Income (USD)	0.07	0.02	0.02
Education Level	0.05	0.02	0.04

(years)			
Market Access (km)	-0.04	0.03	012
Household Size (members)	-0.06	0.02	0.01
Gender of Household Head (female=1)	0.03	0.04	0.25
Access to Extension Services (yes=1)	0.08	0.03	0.01
Livelihood Diversification (yes=1)	0.09	0.02	0.00
Social Safety Net Participation (yes=1)	0.02	0.03	0.40

R-squared = 0.46 adjusted R-Squared= 0.42

Source: Survey Data (2026)

The researcher also assessed the factors affecting household food security. The dependent variable was the household food security index scores. A multiple regression model was employed to assess the predictive influence of parametric insurance coverage on food security indicators, while controlling for other variables such as income, farm size, and education.

The main explanatory variable was insurance coverage, but the researcher also included other explanatory variables such as income, farm size, and education; by including those variables, the model explained a greater proportion of variance in Household Food Security Index scores. From the survey results, it was noted that parametric insurance significantly predicts household food security. The coefficient of insurance coverage was 0.10, implying that if we increase household insurance by one unit, the household food security index score will increase by 0.10 units. The results concur with earlier findings that insurance payouts provide a financial buffer against climate-related shocks (Duchoslav & Van Asseldonk, 2018).

Another explanatory variable that had a significant effect on Household Food Security Index scores was household income. The coefficient for household income was 0.07. The value means that if there is an increase in household income by one unit, the Household Food Security Index scores will increase by 0.07 units. If households have higher incomes, they can buy diverse foods and maintain food reserves. This was also highlighted by Rajeev & Nagendran (2023), who noted that richer farmers are indeed more likely to have crop insurance.

Household size was another explanatory variable that had a significant effect on Household Food Security Index scores. The coefficient was -0.06, which implies that larger households face greater consumption demands that strain food reserves. From the survey, it can be highlighted that there is a need for the government and other aid-offering organisations to support larger families and this concurs to the findings of (Blackmore et al., 2025).

Extension agents are responsible for providing farmers with the skills and information they need to produce sustainably. This is accomplished by giving them current information on market prices, production methods, and the advantages of commercial agriculture by encouraging them to embrace agriculture as a business rather than adopting the subsistence mindset that the majority of communal farmers have. The frequency of contact with extension agents had a positive and statistically significant estimated coefficient. This implies that the likelihood of food security is higher for farmers who interact with extension agents more frequently. This concurs with the findings of Rajeev & Nagendran, (2023) who noted that certain institutional factors, too, bolster insurance adoption, especially in the form of agricultural extension agents who provide technical advice to farmers.

The R-squared and the adjusted R-squared values were used to assess the model robustness. The R-squared value was 0.46, meaning that 46% of the variation in household food security index scores is explained by the explanatory variables. The R-squared value implies that half of the variation in household food security index scores can be attributed to factors such as insurance coverage, household income, educational level, household size, and extension services.

6.6 Conclusion

The results presented in this chapter have shown the role of insurance coverage in determining household food security in Chiweshe. The results have shown that insured

households have a higher household food security index score, a higher grain reserve duration, and a diet that is more diverse as compared to those that are not insured. From the regression analysis results, it was noted that insurance coverage, household income, educational level, household size, and extension services have a significant effect on household food security. The researcher can safely conclude that parametric insurance contributes positively to household resilience, and farmers must be encouraged to uptake parametric insurance.

Chapter 7

Recommendations and Conclusion

7.1 Summary

The researcher analysed the household demographic characteristics. Most households that are married suggest robustness in household structures and possible consequences for social and economic processes. 12% of the households were widowed, and this usually affects labour availability in times of agricultural production and economic processes. Chiweshe area is one of the few areas with strong cultural norms, and this is the reason why divorce rates are very

low in the area. Ownership of high-value assets was very low amongst the respondents. Only 15% of the respondents owned motor cars, 10% owned motorbikes, and 5% owned tractors. The ownership of these high-value assets shows that some farmers are now overcoming capital barriers, potentially improving mobility, market access, and farming efficiency. The research findings support the notion that access to extension services plays a crucial role not only in improving farm productivity but also in strengthening farmers' resilience to the adverse effects of climatic change through greater uptake of insurance services.

The researcher also identified parametric insurance policies for climate resilience and food security**.** From the document analysis that was done, the following parametric insurance packages were identified: Index-Based Livestock Insurance, Smallholder Parametric Insurance, Santam Weather Index Insurance, and African Risk Capacity. The results show that the farmers' attitude towards parametric insurance was positive, significant knowledge gaps persist, and the farmers' perceptions of fairness and timeliness remain mixed. The researcher concludes that there is a need for organisations and the government to build insurance awareness and for the farmers to develop insurance trust. If the farmers can build trust and awareness, this will enable parametric insurance to be a viable risk management tool. The chi-square test was done to identify any association between some selected demographic data and awareness and uptake of parametric insurance. From the chi-square test, the researcher can conclude that educated farmers demonstrated higher levels of awareness and adoption of parametric insurance compared to those farmers with little to no education. The results of the chi-square tests underscore the need for tailored strategies that address demographic disparities. The effectiveness of parametric insurance is not determined solely by its technical design but also by the social and demographic contexts in which it was designed. The results presented have shown the role of insurance coverage in determining household food security in Chiweshe. The results have shown that insured households have a higher household food security index score, a higher grain reserve duration, and a diet that is more diverse as compared to those that are not insured. From the regression analysis results, it was noted that insurance coverage, household income, educational level, household size, and extension services have a significant effect on household food security. The researcher can safely conclude that parametric insurance contributes positively to household resilience, and farmers must be encouraged to uptake parametric insurance.

7.2 Conclusion

The objective of the study was to assess the effectiveness of parametric insurance in Zimbabwe. Zimbabwe is being affected by climate-related risks such as droughts, higher temperatures and floods. By offering payouts triggered by objective weather indices rather than individual loss assessment, this insurance package reduces delays and provides farmers with timely financial support. The findings of the study have demonstrated that parametric insurance has the potential to make smallholder farmers resilient to climate-induced food insecurity. This is being limited by the lower uptake of insurance by the smallholder farmers. From the document analysis that was done, the following parametric insurance packages were identified: Index-Based Livestock Insurance, Smallholder Parametric Insurance, Santam Weather Index Insurance, and African Risk Capacity.

The researcher noted that uptake of insurance was still low in Chiweshe due to limited understanding of insurance mechanisms and scepticism about payout adequacy. Most of the farmers still equity parametric insurance with the traditional insurance packages. Parametric insurance represents a promising innovation that can contribute to food security. Most of the farmers who are insured are more food secure than non-insured farmers in the country. Parametric insurance policies can be incorporated into global climate strategies to increase uptake of it by the farmers.

7.3 Recommendations

Based on the findings of the study and the environments, the following recommendations are forwarded.

- The characterization of farmers indicates that more females participate in parametric insurance. This disparity indicates some form of inequality in the sector. There is a need to encourage men's participation in parametric.
- The government and private sector companies should encourage more farmers to uptake parametric insurance, as this can be a strategy for climate-change-resilient
- There is a need to strengthen extension services. The government extension workers need to incorporate insurance education into their training manuals
- There is a need for farmer capacity building. Training workshops must be conducted with the smallholder farmers to demystify insurance concepts and build financial literacy

References

Addey, K. A., & Jatoe, J. B. D. (2024). Implications of crop yield distributions for multiperil crop insurance rating in Ghana: a lasso model application. *Agricultural Finance Review*, *84*(2–3), 246–265. https://doi.org/10.1108/AFR-05-2024-0078

Blackmore, E., Guarín, A., & Nicolini, G. (2025). *Food and agriculture; Sustainable markets Making crop insurance work for small-scale farmers A review of recent evidence Acknowledgements*. www.iied.org

Duchoslav, J., & Van Asseldonk, M. (2018). Adoption and impact of credit-linked crop index insurance: A case study in Mali. *Studies in Agricultural Economics*, *120*(2), 112–115. https://doi.org/10.7896/j.1813

E., H., & M., M. (2025). The Potential for Parametric Insurance Solutions to Build Resilience for Smallholder Farmers in Zimbabwe. *African Journal of Environment and Natural Science Research*, *8*(1), 119–136. https://doi.org/10.52589/ajensr-5t5eaw3k

Edem, I. . D., & Ekwere, G. E. (2014). *Evaluation of Agricultural Credit Facility in Agricultural Production and Rural Development EvaluationofAgriculturalCreditFacilityinAgriculturalProductionandRuralDevelopment* (Number June) [Azikiwe University, Nigeria]. https://doi.org/10.3126/ije.v3i2.10529

Gebretsadik, Y. H., & Tesfay, K. G. (2023). Impact of weather index crop insurance on smallholder farmers' multidimensional food security: evidence from Ethiopia. *International Journal of Agricultural Sustainability*, *21*(1). https://doi.org/10.1080/14735903.2023.2255451

Mayer-Bosse, A., & Drewes, J. (n.d.). *September 2020 Parametric Insurance The key to microinsurance*.

Patt, A., Suarez, P., & Hess, U. (2010). How do small-holder farmers understand insurance, and how much do they want it? Evidence from Africa. *Global Environmental Change*, *20*(1), 153–161. https://doi.org/10.1016/j.gloenvcha.2009.10.007

Rajeev, M., & Nagendran, P. (2023). Protecting land and livelihood under climate risks: What hinders crop insurance adoption? *Land Use Policy*, *131*. https://doi.org/10.1016/j.landusepol.2023.106711

Tsay, J. H., & Paulson, N. D. (2025). Quantifying basis risk associated with supplemental area-based crop insurance. *Agricultural Finance Review*, *85*(2), 315–336. https://doi.org/10.1108/AFR-10-2023-0145

Wassie, A. G., Nesibu, S. G., & Mengistu, Y. A. (2025). Estimating farmers' willingness to pay for crop insurance with application of choice experiment: case study in South Gondar Zone, Ethiopia. *Agricultural Finance Review*, *85*(1), 19–37. https://doi.org/10.1108/AFR-03-2024-0049

Cardona, Omar. (2004). The Need for Rethinking the Concepts of Vulnerability and Risk from a Holistic Perspective: A Necessary Review and Criticism for Effective Risk Management1. Mapping vulnerability. Disasters, development and people

S.I., N. Nicholls, D. Easterling, C.M. Goodess, S. Kanae, J. Kossin, Y. Luo, J. Marengo, K. McInnes, M. Rahimi, M. Reichstein, A. Sorteberg, C. Vera, and X. Zhang, 2012: Changes in climate extremes and their impacts on the natural physical environment. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 109-230.

Conradt, S., Finger, R. and Spörri, M. (2015) Flexible weather index-based insurance

design. Climate Risk Management, 10, pp.106-117.
Funa, D.B. (2016) Catastrophe risk and parametric insurance.
Hazell, P., Anderson, J., Balzer, N., Hastrup Clemmensen, A., Hess, U. and Rispoli, F. (2010) The potential for scale and sustainability in weather index insurance for agriculture and rural livelihoods. World Food Programme (WFP).
Hazell, P.B. and Hess, U. (2010) Drought insurance for agricultural development and food security in dryland areas. Food Security, 2(4), pp.395-405.
Hess, U. and Syroka, J. (2005) Weather-based insurance in Southern Africa: The case of Malawi.
Jha, P., Ramasundarahettige, C., Landsman, V., Rostron, B., Thun, M., Anderson, R.N., McAfee, T. and Peto, R. (2013) 21st-century hazards of smoking and benefits of cessation in the United States. New England Journal of Medicine, 368(4), pp.341-350.
Lucas, B. (2015) Disaster risk financing and insurance in the Pacific.
Margulescu, S. and Margulescu, E. (2013) Parametric insurance cover for natural catastrophe risks. Global Economic Observer, 1(2), p.97.
Chidoori, T. (2017) Parametric Insurance Critical Instrument to Manage Natural Disaster Risks. Available at: http://ri.co.zw/2017/01/11/parametric-insurance-critical-instrument-to manage-natural-disaster-risks/ (Accessed: 29 July 2021).
International Federation of Red Cross and Red Crescent Societies, (no date) Types of disasters: Definition of hazard. Available at: http://www.ifrc.org/en/what-we-do/disaster management/about-disasters/definition-of-hazard/ (Accessed: 1 August 2021).
Zimbabwe Red Cross Society (2015) Continued Floods affect Zimbabwe. Available at: http://www.redcrosszim.org.zw/index.php/news-and-events/41-continued-floods-affect zimbabwe. (Accessed: 15 July 2021). News Day (2016) 'El Nino and drought take a toll on Zimbabwe's cattle', 12 January.
Available at: https://www.newsday.co.zw/2016/01/12/el-nino-and-drought-take-a-toll-on zimbabwes-cattle/ (Accessed: 26 July 2021).
The Herald (2014) 'Tokwe-Mkosi disaster relieved', 29 December. Available at: http://www.herald.co.zw/tokwe-mkosi-disaster-relived/ (Accessed: 27 July 2021)
at:
Zimbabwe Independent (2016) 'El Niño and its impact on Zim's food security', 18 March. Available
https://www.theindependent.co.zw/2016/03/18/el-nino-impact-zims-food
security/ (Accessed: 27 July 2021).

Questionnaire

QUESTIONNAIRE FOR CHIWESHE COMMUNITY ON PARAMATRIC INSURANCE ENSURING FOOD SECURITY

Instructions

Kindly proved answers in the spaces provided below.

1. What is your Gander.?

a. Male

b. Female

2. How many are you in your family?

……..

……

……

……

3. Is your household food secure?

a. Yes

b. No

4. If YES, what have you done to ensure you are food securer?

……..

……

……

……

5. If NO what is the main reason which have made you not food secure?

……..

……

……

……

6. Which crops do you grow?

……..

……

……

……

7. Do you know about parametric Insurance?

a. Yes

i. Which products do you know about?

……..

……

……

……

b. No

8. Have you ever taken parametric insurance on your Crop?

……..

……

……

……

a. Yes

i. Which Product was it?

……..

……

……

……

ii. How did it work for you?

……..

……

……

……

b. No

i. Why did you not take Parametric Insurance?

……..

……

……

……

9. Have you ever been affected by natural Disasters

a. Yes

i. How bad was it?

……..

……
……
……

ii. Did parametric insurance assist if you had taken cover?

……..
……
……
……

b. No

……..
……
……

10. What do you think about the pricing of parametric insurance?

……..
……
……

11. What is your opinion on parametric insurance?

……..

Final Dissertation for K.Ndagurwa B243612B

Research Project

Document Details

Submission ID
trn:oid:::2945:395453078

Submission Date
Jun 24, 2026, 9:53 PM GMT+2

Download Date
Jun 24, 2026, 9:59 PM GMT+2

File Name
Final Dissertation for K.Ndagurwa B243612B.docx

File Size
501.1 KB

68 Pages

15,668 Words

94,244 Characters

10% Overall Similarity

The combined total of all matches, including overlapping sources, for each database.

Filtered from the Report

- Bibliography
- Quoted Text
- Small Matches (less than 12 words)