

Bindura University of Science Education



**Faculty of Agriculture and Environmental Science
Department of Agricultural Economics, Education and Extension**

**EXPLORING THE NEXUS OF COTTON (*Gossypium hirsutum*) PRODUCTIVITY,
FOOD ACCESS AND COPYING STRATEGIES TO COTTON PRICE VOLATILITY
IN THE ZAMBEZI VALLEY. A CASE STUDY OF MBIRE DISTRICT**

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

By

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June 2025

RELEASE FORM

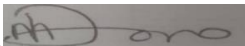
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DECLARATION

I hereby declare that the research project entitled Exploring the nexus of cotton (*Gossypium hirsutum*) productivity , food access and coping strategies to cotton price volatility in the Zambezi Valley. A case study of Mbire District 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 L. Musemwa 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.

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DEDICATION

This dissertation is dedicated to my family and friends, whose unwavering love, encouragement, and support have been the backbone of my academic journey. To my parents, for instilling in me the value of education and hard work, and to my siblings and close friends, who have cheered me on during the most challenging moments of this study your belief in me has been a constant source of strength and motivation. I am deeply grateful for your sacrifices, patience, and understanding throughout this journey

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ABSTRACT

This study investigated the complex relationship between cotton productivity, food access, dietary diversity and coping strategies among smallholder farmers in Mbire District, Zimbabwe. Employing a mixed-methods research design, the study surveyed 150 households using structured questionnaires to assess cotton output, food security, and coping mechanisms. Complementary qualitative data were gathered through in-depth interviews and focus group discussions to gain deeper insights into farmers' perceptions and adaptive strategies. The Sustainable Livelihoods Framework guided the analysis, focusing on how cotton-derived income impacts food security and resource allocation under varying socio-economic and climatic contexts.

The results reveal a gender imbalance in farming, with approximately 66.7% of farmers being male. The average age of the farming population is 43, suggesting a middle-aged demographic that may affect their openness to adopting new agricultural practices. Households typically consist of 5 to 6 members, indicating high dependency ratios that directly influence food security. While the average cultivated area per household is 3.75 hectares, with over half allocated to cotton, this reliance on a single cash crop poses risks. The mean cotton output was 879.4 kg per household, with significant variation in access to resources affecting productivity. Notably, cotton sales accounted for 62.1% of total household income, emphasizing its critical role but also the trade-offs with food security. The findings reveal key relationships among cotton productivity, food access, and dietary diversity. A positive correlation exists between cotton income and dietary diversity ($r = 0.57$, $p < 0.01$), indicating that higher cotton earnings lead to greater dietary variety. Conversely, a negative correlation between cotton income and food access ($r = -0.62$, $p < 0.01$) suggests that reliance on cotton can limit food availability. Additionally, food access negatively correlates with dietary diversity ($r = -0.68$, $p < 0.01$), indicating that limited food access restricts dietary options. The study highlights that while cotton is vital for income generation, its cultivation often compromises food security due to land competition and market constraints.

Farmers employ diverse coping strategies to navigate these challenges. Short-term mechanisms include reducing meal portions, borrowing money, and seeking alternative income sources, while long-term strategies involve crop diversification and investing in sustainable agricultural practices. Factors such as access to credit, extension services, education level, and climatic variability significantly influence these coping strategies. The study concludes that sustainable improvements in cotton productivity must be integrated with targeted food security interventions. The study concludes that while cotton is essential for income generation, its cultivation often compromises food security due to land competition and market challenges. Farmers adopt various coping strategies, such as crop diversification and reducing meal portions, influenced by factors like credit access and climatic conditions. Recommendations for improving cotton productivity include promoting climate-smart agricultural practices, enhancing access to credit and extension services, and bolstering market infrastructure. The findings suggest that policymakers should take a holistic approach to balance agricultural productivity with food access, ensuring sustainable livelihoods for smallholder farmers in the region.

Keywords: Cotton Productivity, Food Security, Coping Strategies, Smallholder Farmers, Mbire District

LIST OF ACRONYMS AND ABBREVIATIONS

CAB – Coping and Adjustment Behaviour
FAO – Food and Agriculture Organization
HH – Household
ICT – Information and Communication Technologies
MDGs – Millennium Development Goals
NGO – Non-Governmental Organization
PCR – Principal Component Regression
SDGs – Sustainable Development Goals
SPSS – Statistical Package for the Social Sciences
USD – United States Dollar
ZESA – Zimbabwe Electricity Supply Authority
ZIMAS – Zimbabwe Multiple Indicator Cluster Survey
ZIMREF – Zimbabwe Research and Education Fund

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CHAPTER 1

INTRODUCTION

1.1 Background of the Study

The investigation of the interrelationship between productivity in cotton, access to food, and adaptability in reaction to price fluctuations in cotton in the Zambezi Valley forms a complex issue placed in a larger picture of worldwide agricultural trends, food security concerns, and economic interdependencies between rural communities. Cotton, especially *Gossypium hirsutum*, is one of the leading cash crops globally, significantly influencing the economies of many developing nations. The production of cotton is not only tied to the apparel industry but also crucial for the livelihoods of millions of smallholder farmers. Consequently, fluctuations in cotton prices can lead to major socio-economic impacts. The International Cotton Advisory Committee (ICAC, 2020) notes that cotton prices are affected by various factors, including shifts in global demand, weather changes, and political issues, all contributing to persistent price volatility. This unpredictability poses challenges for producers in developing countries and threatens global food security, as agricultural efficiency and financial stability are closely linked.

In Africa, agricultural practices face distinct challenges and opportunities shaped by the continent's unique geo-economic and socio-economic landscapes. Cotton production is concentrated in a few countries, with sub-Saharan Africa playing a vital role in the global cotton market. The Food and Agriculture Organisation (FAO, 2019) highlights that cotton is a key source of income for many households reliant on agriculture across various African nations. However, agricultural productivity on the continent is hampered by several issues, such as inadequate infrastructure, limited market access, and the impacts of climate change (Chadwick et al., 2019). Countries involved in cotton production often struggle with low yields and high price volatility, which adversely affects farmers' incomes and their access to food. This is compounded by external market factors and changing demand for cotton, and farmers become susceptible to financial uncertainty.

The cotton industry in Zimbabwe has a rich heritage, supporting many rural farmers' livelihoods. Over two decades of turbulent economies, however, this sector has been under significant strain, with productivity reduced and farmers living in a survival state under variable market regimes. According to the Zimbabwe National Statistics Agency (ZIMSTAT, 2020),

smallholder farmers, particularly in districts such as Mbire, face significant difficulty in accessing food through reduced incomes derived from growing cotton and uncertainty in terms of changing prices. Under such a scenario, farmers have no alternative but to develop survival strategies in a quest to mitigate the impact of price uncertainty, in addition to overall food security. Despite a section choosing to adapt through alternative cropping options or seek alternative sources of incomes, social and environmental concerns surrounding such adaptations require deeper analysis.

Prior investigations have confirmed the interrelatedness between farm food access and productivity in cotton, and have determined that price fluctuations in cotton have a significant impact on farmers' food security (Nhemachena et al., 2020). Fluctuations in cotton prices can significantly affect farmers' incomes, which in turn influences their ability to access food. Research has shown that sudden declines in cotton prices can negatively impact farmers' consumption and nutritional levels, ultimately affecting the wellbeing of the entire community (Mutoko et al., 2019). Conversely, in times of high cotton price, farmers can use resources to boost agricultural productivity and apply technology that can mitigate food security concerns. Nevertheless, discussion about such dynamics tends to rely on general statements, with little in-depth examination of localized environments in which such dynamics occur, specifically in key agricultural areas such as in the Zambezi Valley.

The motivation for this study arises from ongoing economic vulnerability and food security issues, with Mbire District serving as a pertinent example that reflects the broader trends faced by farmers across Zimbabwe. By exploring the intricate connections between adaptability, food access, and cotton productivity, this research seeks to illuminate not only the vulnerabilities of farmers but also their abilities to build resilience during challenging times. Study objectives include an examination of farmers' incomes and access to food in relation to fluctuations in cotton price, an examination of farmers' adaptations in reaction to changing economies, and an analysis of productivity in cotton and its impact on food security.

This study focuses specifically on Mbire District, providing a detailed examination of local experiences and responses to global market pressures. While this targeted approach allows for a deeper understanding, several limitations should be noted. These include potential biases in self-reported data, difficulties in capturing the full range of coping strategies, and the necessity for comprehensive quantitative data to support qualitative findings. Additionally, external

factors such as government policies and international market changes can complicate the analysis, as they may affect both productivity and price stability.

The importance of this study lies in its ability to inform policy decisions aimed at improving food security through a better understanding of cotton dynamics. By shedding light on the specific situations of cotton farmers in Mbire, stakeholders can identify effective support strategies and interventions. Furthermore, the findings may contribute to broader discussions about agricultural sustainability, economic resilience, and food justice, especially within vulnerable communities. Understanding the complexities of these interconnected themes is essential for developing effective policies and coping strategies that not only stabilize cotton prices but also improve food access and livelihoods for farmers.

This research is based on the hypothesis that there is a significant relationship between cotton price volatility, productivity, and food access among farmers in Mbire District. More specifically, it suggests that as cotton prices become more volatile, productivity declines, which in turn compromises food access and increases reliance on various coping strategies. It is anticipated that these findings will enhance the understanding of the economic interdependencies involved in cotton farming while clarifying broader implications for food security policy in Zimbabwe and similar contexts.

1.2 Problem Statement

The intersection of cotton productivity, food access, and coping strategies in the face of cotton price volatility raises urgent concerns in the Zambezi Valley, particularly within the Mbire District. The region represents a critical case where agricultural practices are directly influenced by fluctuating market conditions, resulting in significant implications for food security and nutrition. Recent assessments indicate that approximately 60% of households in Mbire District experience food insecurity, with over 30% of children under five years old demonstrating stunted growth a clear indicator of malnutrition. These statistics highlight the pervasive crisis affecting the district, prominently fueled by the highly volatile nature of cotton prices which have, over the last decade, dropped by as much as 40% during peak harvest seasons, severely crippling farmer incomes and their ability to ensure adequate food access for their families.

The decline in cotton prices is intrinsically linked to the escalating levels of food insecurity observed in the region. Historical data shows that periods of price decrease coincide with increased reports of hunger, where farmers, facing reduced revenue streams, are forced to forgo essential expenditures on food and healthcare. This relationship is evident; for example, in years marked by significant price drops, many households reported a reduction in food diversity and quantity, further exacerbating nutritional deficits and overall living conditions. Additionally, the socio-economic ramifications of this price volatility are profound. Reports indicate that as many as 20% of local shops have closed in recent years due to declining consumer purchasing power, while school dropout rates have surged by nearly 25%, attributed directly to families' inability to afford school fees amid economic instability. Health outcomes are deteriorating alarmingly in Mbire District, with increased rates of communicable diseases largely driven by malnutrition and poverty. Recent health surveys documented a rise in child mortality rates, with access to healthcare facilities dwindling as families prioritize spending on immediate food needs. Stunting and wasting among children are present at rates that exceed national averages, calling for immediate intervention and research into the underlying causes connecting agricultural output to health crises.

Despite the critical need for understanding these dynamics, there exists a significant paucity of research exploring the interrelationship between cotton productivity, food security, and coping strategies amidst price volatility within this context. Existing literature has often addressed these issues in isolation, rarely synthesizing the intricate connections that define this socio-economic landscape in Mbire District. Studies have acknowledged agricultural productivity and food security in similar contexts but have overlooked the specific ramifications of commodity price fluctuations within cotton-growing regions. This gap in the literature highlights the urgent necessity for the proposed study, which seeks to elucidate these complex interrelations, contributing valuable insights that could inform policy actions aimed at mitigating food insecurity, enhancing nutrition, and improving overall livelihoods in the region.

1.3 Main Objective

To investigate the interconnections between cotton productivity, food access, and adaptive strategies employed by farmers in response to cotton price volatility in Mbire District, Zambezi Valley.

1.3.1 Specific Objectives

1. To analyse the socio-economic factors influencing cotton productivity in Mbire District, Zambezi Valley.
2. To assess the effect of cotton productivity on household food access and dietary diversity in Mbire District.
3. To evaluate the coping strategies adopted by cotton farmers to manage the risks associated with cotton price volatility.

1.4 Research Questions

1. What socio-economic factors significantly affect cotton productivity in Mbire District?
2. How does cotton productivity influence food access and dietary diversity of cotton growing households in Mbire District?
3. What coping strategies do cotton farmers utilise in response to fluctuations in cotton prices, and how effective are these strategies?

1.5 Research Hypothesis

The thesis will be guided by the following hypothesis:

- i. Socio-economic characteristics (farming experience, age, gender, marital status, education, household size and farm size) have a significant effect on cotton productivity.
- ii. Cotton productivity significantly affects household food access and dietary diversity.

1.6 Justification of the Study

The nexus between cotton productivity, food access, and coping strategies in the face of cotton price volatility presents a critical issue that demands thorough investigation, particularly in regions such as the Zambezi Valley. Cotton (*Gossypium hirsutum*) represents more than just a cash crop in Mbire District; it is integral to the livelihood and food security of local farmers. The economic sustainability of many households in this region is closely tied to cotton production, where fluctuations in market prices significantly impact farmers' incomes. Such volatility affects their ability to procure food and other essential goods, posing a direct threat to household food security. Therefore, this study aims to rigorously examine how price fluctuations influence productivity and food access. By establishing a comprehensive understanding of these intricate relationships, we aim to provide invaluable insights for

policymakers and stakeholders, equipping them to develop targeted interventions that can potentially mitigate the adverse effects of price volatility on local farmers.

Furthermore, the coping strategies that farmers deploy in response to cotton price volatility are vital for enhancing their resilience against economic shocks. This research will delve into the various adaptive measures taken by communities within the Zambezi Valley, documenting their experiences and insights on managing risks associated with cotton market fluctuations. By systematically analysing these strategies, the study will contribute to a deeper understanding of rural resilience and adaptive capacity, offering a blueprint for effective rural development initiatives. The findings will not only highlight the strengths and weaknesses inherent to current coping mechanisms but will also identify gaps where additional support may be required, thus fostering a stronger response to future price instabilities and ensuring sustainable agricultural practices in the region.

The insights generated from this research can significantly inform broader agricultural policies and practices, not only within Zimbabwe but also across similar socio-economic contexts throughout Sub-Saharan Africa. The study will provide clear evidence on how cash cropping, particularly cotton production, can both facilitate food security and pose barriers to food sovereignty among local farmers. As such, stakeholders operating in the cotton value chain including farmers, cotton contractors, transporters, input suppliers, scholars, researchers, and policymakers will benefit from the research findings. Farmers and cotton contractors can utilise the evidence-based recommendations to improve productivity and food access, while policymakers can formulate robust agricultural policies that promote both economic growth and food security. This collaborative approach will be instrumental in shaping a resilient agricultural framework that ensures the well-being of rural communities, thereby fostering lasting benefits across the value chain.

1.7 Scope and Limitations of Study

1.7.1 Scope of study

Geographical Focus: The research is confined to the Mbire District within the Zambezi Valley region. While cotton production and price volatility may be relevant in other districts or regions of Zimbabwe, this study does not extend its analysis beyond Mbire District, allowing for a thorough and detailed investigation of localised dynamics.

Crop Specificity: The study centres solely on *Gossypium hirsutum* (cotton) and does not explore other agricultural products or alternative cash crops within the region. This delimitation is intended to provide a focused analysis of cotton-related issues and their ramifications for food access and coping strategies.

1.7.2 Limitations of study

a) Scope and Generalisability: The study is confined to the Mbire District in the Zambezi Valley, which may limit the generalisability of findings to other regions with different socio-economic conditions or agricultural practices. As such, insights drawn may not accurately reflect the broader cotton farming context in Zimbabwe or other countries. To address this limitation, future research could incorporate a multi-site approach, engaging multiple districts or regions within Zimbabwe or even in different countries. This would allow for comparative analyses and enhance the generalisability of the study's findings.

b) Potential Bias in Data Collection: The reliance on self-reported data from farmers could introduce bias, as participants may over or under report their productivity and access to food due to social desirability or recall bias. This could compromise the accuracy of the data analysis and the overall findings. To mitigate this bias, the study could incorporate multiple data sources, such as government agricultural statistics, market price records, and observational measures. Triangulating data from various sources can help validate findings and reduce the risk of skewed results. Additionally, employing trained enumerators to conduct surveys could also minimise bias in data collection.

1.8 Outline of Dissertation

This research study will be organized into five chapters. The first chapter provides the background of the study. This offers the insight of the nexus of cotton (*Gossypium Hirsutum*) productivity, food access and copying strategies to cotton price volatility in the Zambezi Valley. It spells out the problem statement and highlights the objectives of the study. Further, it reconnoitres questions to be answered in the research study.

Chapter two, highlights the literature review of the nexus of cotton (*Gossypium hirsutum*) productivity, food access and copying strategies to cotton price volatility. Further, the chapter provides an overview of global and regional cotton production and price volatility and its effects on smallholder farmers' welfare. It also reviews food access and copying strategies to cotton price volatility in the country, bringing into attention some of the factors that contribute to cotton price fluctuations.

Chapter three, which covers the research methodology then follows. This spells out the description of study site and research design of the project and such issues as; the data collection, population sampling, the research instruments, the data collection procedures and the data analysis pertaining to; the nexus of cotton (*Gossypium hirsutum*) productivity, food access and copying strategies to cotton price volatility.

Chapter four explores the results of the study. Data presentation, analysis, interpretation and discussion on the research study will be put into scrutiny.

Furthermore, chapter five concludes the study with the summary, conclusions and recommendations based on the nexus of cotton (*Gossypium hirsutum*) productivity, food access and copying strategies to cotton price volatility.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter reviews other scholars' literature on the matter. The chapter discussed what other researchers had published about factors affecting cotton prices globally, factors affecting cotton production and prices regionally, and the Zimbabwean setting in general. The chapter also examined research gaps in the existing literature and ways in which Zimbabwe can learn from other countries and implement them in Zimbabwe in order to address the critical issues that must be addressed by learning from developed nations and other regional peers. Furthermore, the chapters described the theoretical frameworks used in this study. The researcher employed the sustainable livelihood framework; the theory helps one look at how sustainable cotton production is in the livelihoods of the farmers.

2.2 Factors impacting Cotton Prices in the World

Understanding factors affecting price of cotton is, perhaps, the most important consideration for solutions to the problems facing communities that produce cotton. The following section discusses global market dynamics, effects of trade policies, and some fundamental principles of supply and demand that really affect cotton price.

2.2.1 Global Market Dynamics

Generally, the global cotton market is characterized by several instabilities in price abutting production levels, export demands, and competing fibres (Moyo, 2020). For example, fluctuations in cotton prices from 2010 until 2020. A peak of \$2.00 per kilogram was reached in March 2011 and fell further by 2020 to just US\$0.60 per kilogram (Burhan, 2022).

Revealing such sharp volatility is placed under

Table 1: Global Market Prices of Cotton in the Last Decade

Year	Average Cotton Price (US\$/kg)
2011	2
2012	1.30
2013	0.90
2014	0.80
2015	0.70
2016	0.70
2017	1.50
2018	1.00
2019	0.90

2020	0.60
------	------

Source: ICAC (2020)

Cotton prices remain unstable due to a variety of technological overheads in the cotton farming business, as well as pricing and consumer behaviour changes as shown in Table 1. According to Singh (2019), adverse weather fluctuations, such as greater drought or rainfall, significantly affect cotton harvests, resulting in price increases.

2.2.2 Trade Policies and Tariffs

Trade policies and tariffs significantly determine cotton prices. Generally, countries that practice protective policies would resort to tariffs on cotton input either to raise that domestic price, which has implications not only on cotton producers but also end consumers (Zhang et al., 2021). America, as one of the top cotton producers and exporters, is maintaining its markets through subsidies and tariffs (Pan, 2020). The WTO report (2019) observes that for such practices to continue as they have, there will be market distortions affecting price arrangements for international cotton and, more often than not, retaliation from other countries (Ridley and Devadoss, 2014). Changes in trade policies pertaining especially to the major importing nations, such as China, can dictate the pattern of demand for global cotton. Recently, for instance, trade disputes between the USA and China resulted in a level of uncertainty in price levels, causing fluctuations that affected not just U.S. producers but also farmers from Africa and other countries producing cotton (Ridley and Devadoss, 2023).

2.2.3 Supply and Demand Influences

Voora et al (2023), cotton prices are primarily driven by the fundamentals of supply and demand, which, in turn, mirror the interaction of the quantities of cotton produced and the desires held by consumers for that product. According to Baffes (2015), shifts in supply and demand can considerably affect prices, with consequences on farmers and economies depending on cotton production.

i) Supply Factors

Agricultural practices, methods, and inventions in technology, atmospheric conditions, and global production capacity are the particular supply factors determining the supply of cotton (Dai and Dong, 2018). Cotton is a very sensitive crop with specific climatic requirements for its cultivation, namely adequate moisture and temperatures ranging from 20°C to 30°C; therefore, adverse weather phenomena, such as droughts or floods, locusts, and so on, can have an immediate effect on production levels (Skendžić, 2021). For example, some major cotton-

growing regions being hit by drought would yield substantially lower yields, thereby declining market supply and increasing price levels. Inherent to the continuous improvement of agricultural technologies and practices, raising productivity levels. For example, GM cotton variety innovations resist pest and disease intervention in yielding better and stabilizing supply against adverse conditions. Precision agriculture techniques apply data analytics to irrigation and fertilization for output maximization (Kumar et al., 2021). Therefore, any increase in efficiencies in cotton production raising supply may fall to less demand, thus pushing down prices. Relative to global production statistics, there is an upward trend moving from 25 million bales in 2010/11 to 29 million bales in 2020/21 (USDA, 2020). This increase implies the potential shift in market power dynamics, especially if some areas sustained reasonably high yields while others were impaired. With these unexpected variations in cotton supply, price increases may take place that pose threats to economic viability to both producers and consumers.

ii) Factors Affecting Demand

Demand for cotton, on the other hand, is mainly driven by the textile and apparel industries, by far the greatest consumers of cotton. Demand may vary due to different economic scenarios depending on global economic growth, changes in consumer preferences, fashion trends, and competitive pressures from synthetic fibre industries. Economic growth generally increases demand for textiles, as rising disposable incomes result in enhanced clothing consumption. The rapid industrialisation and urbanisation of countries lead to a sudden surge in demand for cotton since the local industries expand to meet the need from the ever-increasing populations. For example, both China and India, major cotton consumers, witnessed quite a phenomenal demand because of their growing middle-class consumer bases. On the contrary, what could adversely influence cotton demand are changing consumer preferences for sustainable fashion and environmentally friendly materials. As environmental awareness increases, many consumers are shifting towards synthetic or alternative fibres, which tend to be inexpensive and have a more sustainable image (Harrington et al., 2020). Also, with improved quality and cheaper sales of synthetic fibres, it has become an uttermost rival to cotton in its existing markets. As the report of the Fibre Economics Bureau of America (2021) reveals, an emerging trend can be witnessed in favour of synthetic fibres, which represent about 75% of the global fibre market, marking a probable threat to cotton's market share.

iii) The Price- Demand Relationship

As per the International Monetary Fund (2021), there is a volatile market for cotton because there is an unstable supply-demand dynamic making it susceptible to sudden shocks. Price elasticity of demand for cotton is critical, and unless the demand is elastic, minor disruptions in the expected supply can create dramatic increases in the price (Janzen, 2018). On the other hand, if demand turns relatively more elastic as a result of substitute availability, then producers will find it difficult to adjust their prices changes. Eventually, it is the inter-link among supply and demand that governs market prices and creates the market environment for cotton farmers (Bayrau et al 2021). Understanding these underlying elements is critical for stakeholders aiming to navigate the complexities of global cotton markets and for policymakers who seek to implement an effective strategy for agricultural sustainability and income stability in cotton-growing regions like the Zambezi Valley.

2.3 Cotton Production and Marketing in Sub-Saharan Africa

According to Amanet (2019), cotton production is a major cash crop, which greatly supports Sub-Saharan Africa's agrarian practices and the economies of several countries. Twumasi (2021), states that over the past years, cotton production in this region has been on a sustainable increase and was approximately 2.2 million tonnes in 2020. This production volume is about 4% of global cotton production, making this region an important player in the global cotton market. Radhakrishnan (2017) indicates that cotton provides primary income to millions of smallholder farmers in rural communities, therefore supporting the livelihoods of innumerable individuals and families. According to Ibrahim et al (2022) , the very concept of the importance of the cotton sector in Sub-Saharan Africa implies that there exist a number of challenges blocking the sector from operating properly. Smallholder farmers, who are the backbone of the cotton industry, often do not get access to quality inputs such as seeds, fertilizers, and pest management technologies. Limited access lowers productivity and profitability in cotton farming (Kavhosy, 2020). In addition, the climate is another concern for the cotton farmers in this region. The threats that climate change pose on cotton crops include droughts, floods, and heat stress (Lobell, 2021). Price fluctuations in the cotton markets of Sub-Saharan Africa pose another challenge for farmers to predict and prepare for impending market changes (ICAC, 2020).

The crops and marketing systems of cotton in Sub-Saharan Africa have thus become the subject of intervention by several key players, including governments, international institutions, and

private sector actors, aimed at reversing the tide. Such efforts may include the need to improve access to finance and credit to enable the smallholder farmers to generate reasonable productivity over time while imparting knowledge and skills on agricultural practices and market dynamics, generating climate-resilient cotton varieties (Okwu, 2020). In that order, reforms in the market system for efficiency, inclusiveness, and transparency, utilizing digital platforms in price discovery and market information, are indispensable to linking farmers with buyers so the farmers can bargain for fair prices (Morris, 2020). Despite these efforts, the cotton sector in Sub-Saharan Africa remains underdeveloped, with much opportunity for growth and expansion. The realization of this potential requires the involvement of policy intervention and other interested actors in mitigating structural and market failures. Kavhosy (2020), notes that smallholder farmers benefit from initiatives aimed at research and development in agriculture, access to marketing, and capacity-building in relation to climate change. Only then can returns from increased cotton production be garnered for millions of smallholder farmers, with a ripple effect on the economic development of the region.

2.3.1 Overview cotton Production in Sub-Saharan Africa

The cotton industry in West Africa and the Sub-Saharan region stagnated because of several factors namely climate, agricultural practices, and economic policies. According to this study, countries in Sub-Sahara Africa, such as Mali, Burkina Faso, Benin, and Zimbabwe, are known to be the primary cash crops producing some cotton as shown in Table 2.

Table 2: Cotton Production in Selected Sub-Saharan African Countries (2020)

Country	Production in Tonnes	Global Ranking
Mali	700,000	4
Burkina Faso	1,000,000	3
Benin	450,000	6
Zimbabwe	150,000	20
Tanzania	200,000	24

Source: FAO (2021)

The weather conditions prevailing in the majority of these countries are conducive to the cultivation of cotton. Generally, cotton is planted around the rainy season, which occurs majorly from October to March; this timing allows farmers to rely on natural rainfall for irrigation (Williams, et al, 2018). There are essentially very diverse farming practices, with quite a number of smallholder farmers using traditional farming methods limiting the production efficiency. While very many agribusinesses practice, modern agriculture and make use of genetically modified seeds and efficient pest management, smallholder farmers do not

have access to most of the above technologies, thus affecting the overall yield (Morris et al., 2020).

2.3.2 Marketing Channels and Strategies

The marketing of cotton in Sub-Saharan Africa is multifaceted, involving various stakeholders from producers to international buyers. Typically, cotton producers sell their harvest through several marketing channels, including direct sales to ginners, cooperatives, or through local agents. The choice of marketing channel often depends on the region's infrastructure, the relationship between farmers and buyers, and market conditions. In many sub-Saharan countries, farmers often rely on cooperative societies to aggregate their cotton. This not only assists smallholder farmers in pooling their produce for better bargaining power but also enables them to access financing and farming inputs through these cooperatives (Kavhosy et al., 2020). The cooperatives help the farmers for a more guaranteed and stable price as opposed to individual selling, especially during price fluctuations. Pricing strategies can be very diverse from one country to the other and also according to the market conditions. For example, in countries where there are efficient grading systems, the higher-quality cotton gets paid at better prices per unit weight. In the contrary, if there is no clear standard of grading, farmers may receive very less by way of payment for their produce. According to (ICAC) International Cotton Advisory Committee (2020), the offering of real-time market information has eventually become crucial for farmers to sell their cotton due to the increasing demand and supply and competition in the cotton industry. Also, with the advent of technology, they have begun their way to the farmers' empowerment through mobile applications for market updates.

Table 3: Marketing Strategies Used by Cotton Farmers

Marketing Strategy	Description	Advantages
Direct Sales	Selling directly to ginners or exporters	Higher profit margins
Cooperative Marketing	Farmer cooperatives pooling resources	Enhanced negotiating power
Contract Farming	Agreements with buyers for guaranteed prices	Price stability
Mobile Market Information	Use of technology for real-time pricing	Informed decision-making

Source: Kavhosy et al. (2020)

2.3.3 Challenges Faced by Cotton Producers in Sub-Saharan Africa

- **Pest and disease pressures:** From recorded literature, cotton crops produced in Sub-Saharan Africa are prone to a multitude of pests and diseases causing great losses in

yield and quality. Cotton bollworm, for instance, has wrought havoc on cotton farms across countries, resulting in tremendous economic losses (Huang et al., 2020). Farmers, especially those under the smallholder category, may lack the resources to combine control measures under integrated pest management against pest populations and their disease outbreaks (Adekunle,218). Likewise, the routine application of chemical pesticides without proper knowledge and training often exacerbates the situation by inducing secondary pest outbreaks. There is no guarantee that research-based solutions are delivered to the farmers effectively, impairing their ability to manage these agricultural threats on their own.

- **Lack of Accessibility to finances:** Many smallholders find it almost impossible to gain access to any credit facilities because of the idea that smallholder operations are high-risk ventures in the eyes of financial institutions. It eventually leaves the farming community with depleted supplies of high-quality seeds, fertilizers, and pest control measures that would otherwise increase output or assure better yields (Okwu et al., 2020). Not forgetting the issue of collateral and financial literacy, it can prove difficult to set up financial models and products specifically meant for smallholder cotton farmers. Innovative avenues such as microfinance and cooperative-based lending have been suggested but are further required for broader implementation to be of greater benefit.
- **Poor infrastructure:** The problem of inadequacy is one of the recurrent issues attached to cotton production and marketing movement. Poor transport network immobilized mobility of farmers as they cannot move their produce easily from farm sites to markets, which causes post-harvest losses (Morris et al., 2020). Most places are characterized by poor access roads and, because of this inability to access a reliable transport system, posting of crops is delayed and it reduces market opportunities. As well as leading to serious loss of produce through spoilage or deterioration in the quality of such produce during the storage period due to inadequate storage facilities. There is need to improve rural infrastructures so that the producers will have a chance of better connecting them to the market and thus improved price realization and reduced losses.
- **Price changes (Fluctuations):** Another important impediment to cotton farmers in Sub-Saharan Africa are prices that fluctuate. Numerous factors impact global cotton prices, including the international market mechanisms, climatic conditions in cotton-producing countries, and changes in trade policies (ICAC, 2020). These fluctuations

put farmers in uncertain situations such that rates become difficult to forecast and decisions related to planting become difficult to make. Therefore, many of these farmers may respond by avoiding risk-for example, by reducing cotton area or by choosing the production of relatively less profitable crops that would, however, offer relatively stable returns. Price stabilization mechanisms and enhanced access to market intelligence could, however, partly reduce farmers' price-related risks(Tripathi et al, 2023)

2.4 Cotton Production and Marketing in Zimbabwe

2.4.1 Historical Context of Cotton Production in Zimbabwe

As narrated by Rubert (1998), cotton's introduction as a cash crop during the colonial period saw the initiation of increased transformation to the Zimbabwean landscape in the early 20th century. The onset of these changes heralded the beginning of a dynamic agent of change that would see cotton at some stage become an important player in Zimbabwe's agricultural economy. Guided by self-interest for economic growth, the British colonial agenda was steering cotton cultivation to save its lucrative interest in the region (Hodge, 2007). Cotton farming stood to satisfy an all-embracing appetite for resource exploitation in Zimbabwe, providing raw materials for the delocalizing British textile industry and establishing a system of labour and economic control. Further investments in agricultural projects were implemented in the 1960s and 1970s, all meant to generally increase agricultural productivity, encourage local participation, and guarantee higher yields. In the late 1970s, the Cotton Marketing Board was set up as a very crucial step that ensured marketing processes were efficient, thus giving just and fair returns to farmers (Rubert, 1998). Its function was to be some form of supervisory agency. The efficiency pursued ran from the collection of the crop through distribution and sale on the international market. The Eastern Highlands and the Lowveld were the main cotton-producing areas during this time, characterized by climates favourable to the attainment of good yields.

Nevertheless, nothing could have been more devastating than the play of the late 1990s and the 2000s in the Zimbabwean cotton industry (Chigumira, 2017). The bankruptcy upheavals in the country caused tremendous upheavals in land ownership and agricultural practices. The land reform processes set into motion saw the white commercial farmers, who were previously producing a large percentage of cotton, being displaced (Rubert, 2001). The whole process, at

times, proved to be injurious to the life of the new landowners, the majority of whom were smallholder farmers. The result was a very sharp decline in cotton yields and in production volume. By the mid-2000s, the image of Zimbabwe as an African cotton giant was, therefore, in jeopardy. It was an industry battling the declining quality of its product, coupled with poor infrastructure. Support services had all but disappeared. Nonetheless, in recent times, various stakeholders have recognized the potential of the industry to improve rural livelihoods and contribute to economic growth (Rubert, 2001). Reviving cotton has lately been high on the agenda, with a special emphasis on revamping infrastructure, financial support, and improved farming practices.

2.4.2 Current Practices and Trends

Change is always inevitable in the Zimbabwe cotton industry, which is currently described or characterized as being dominated by a mixture of smallholders and a smaller number of large commercial farms. Approximately 80 percent of cotton produced in the country is derived from smallholder farmers, making this crop very important for the income of the rural population (Laris et al , 2015). Current practices include promotion of improved varieties of seed and agricultural technology use, which form the basis for yield improvement and improved quality of cotton as shown in Figure 1. Many farmers have also been adopting conservation agricultural practices such as minimum tillage and crop rotations to enhance soil fertility and also to mitigate environmental degradation effects. Together with various partners, The Zimbabwean government puts in place some initiatives targeting the training of farmers into sustainable production systems, pest control, and integrated crop management. In addition, private companies have come up to deal with providing inputs and technical services, which would enhance the capacity of smallholders to produce cotton more competitively. These achievements notwithstanding, the sector still faces global price volatility, access and market challenges, as well as limited financial support. More significantly, there is a growing awareness of the value of raw input, with some of the producers already chasing opportunities in ginning and textile production to maximize their returns from cotton growing.



Figure 1: Cotton production in Zimbabwe

Source: <https://revision.co.zw/cotton-farming-zimbabwe/>

2.4.3 Market Access and Infrastructure

Access to the market and infrastructure has remained critical variables influencing overall performance in the cotton sub-sector of Zimbabwe. According to Makasi (2015) traditionally, Zimbabwe was well endowed with structured marketing channels for cotton through which cotton moved from the farms to the local and international markets. This has, however, been heavily subverted by the negative influences of economic hardships and crumbling infrastructure. Recently, government and private sector efforts have turned to rehabilitating and expanding rural infrastructure in terms of roads, storage facilities, and transport networks of utmost importance in enhancing market access for cotton farmers (Kaiser and Barstew, 2022). Giving cotton-buying and processing companies and better market access. These companies often supply farmers with inputs through credit arrangements and secure cotton output in return. Nevertheless, smallholder farmers are mostly disadvantaged with information on market asymmetry that can easily infringe upon their rights by middlemen, thereby attaining lower prices for their produce (Minot, 2011). Digital platforms and mobile technology are being increasingly pressed into service in providing farmers with real-time access to information on markets so they can better organize for sales and pricing. Zimbabwe has prospects for sustainable and ethically produced cotton products in international markets with increased demand (Rugedhla et al, 2020). The implementation of proper marketing tactics and quality improvements would benefit Zimbabwean cotton in niche markets such as organic cotton and fair trade. Improved market access and infrastructure are critical to recovering Zimbabwe's cotton sector, which makes a significant contribution to sustainable economic growth and the elevation of rural people.

2.5 Importance of Cotton Production to Zimbabwe

2.5.1 Contribution to Economic Growth

Cotton now is one of the major contributions to the economy of Zimbabwe both at a national level and even more locally. This is one of the cash crops in Zimbabwe which sustains so many activities regarding farming, ginning, and textile manufacture. Cotton revenue generated from production goes to GDP and benefits most farmers, especially those from rural areas, with few income-generating activities. The other benefit of cotton is that it contributes to local agro-based industries while enhancing the diversification of the economy and reducing dependency on few crops. The significant economic value that cotton produces is, indeed, the whole value chain of cotton farming. Moreover, the entire value chain triggered by cotton farming promotes economic activity by connecting sectors within the economy (German et al., 2020). Increased activity will expect the input supply chain, which includes suppliers of fertilizers, seeds, and pesticides associated with cotton farming. Demand from these farmers will thus be economic activity in transport and logistics, processing, and marketing. Such supporting industries push the envelope of agricultural productivity forward while creating opportunities for entrepreneurship and building a vigorous agricultural economy-infrastructure that is fundamental to long-term economic recovery and development for Zimbabwe. Cotton farming provides income security for smallholder farmers, many of whom farm marginal lands. Smallholder farmers receive much investment, which enhances their knowledge of and access to technologies, as well as agricultural extension services (Cafer et al., 2018). The end result will be to improve the productivity and yields of cotton farming, making it a more sustainable and profitable agriculture, improving community welfare, and reducing poverty. Thus, the benefits of cotton production go beyond the immediate household incomes into wider sectors affecting social and economic development contexts in Zimbabwe.

2.5.2 Employment Opportunities

The cotton industry of Zimbabwe is very critical in employing workers throughout the value chains. Cotton production serves to provide employment opportunities ranging from farming to ginning, processing, and retailing. Many smallholder farmers grow cotton as the main income-generating activity, and this has an impact on their households and the entire community. About 80% of cotton produced is from smallholder farmers, direct employment being given to thousands of agricultural workers during planting, management, and harvesting seasons (Tlatlaa et al., 2023). The labour-intensive nature of cotton farming means that many

people, both men and women, can find work in this industry, which adds income to households and contributes to food security. Cotton activities also create employment opportunities in the processing industry. Ginning companies need workers to convert cotton fibres from the seeds; this processing adds value to the cotton before it is released into the market. Jobs in this industry will also stimulate the local economy by creating demand for labour. The textile and apparel sector, which is heavily reliant on cotton as a first raw material, serves as another pillar for creating more avenues for employment. This industry, however, has the potential for growth, especially if local manufacturers take advantage of the resurgence in demand for ethical and sustainable textiles both locally and internationally. Further, cotton production highlights gender equity in employment. Several communities have women taking the lead in cotton farming and labouring work, which enables them to financially engage and obtain financial independence. By increasing their participation in cotton cultivation and related activities, women empower themselves and improve their social status in their families and communities. The cotton industry thus acts as an economic backbone and social change agent towards creating an inclusive workforce in rural Zimbabwe.

2.5.3 Role in Export Earnings

Gwanongodza (2020) noted that, Zimbabwe exports a considerable quantity of cotton, which directly determines its foreign trade balance. Over time, the country has grown to be one of the largest cotton exporting countries in the region, open to international markets for the disposal of any excess production. These export markets afford farmers better prices than the local markets, thus improving their margins and encouraging further investment into cotton production. With the varying quality of the cotton produced, a greater emphasis on grades and standards will help Zimbabwean producers compete effectively in international markets so as to retain or increase their share of the international cotton trade (Newfarmer and Pierola, 2019). The revenue from exports of cotton is a direct source of income for the country and can spill over into the economy, in an effect termed the multiplier effect. The essential foreign currency earned from cotton exports can be used to import goods and services, thereby stabilizing the economy. Zimbabwean exports of cotton predominantly target the Asian and European markets, which are the growing destinations for high-standard fibres (Undenge, 1994). Throughout this increase in export revenue, there might be a perfect opportunity to have their cotton, especially organic and sustainably produced cotton, under positioned in emerging markets, increasingly with sustainability in mind, so that when the cotton is being produced, it will be placed on the market.

Still, beyond the development of value-added products within the cotton sector, there is much to gain for the contribution of cotton to earnings from export(Kabish et al , 2024). That goes along with local processing for textiles; Zimbabwe will thus be converting its position from that of exporters of mostly raw cotton to producers of finished cotton goods like garments or home textiles. Furthermore, this will not only benefit the local skills, but it will also mean investment in technology and skills development within the national industry. Such exploitation would afford high-profit margins while consolidating a more resilient economy founded upon the cotton sector, thus guaranteeing that Zimbabwe's cotton production is as well a sure route for sustainable economic growth and development.

2.6 Impact of Price Instability on Cotton Production and Productivity

2.6.1 Effects on Farmer Decision-Making

According to Chari and Ngcamu (2019) state that, on cotton market price instability, it affects the decision processes of farmers deeply, especially the smallholders, who form the bulk of cotton producers in Zimbabwe. Fluctuating prices leave little certitude with regard to returns on investments, and this keeps farmers in a conservative decision-making mode. Small-scale farmers can curtail their input costs, for instance, buying less seeds, fertilizers, or pesticides, and thus prioritize mere survival, not long-term agricultural practices. Hence, suboptimal production practices may emerge, thus compromising their agricultural trade sustainability. Also, this price uncertainty can lead farmers to consider other crops that are presumed to have more stable or profitable markets. A significant decline in cotton prices would make cotton farmers quit cotton altogether and move to crops that have a more secure income, such as maize, groundnuts, and potatoes (Jares, 2024) , this will disrupt cotton production and the entire local economy that relies on cotton for cash cropping. Therefore, the decisions of farmers almost always tend to be reactionary and not in anticipation of the short-term financial viability of cotton production. Moreover, an unforeseen price situation negatively affects farmers decisions about adopting modern technology and practices to increase their productivity(Bowman and Zilberman, 2013). Farmers will neither engage in activities requiring upfront costs of investment, such as irrigation systems or improved seed varieties, thereby compromising their productivity growth and marketing potential, if they do not trust fair compensation. This dwindling investment would trigger a cycle of low productivity and sustainability challenges that would theoretically, in the long run, with time, affect cotton farmers.

2.6.2 Consequences for Yield and Quality

Price instability has a significant impact on the production and quality of cotton farmed in Zimbabwe (Mutambara and Mujeyi, 2021). When farmers are concerned about future prices, they tend to reduce their investment in cotton. Within this, they will likely neglect quality inputs such as appropriate seed kinds, fertilisers, and pesticide management. As such, by keeping low input use, cotton yield will be adversely impacted because the crops need nutritional and environmental support to realize their full potential. This reduction in production may present problems for the sustainability of the country's position in the global cotton market. Price instability affects not just yield but also the quality of cotton produced. Farmers might neglect fundamental practices, such as irrigation and pest control, thus compromising quality. Price fluctuations that lead to farmers' decisions might trigger high volumes of low-quality cotton production, which can tarnish the reputation of Zimbabwean cotton producers. Such reputation may lead to exclusion from some high-quality markets, translating into the loss of earnings for farmers and reduced access to high-value opportunities. Yield and quality impact mostly tend to form a vicious cycle in the cotton production sector. Poor yields equate low quantities offered for sale, which further leads to price instability and discouragement from investment. Quality degradation creates mistrust with buyers, and surplus stocks that fail to find buyers exacerbate the market instability. Gradually, the industry is locked up in these problems, making it harder for farmers to adopt best agricultural practices that would sustain any livelihoods while stimulating population employment.

2.6.3 Long-term Implications for the Industry

The effects of price instability in the longer term go well beyond any immediate difficulties for farmers; they can profoundly modify even the whole cotton sector in Zimbabwe (Mahofa, 2021). With the ever-increasing price fluctuations making continuous viability of cotton production extremely hard for many farmers, soon, many of them may abandon the crop entirely, leading to more and more severe declines in cotton acreage over time. Such a situation may jeopardize the entire cotton industry by reducing domestic production volumes, thus increasing chances for more imports of cotton; the imports can be detrimental by worsening trade balances and adversely interplaying with the national agricultural policy. Other than that, uncertainty concerning cotton markets could deter both foreign and domestic investors from undertaking any venture with regard to the production-processing model, such as construction of ginneries and processing facilities. Investment slowdown stagnates fertility, probably killing

innovation and technological advancement within Zimbabwe's competitive arena (Ncube, 2019). Absent those, cotton shall be able to value-add investment opportunities but lack. Thus, it will be a more static economy that underplays the entire strength behind the agricultural assets. As the overarching hills of volatility loom over cotton prices, so the economy has rippling effects; the thunder of rural dwellers is at the end of numerous aggravated sounds (West, 2023). Increases in rural poverty, which are bound to emerge as a consequence of diminishing cotton production and dwindling incomes, will undermine food security in communities that depend largely on smallholder farmers (Gillson et al, 2020). Such economic strain is expected to boost rural-to-urban migration as people resort to seeking alternative livelihoods in cities, further decreasing the agricultural workforce. All of these add up to creating precarious conditions for the cotton industry in Zimbabwe, thus requiring an urgent proactive marketing stabilization, a mechanism for better pricing, and support systems within the sector to engender resilience and sustainability.

2.7 Merchants' Views on Price Instability in the World Market

2.7.1 Perspectives from Local Merchants

Of such concerns in local arenas usually entails the local merchants regarding the effects of price instabilities. Changes in global commodity prices could significantly affect the costs of goods the local merchants get thereby pinching margins and making inventory management uncertain (Smith & Jones, 2022). The ripple effects of international price changes can create that situation for the local demand as households recalibrate consumption via perceived pressures from the economy, thereby reducing sales and storage costs (Brown, 2023). Such instabilities can also block small merchants from effectively competing against larger retailers who, at the same time, have more access to not only hedging tools but also diversified supply chains (Lee et al., 2024). Local perspectives on price swings usually illustrate the challenges facing small businesses in response to price fluctuations. There is little access to timely real-time market information and financial instruments that would protect such businesses from speculative price bubbles and abrupt corrections (Davis, 2021). Most small companies have established ties with their suppliers and are not willing to change sources even if the prices become unattractive, as the owners feel there is danger of disorganized supply and inferior quality (Wilson, 2022). Therefore, price instability is understood by local merchants as external phenomena, not primarily of their making and, hence, beyond their control and ability to future plan or to maintain consistent pricing conditions for their customers (Garcia & Patel, 2023).

Recent studies indicate that local merchants could go through significant psychological trauma because of the price instability. Constant projections about market trends and changing prices induce more stress while reducing job satisfaction (Thompson, 2024). This also affects the making of decisions by making them risk-averse and less willing to invest in new innovations or expansion (Clark, 2022). Ultimately, the perceived susceptibility to price instability will undermine the resilience of local businesses and their contribution to the local economy (Roberts, 2023).

2.7.2 Insights from International Traders

International traders, who operate on a large scale, adopt a much more sophisticated definition of price instability. On the one hand, these traders acknowledge the risks posed by price instability, but they regard price instability as an opportunity for profit through arbitrage and speculative actions (Kim, 2023). Equipped with advanced analytical tools and worldwide access to information about the movements of the market, these traders seek to anticipate such price movements, modifying their strategies accordingly (Chen and Miller, 2022). Nevertheless, price instability management is difficult due to the uncertain nature of international trade, which encompasses currency and geopolitical risks (Jackson, 2024). Price fluctuations, in return, have connotations to global business, thus pushing the diversification and hedging strategy. By across markets and geographical locations spreading bets, an empty market is able to sustain the negative impact of a certain shock on one market (Nguyễn, 2021). Futures and options trading comes with its own costs and risks, yet futures and options trading will lock or protect prices from adverse effects of price changes (O'Connell, 2023). Successful international traders blend risk with reward by using their skills to make sense of the complexities of global markets (Dubey, 2022). Investigation has recently been noted into the relevance of information asymmetry in international trade. Those traders who enjoy superior access to market intelligence and insider information will in certain situations enjoy a competitive edge, allowing them to profit from price differentials (Hernandez, 2024). However, depending on the use of such information, market instability can be worsened by unethical trading (Rajan, 2023). Transparency and regulation further guarantee fair competition and do not permit excessive speculation to destabilise global commodity markets (Ali & Berg, 2022).

2.7.3 Strategies to Mitigate Risks

They employ a lot of strategies to lessen the impact of price volatility on themselves: short-term tactical planning to long-term strategic options. For example, fixed-price contracts through which they can contract suppliers assure them of some price certainty, but reduce their flexibility to respond to market changes (Cooper, 2023). In the same line of inventory management methods, just-in-time reduces the costs of holding goods, minimizes their exposure to price fluctuations, and maintains vigilant coordination with suppliers (Evans & Green, 2022). Furthermore, developing trust with both suppliers and customers allows creating collaborative strategies to manage price risks (Park, 2024). Primarily, for several bigger markers trading on the international market, financial hedge instruments are essential in proving price risks. Futures contracts protect merchants from adverse price movements by locking in a future price for a commodity while options contracts offer the right but not the obligation to either buy or sell a commodity at a price that has been predetermined, thereby providing flexibility in reacting to market changes (White, 2021). However, they need expertise and careful managing as they could also produce losses if misapplied (Ito, 2023). Price volatile exposure to certain markets could also be reduced by diversification of sourcing and sales channels (Singh, 2022). Recent scholarly work cites resilience and adaptability as significant mitigators of the impact of price instability. Merchants who quickly shift their strategies in accordance with altered market conditions are more likely to survive price shocks (Martin, 2024). Investment in technology and data analytics could also improve market intelligence and thus empower even more informed decision making (D'Souza, 2023). Strong networks and partnerships with other businesses create avenues to resources and expertise that make the firm stronger in price-changing situations (Gray, 2022).

2.8 Factors Affecting Cotton Prices in Zimbabwe

2.8.1 Local Economic Conditions

Zimbabwe's cotton prices are ultimately influenced by the prevailing local economic conditions. Inflation rates, which have always been a challenge to this nation, erode the real value of earnings for farmers for cotton and thus adversely affect their incentive to produce (Chibanda, 2022). Availability of low-cost finance for input provision such as seeds and fertiliser are mostly lacking, restricting levels of production and thus affecting the entire supply of cotton, influencing prices (Moyo & Nkomo, 2023). Fluctuating exchange rates between the Zimbabwean dollar (ZIG) and major currencies especially the United States dollar (USD), also

add uncertainty in pricing especially for the cotton that is meant for export (Dube, 2024). As always with any factor concerning the activity levels in Zimbabwe economy, local demand for textiles and products associated with it can further widen the gap of benefits to local cotton farmers (Ncube, 2021). Weak consumer spending power as it is an unemployed and underpaid job market has the potential to lower demand and apply downward pressure on prices (Sibanda, 2022). The efficiency of local cotton processing industry also has an influence by ginning and spinning processes on the value chain and how much farmers earn on their raw cotton (Rukuni, 2023). Recent research by Maposa (2024), shows that infrastructure deficits affect cotton prices. Poor road networks and unreliable transportation increase the cost of moving cotton from farms to markets, making profit less desirable to farmers and traders alike (Maposa, 2024). Such underdeveloped storage facilities can minimize losses incurred after harvest and usually available stocks, and thus have the potential to affect prices (Taruvunga, 2023). All these need to have been catered for because infrastructure thresholds are important in improving comparison between the Zimbabwe cotton sector and their international counterparts and also for price fairness for the farmer (Zhou, 2022).

2.8.2 Government Policies

According to Zhou et al (2021), government policies have clear impacts on the cotton prices in Zimbabwe. There is subsidy on input-fertiliser and seed costs, which can reduce costs of production and possibly, increase cotton output thus avail more supply leading cotton prices to degenerate (Matema, 2023). Even if price controls as well as guaranteed minimums are set for cotton in order to protect the farmers, they distort the market signals leading to un-efficient allocation of resources within (Chinogurei, 2022). Policies concerning land tenure and access to credit can also impact the realization of an optimal investment in cotton production by farmers (Makovere, 2024). Same as national policies, regulations accompanying the ginning and marketing processes of cotton also contribute largely toward nation output. While other restrictions limit the choice of markets by farmers, some conditions stipulate local processing as prerequisite for export. All the above directly affect the market demand for cotton, hence affecting the prices that farmers are going to get (Hamadziripi, 2021). At times, government initiatives, which drive value addition within the cotton sector-such as support of textile manufacturing-have the capacity to create demand for locally produced cotton and thus push for higher prices (Chitiga-Mabugu, 2022). However, the success of policies above really depends on the design, implementation, and consistence of a policy over time (Manzungu, 2023).

Analysis trends have shown that policy uncertainty might adversely affect cotton prices. Changes on the statutes frequently or through an inconsistent manner would create a non-confiding environment for farmers and investors for their investments and thus discourage investment, which then contributes to the overall decrease in production of cotton (Nyanga, 2024). Public and foreseeable policy frameworks are hence essential in creating a better and viable confidence booster for the cotton sector while promising a steady level of prices which will entrench sustainable production (Gumbo, 2023). The government support for research and development into cotton farming also augurs well towards bettering Zimbabwean cotton both in yields and quality to make it internationally competitive (Manyanhaire, 2022).

2.8.3 Environmental Factors

Environmental elements have become a major point of concern when it comes to affecting the yield of cotton and, thus, prices for the commodity in Zimbabwe. Particularly important rainfall patterns, such as timings and amounts of precipitation during the growing season, are thus relevant to cotton production (Nyakudya, 2023). Crop failures may be a result of prolonged dry spells or erratic rainfall such that supply reduces and prices shoot up (Gandari, 2022). On the other hand, damage also arises from excess rainfall with regard to yields and quality of the crop (Musiyiwa, 2024). Soil fertility and health are also important determinants of cotton productivity. Depleted soils, as some cotton-growing areas in Zimbabwe, may limit the yields and have increased production costs that affect the competitiveness of Zimbabwean cotton (Thondhlana, 2021). Some pests and diseases such as bollworms and the cotton leaf curl virus can also multiply easily by reducing yields that, in turn, affect supply and prices (Mazvimavi, 2022). Climate change aggravates these environmental problems all the more, making even the cotton crop extremely prone to extreme weather events and crop pests' outbreaks (Muchero, 2023). According to Cul (2025), soil conservation practises such as reduced tillage and crop rotation will go a long way to enhancing soil health and water retention in turn boosting cotton productivity (Bongo, 2024). Integrated pest management-the practice of farming with minimal use of synthetic pesticides-promises tremendous potential for decreasing environmental harm while enhancing long-term sustainability of cotton farming (Nhundu, 2023). Climate-smart agriculture has to modify agricultural practices so as to counteract climate change effects for future sustainability of cotton production in Zimbabwe (Basira, 2022).

2.9 Contribution of Cotton Income to Food Access and Dietary Diversity

2.9.1 Economic Stability and Food Security

Custom from household subsistence farms, small-scale farmers depend heavily on cotton farming because it is one of the major sources of income for buying food for households during the failed crops, which directly contribute to food security in households (Jayne et al., 2022). Hence, cotton growing renders an income resource but also alienates households away from subsistence agriculture and diversifies their livelihoods, thus increasing resilience to shocks-economic (Chirwa, 2023). Moreover, profits made from cash crops such as cotton can be used for replacing farm inputs and technologies increasing productivity and long-term production possibility in food (Holden & Otsuka, 2024). Nevertheless, it's often the accessibility of the markets and prices which play an important mediating role of cotton income towards household food security. When prices for cotton are good, the farmers make enough money to buy a wide variety of food items for (improving household nutrition) (Barrett & Bevis, 2015). However, price volatility and market imperfections can defeat this connection, keeping farmers at risk of food insecurity despite a bumper cotton production (Stephens & Barrett, 2011). Credit and insurance also affect how much cotton income translates to better food security outcomes (Carter & Barrett, 2006).

These include a regular income stream from the sale of cotton. An income source that is stable and regular in character is particularly important for food security in the long run. When the income from cotton sales is regular and predictable, households can then make plans for food consumption and investments, relieving them of vulnerability to seasonal food shortages (Hoddinott & Yohannes 2002). In contrast, income streams that are irregular give rise to uncertainty and underinvestment in agriculture, which perpetuates the cycle of poverty and food insecurity (Dercon 2006). Important pillars required for ensuring that stability of cotton income translates into food security are improved accessibility and strengthening market linkages with financial services (Stifel & Christiaensen, 2007). New studies recently have revealed the influence of gender in the mediation of the relationship between cotton income and food security. For instance, if women control a larger share of cotton income in the household, a larger share of the resource is allocated to food and nutrition, resulting in improved food security for children (Quisumbing and Meinzen-Dick, 2001). Therefore, empowerment of women on cotton production and marketing may probably be an efficient strategy of enhancing cotton income's contribution to household food security (Smith &

Haddad, 2002). Addressing gender inequalities with regard to access to land, credit, and markets is thus critical to realizing cotton income's full potential for improvements in food security (Agarwal, 1994).

2.9.2 Dietary Diversity in Smallholder Households

Cotton income can further influence dietary diversity within smallholder households, apart from ensuring enough calories for sustenance. When a family has some cash to buy more diverse foods—stuffed, fruits, vegetables, and animal-source products—it raises the nutritional value of its diet greatly (Bouis & Welch, 2010). Improving dietary diversity can mitigate micronutrient deficiencies and result in better health outcomes for children and pregnant mothers (Ruel, 2003). Accordingly, buying products in the market helps increase food-source diversification among families that heavily rely on a few staple crops produced for subsistence (Swindale & Bilinsky, 2006). The main factors making income available from cotton translate into improved dietary diversity are household preferences, cultural norms, and access to food markets. Food types may likely be prioritized for purchase by households based on their personal customs regarding nutrition and health (Minten & Barrett, 2008). The price and availability of different foods in local markets also mediate dietary input choices (Jones et al., 2014). Cotton income and dietary diversity could be strengthened through enhanced market infrastructure supporting the production and sale of micronutrient-rich foods (Webb & Kennedy, 2014).

A household's knowledge and nutritional awareness also govern dietary diversity. Households, which generally maximize nutrition importance, are more likely to spend on a variety of foods (Bhutta et al., 2013). Nutrition education programmes could go a long way in fostering healthy eating habits and raising the demand for nutritious food (Gillespie et al., 2013). Lastly, strengthening nutrition education with agricultural extension services will enhance the impact of cotton income in improving dietary diversity (Masset et al., 2012). In this case, Sharma et al. (2021) suggest that integrating cotton production with nutrition-sensitive agricultural interventions can confer further benefits on dietary diversity. Promotion of nutrient-rich crops along with cotton is a way of providing households wider access to foods from their own farms (Johnston et al., 2018). With this in mind, the integration of animal production with cotton systems may also enhance the access of households to animal-source foods, thus improving dietary diversity and nutritional well-being (Murphy et al., 2014). The integrated approach will optimize the contribution of cotton farming with respect to income generation and

improvement in nutrition indicating an overall health of the household (Herforth & Harris, 2014).

2.10 Effects of Dietary Diversity on Smallholder Farmers' Wellbeing

2.10.1 Health Outcomes

Dietary diversity promotes improved health outcomes of smallholder farmers. A well-diversified diet that encompasses a variety of foods can enhance the intake of essential micronutrients, vitamins, and minerals that are necessary to maintain immune function and reduce susceptibility to infectious diseases (Black et al., 2013). In other words, reduced malnutrition rates arising from better dietary diversity in women and children particularly affect normal growth and cognitive development (Victora et al., 2008). This is important for the productivity of farmers since a healthy person can partake in the quite manual work of farming (Horton & Steckel, 2011). Various studies point toward a strong correlation between dietary diversity scores and the decrease in incidences of chronic illnesses, thus fostering a healthier, more productive workforce in farming communities (Kennedy et al., 2007). It, therefore, follows that investing to enhance dietary diversity is investing in the long-term health of smallholder farming population (Ruel & Hodinott, 2008). New evidence highlights the importance of culturally appropriate nutrition education in optimizing results for interventions intended to address dietary diversity (Anderson et al., 2020). Further, adequate dietary diversity is at the centre of NCDs (non-communicable diseases) prevention:

Type II diabetes and cardiovascular diseases. A diet composed of predominantly fruits, vegetables, and whole grains provides antioxidants and fibre, defending cellular damage and enhancing cardiovascular health (Willett, 2002). A group of smallholder farmers eating varied diets will, therefore, generally have less insulin resistance and blood sugar balance, thus lowering type II diabetes risk (Brand-Miller et al., 2003). NCD prevention augments individual health, thereby reducing health care billings and improving farm productivity for these communities (Bloom et al., 2011). Dietary diversity prevention must be fore fronted in addressing forthcoming heavy burden of NCDs in low-income countries (Beaglehole et al., 2011). Newer observations justify the use of integrated schemes combining agricultural interventions and nutrition-sensitive health policies to ameliorate NCDs among rural settings (Hawkes et al., 2012).

Thus, dietary diversity has a fundamental role in the improvement of maternal and child health in critical windows of growth and development. Pregnant and lactating women require a wide variety of nutrients to retain their own health and that of their infants (Ramakrishnan et al., 2008). Diets deprived of requisite nutrients may turn to unfavourable birth outcomes, in low birth weight and pre-term birth, heightening the chance of such occurrences being followed by infant mortality and long-term health complications (Christian et al., 2013). Promotion of dietary diversity among women of reproductive age is paramount to ensuring favourable maternal and child health in farming communities (Bhutta et al., 2011). A diverse diet will enhance breastfeeding by providing nutrients and antibodies essential for the growth of the infant and protection from infections (Lutter & Dewey, 2003). Recent investigations indicate that adolescent girls' nutritional needs should thus be addressed as a way of preventing intergenerational malnutrition and enhancing long-term health outcomes (Victora et al., 2021).

2.10.2 Economic Resilience

Dietary diversity enhances smallholder farmers' economic resilience by enabling them to manage food price shocks and crop failures. Households that are heavily reliant on only a few staple foods are more affected by price volatility since any fluctuation in the price of these commodities can gravely affect household food security (Barrett, 2002). By incorporating a wider spectrum of food sources into nutrition-aiding diets, they reduce their dependence on staple crops and bolster their resistance against market price shocks (Timmer, 2000). Farmers eating a variety of foods will suffer less from nutritional vulnerability associated with crop failure, and such farmers will have other food sources to meet their nutritional needs (Maxwell et al., 2003). These enhanced levels of resilience enable the farmers to withstand economic and environmental shocks (Frankenberger et al., 2012).

Integrated along with productivity and income-generating capacities, dietary diversity also lays the foundation for resilience against working such conditions in favor of smallholder farmers. A healthy, well-nourished workforce can productively participate in agricultural activities, thus enhancing yields and income (Strauss & Thomas, 1998). Enhanced dietary diversity may also enable farmers to diversify agricultural production; these farmers can produce more types of crops and livestock (Ellis, 2000). This diversification would work against the reliance on any one commodity, providing them with added sources of income and thereby strengthening their economic resilience (Reardon et al., 2007). Evidence asserts that farmers with diverse diets are more likely to invest in sustainable farming methods, which ultimately enhance the farm's long-

term productivity (Pretty, 1995). Surveys conducted recently indicate access to credit and financial services allowed farmers to diversify their diets and agricultural production (Morduch, 1999).

Dietary diversity can also enhance local food systems and market development. Increasing demand for a wider range of foods, dietary diversity stimulates local production and trade, providing opportunities for smallholder farmers to diversify their income sources (von Braun & Kennedy, 1994). This could lead to the establishment of more resilient and sustainable food systems, which are further liberated from the hold of external inputs and market forces (Altieri, 1999). Thus, promotion of dietary diversity will contribute to the economic development of rural communities (Dixon et al. 2001). Recent findings highlight the importance of aiding small-scale food processors and retailers in increasing the availability and affordability of diverse foods in local markets (Haggblade et al. 2007).

2.10.3 Social Wellbeing

For smallholder farmers and actually their communities, dietary diversity has far-reaching implications for social wellbeing. In several cultures, food becomes a focal point for social life, as often the joining of different meals forms a ritualization in celebrations, festivals, or other types of social gathering (Mintz, 1985). Also, sharing diverse and nutritious meals strengthens ties and creates a sense of community (Fieldhouse, 1995). Dietary diversity improves cognitive function and mental health, increasing social interaction and participation in community life (Strickland, 2000). Dietary diversity further lessens social differences and enables increased social inclusion. Malnutrition and food insecurity primarily affect vulnerable populations, such as women, children, and marginalized ethnic communities (Sen, 1981). Promoting dietary diversity will provide nutritional benefits to all members of society as insufficient consumption of nutritious food will help alleviate some of these disparities (Dreze & Sen, 1989). Such undertakings could promote better social cohesion and fairer justice within communities (Wilkinson & Pickett, 2009). Research has shown that cultural and social barriers to dietary diversity, if addressed, will enable all segments of society to benefit from better nutrition (Sobal & Nelson, 2003).

Dietary diversity may also empower women and promote gender equality within farming households. In general, women spend a substantial amount of time preparing dishes and making revolving decisions, and this knowledge and control may have an important role to play in

household dietary diversity (Quisumbing, 2003). Education, land, and credit can empower women to make informed food choices and thus improve their families' nutrition (Agarwal, 1994). Recent studies highlight the importance of incorporating men into nutrition education initiatives to build a sense of collective responsibility for household food security and dietary diversity (Gillespie & Haddad, 2001).

2.11 Household Coping Mechanisms to Cotton Price Volatility in Zimbabwe

2.11.1 Short-term Strategies

Smallholder households in Zimbabwe take alternate short-term strategies each time the price of cotton drops suddenly. One of the ways involves the reduction of household consumption, especially non-essential and, in some cases, even basic food items, since in such situations, all the households tend to have their immediate deprivation in terms of food diversity for a short period (Devereux, 2000). Other smallholder households even borrow informal loans, mainly from relatives or local moneylenders. While borrowing remains one of the most popular short-term coping strategies, it is often characterized by tendencies of falling into debt cycles that expose one to more vulnerabilities than were originally present (Collins et al., 2009). Some sell their assets like livestock or household goods to generate cash immediately, although that creates long-term wealth and productive incapacity (Barrett & Carter, 2013). Casual labour is often done on nearby farms or towns and gives people more income, but may also be limited and with poor wages (Bryceson, 1999). Although these strategies would bring immediate relief, they are quite expensive and will affect long-term household wellbeing (Hoddinott, 2006). In another study, the authors elaborated on social safety nets to mitigate the adverse effects of price volatility on affected vulnerable households (Subbarao et al., 1997).

Another very short-term coping mechanism can be to change farming methods in direction of less immediacy or severity of the consequences on the immediate costs. This might lead to a reduced application of fertilizers and pesticides, thus resulting in lower yields the following season (Anderson & Hazell, 1989). Households could also delay planting their cotton or reduce the area they've planted and then turn to other crops that are seen as having lower risk or prices that are perceived to be more consistent (Ellis, 2000). Such a shift may disrupt established farming systems and may not always be possible because of limited access to alternative inputs or markets (Reardon et al., 2007). Most resource and labour sharing with other households is a common strategy, allowing families to pool resources and relieve individual pressure of making

ends meet during difficult times (Fafchamps & Lund, 2003). These are the strategies people use to depict immediate tensions that childish farmers undergo to price shocks (Moser, 1998). Some other short-term coping mechanisms are seeking help from relatives and friends living in urban areas or abroad. For many, visiting relatives abroad often becomes the crux of short-term ways to help many rural households cope. During bad economic times, remittances of migrant workers prove to be an important emergency lifeline, if not the only one, and may thus help families satisfy basic needs (Ratha, 2003). Dependency is one of the pitfalls of remittances as a coping strategy in times of economic distress, and this solution may not be permanent (Taylor, 1999). Working in other non-farm activities like trade and crafts can provide a stream of income, but entrepreneurial opportunities are often limited by access to markets and capital (Barrett et al., 2001). Recent studies prove that farmers still need timely information about market price and weather conditions to make better decisions and therefore reduce the effects of price volatility on their production decisions (Baumol, 1990).

2.11.2 Long-term Adaptations

Zimbabwean smallholder farmers adopt a range of long-term adaptation strategies to enhance their resilience and reduce their vulnerability to deal with relentless cotton price volatility. Key amongst such strategies is agricultural diversification, which may include combining crop and livestock production (Ellis 2000). Such diversification reduces dependency on cotton as the sole source of income and provides different sources of food and income during periods of low cotton prices (Reardon et al. 2007). Better farming technologies are investments that usually increase productivity and reduce vulnerability to climate-related shocks, such as drought-resistant varieties or irrigation systems (Thirtle et al. 2003). This would also imply the availability of information and capital (Hayami & Ruttan 1985). Another long-term adaptation strategy is investing in education and skills development to improve off-farm employment opportunities. This would allow household members to earn more stable and diversified sources of income, thereby reducing their dependency on agriculture (Schultz 1961); yet, migration to urban centers and elsewhere in search of jobs is a widespread adaptation strategy, carrying social costs such as family separation (Stark 1991). Improving land tenure security would encourage the farmer to invest the necessary long-term gains into the improvement of their respective lands, thereby increasing their productivity and resilience (Besley 1995). Secure land rights are correlated with increased agricultural productivity investment while decreasing vulnerability (Feder & Feeny 1991).

Farmers can also form cooperatives or farmer organizations in order to mitigate the price volatility impacts through collective marketing activities toward better prices and markets. This strengthens their bargaining power and reduces their dependence from exploitative intermediaries (Ostrom 1990). Crop insurance schemes can reduce the financial risks possibly due to crop losses incurred from adverse weather or pest infestation by acting as a safety net (Hazell et al. 1986). Sustainable agricultural practices such as conservation tillage and agroforestry promote soil fertility and water retention, which ensure productivity and resilience in times to come (Pretty 1995). Because of this, recent research suggests that access to information and communication technology may assist farmers in obtaining market information, contacting buyers, and enhancing their bargaining power (Jensen 2007).

2.11.3 Community Support Systems

Community support systems play a very significant role in enabling Zimbabwean smallholder farmers to withstand the cotton price swings in a market. Traditional social networks, based on kinship and reciprocity, offer safety nets for vulnerable households at times of hardship (Platteau, 1991). Sharing food, providing reduced costs for labour, and offering monetary support are some communities support channels that families may use to confront and cope with economic shocks (Fafchamps & Lund, 2003). These informal support systems are more accessible and responsive than formal institutions, especially in rural areas (Putnam, 2000). This explains why these systems should be considered as dynamic entities whose strength and effectiveness depend on social cohesion and trust within community boundaries (Woolcock & Narayan, 2000). Local churches and all other religious organizations lend important manpower support to the vulnerable households through food provision, counselling, and spiritual addresses for frazzled members (Berger & Neuhaus, 1977). Such organizations usually have strong kinship ties to the community and therefore make an ideal mobilizer for resources and volunteers to help in such an instance (Wuthnow, 1991). Community-based organizations (CBOs) are crucial for smallholder farmers as they work around offering sustainable training in the practices of agriculture; they give access to credit and represent the voices of farmers (Uphoff, 1992). The capacity of mobilizing resources, building partnerships, and representing members' needs tends to determine the success of CBOs (Edwards & Hulme, 1996).

Government and NGOs help smallholder farmers through several programs that involve agricultural extension services, input subsidies, and social welfare (Bebbington & Farrington, 1993). The success of most intervention programs relies on their targeting of the most

vulnerable households and redress of their underlying causes of poverty and vulnerability (Chambers, 1983). Recently, studies validated the continued focus on strengthening community participation in the design and implementation of development programs, which results in these programs responding better to the specific local contexts and priorities (Arnstein, 1969). Building firm partnerships among community support systems, government agencies, and NGOs is centrally important to lessening the risks while increasing diversification and resilience in the agricultural sector (Evans, 1996).

2.12 Theoretical Framework

2.12.1 Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework is a reasonable paradigm for addressing the complex dynamics of poverty and vulnerability in rural Zimbabwe. This framework states that poverty and vulnerability are an amalgamation of socioeconomic factors, available livelihood assets, the strategies adopted to cope with those assets, and the outcomes (Chambers & Conway 1992). The framework breaks down into four independents but interacting components: the vulnerability context, livelihood assets, livelihood strategies, and livelihood outcomes. A context of vulnerability concerns all external factors that may influence the livelihood of individuals and households, whether it be economic, environmental, or social aspects impacting these individuals (Ellis, 2000). It is presumed that rural livelihoods in Zimbabwe are confronted with a vulnerability context characterized by a politically manipulated historical economic decline, environmental degradation, and social inequality (Bryceson, 1999). The authors of Reardon et al. (2007) contend that livelihood assets represent all pertinent resources and capabilities an individual or household possesses, including physical and human capital, social networks, and access to markets. Many households in rural Zimbabwe, according to Fafchamps & Lund (2003), do not have access to important livelihood assets, such as credit, markets, and information.

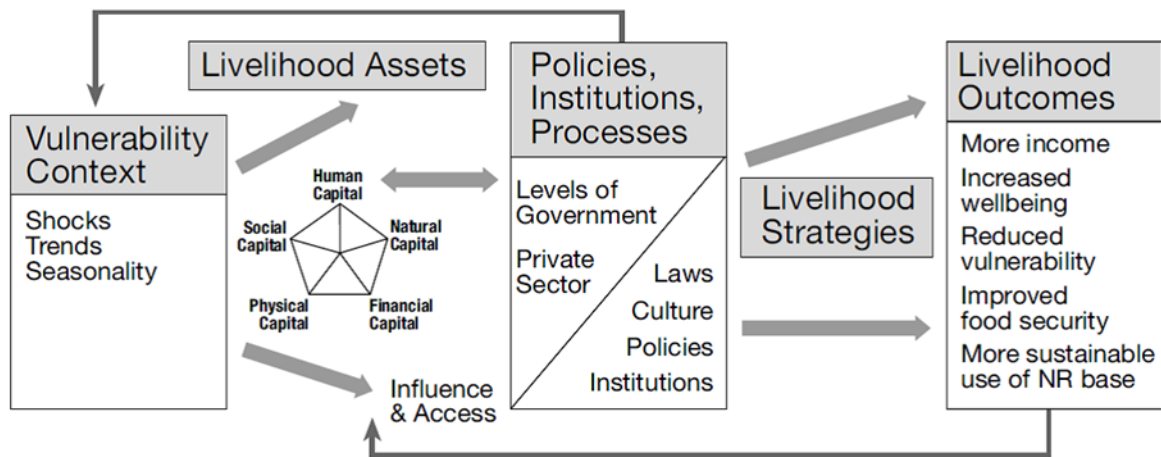


Figure 2: The Sustainable Livelihoods Framework
Source: Bohle (2009)

Livelihood strategies are defined as the choices and actions undertaken by an individual or household to manage the assets of their livelihood so as to attain the desired goals and objectives (Barrett et al., 2001). In rural Zimbabwe, a lot of households mix the livelihood strategies of subsistence agriculture, casual labour, and petty trade (Devereux, 2000). But these livelihood strategies are usually exposed or vulnerable to external perturbations such as drought or fluctuations in prices (Hazell et al., 1986). Livelihood outcomes indicate the concrete results that individuals or households achieve through the livelihood strategies adopted by them (Thirtle et al., 2003). Therefore, because of challenges faced by many households in Zimbabwe in managing their livelihood assets, achieving secure and sustainable livelihood outcomes is an uphill task.

The Sustainable Livelihoods Framework emphasizes the importance of putting greater stock in household assets and capacities for enhancing resilience and responsiveness to shocks (Moser, 1998). This entails working with the households to enable them with the skills and knowledge needed to better manage their assets and make considered choices about their livelihoods (Chambers & Conway, 1992). It also entails addressing the structures responsible for perpetuating poverty and vulnerability, such as inequality and environmental degradation (Bryceson, 1999). This has led to a range of interventions designed to enhance household resilience and reduce poverty in rural Zimbabwe: The Sustainable Livelihoods Framework have been used by Reardon et al., (2007). Among these interventions have been programs designed to improve access to credit and marketing, enhance agriculture productivity, and encourage social protection as shown in Figure 2 (Devereux, 2000). The provisions thus have

been constrained by various contexts, such as lack of synergy and co-ordination among different agencies and programs (Fafchamps & Lund, 2003).

The frameworks in livelihood sustainabilities often bring into importance the interfaces among different factors that concern the livelihoods of a household (Thirtle et al., 2003). Therefore, it must be a common cause in development that it has already tackled poverty and vulnerability from the possible poverty dimensions through social, economic, and environmental forms (Ellis, 2000). It also needs to be focused on the building blocks of local capacities and assets that serve to increase household resilience or the ability to cope with shocks (Moser, 1998). This study improves our understanding of the complex nature of poverty and vulnerability in rural Zimbabwe by applying the Sustainable Livelihoods Framework to the instance of a Zimbabwean cotton farmer. It demonstrates the significance of the vulnerability setting, livelihood assets, livelihood tactics, and livelihood results in shaping rural households' experiences. It emphasises the importance of taking a comprehensive approach to development determinants, which includes the social, economic, and environmental elements of poverty and vulnerability.

2.13 The Nexus between Cotton Productivity and Food Access

Cotton productivity access incorporating food per se is a very complex relationship; the broad influence of agricultural production practices is clearly concerned with household food self-sufficiency, which relates to its dependency on cash crops, such as cotton in this case. Specifically, cotton serves as a lifeline for smallholder farmers, providing the necessary income that acts as a source for income to cushion them against purchasing food and other essential needs (Erenstein et al., 2010). The production activities may ignore food crop production since sometimes cotton tends to overshadow food crop production, creating a conflict between acceptable cash crop production and food sufficiency (Zhou et al., 2017). Within this context, it becomes vital to examine how cotton productivity access is linked to household food security issues in cotton-dependent households. Increasing cotton productivity would increase household incomes in rural areas and, thus, access to food (Khatun et al., 2018). When farmers obtain better yields, they may sell off surplus cotton and use the profits to diversify the diet more (Kavinga & Mvumi, 2010). This would encourage better nutrition by allowing households to have access to foods beyond basic foods (Ndepumukandira et al., 2018). Beyond this, higher productivity can also promote investment in other economic activities with the multiplier effect, increasing the access for food within the community (Moyo et al., 2019).

However, this situation does not always end up being useful, as an overdependence on cash crops will increase households' vulnerability to market fluctuations and other external shocks. In contrast, the low sale prices of cotton or the incidence of poor harvests can negatively affect food and thus induce a cycle of food insecurity (see Carletto et al. 2013). Economic pressure on cotton farmers reduces their capacity to buy food and brings about an increasing reliance on food aid or informal support mechanisms, as per Devereux (2000). This phenomenon thus reveals clearly how vulnerable rural households are since they heavily rely on cotton production to provide an income and access to food. Cultivation of a single cash crop is seen to exacerbate food insecurity during times of price volatility or productivity shocks brought about by climate changes (Kumar & Singh, 2019). Hence, cotton productivity is likely to improve access to food; however, attention should also be given to the threats of monoculture practices.

Policymakers can consider strategies to diversify subsistence agriculture as one of the possible solutions to this challenge of the entanglement of cotton productivity and food access. Diversified production systems will obviously lead smallholder farmers nowadays to resort to a mix of cash and food articles to brave market chances and environmental shocks more efficiently (Zhou et al., 2017). Sustainable practices might also contribute to future improved health and productivity of the soil as well as cash and food crops (Pretty et al., 2018). Building sustainable markets and access to inputs and training might allow farmers to optimize their productivity while achieving adequate food access for their households (Farnworth & Jiggins, 2006). Thus, an understanding of how cotton productivity tangles with food access is required as an effective policy approach to developing interventions that are economically viable but also food secure.

2.14 Case Studies from Other Countries: Lessons for Zimbabwe

2.14.1 Brazil Case Study

Brazil has been found to be a major participant in the international cotton scene, and much of Brazil's cotton production and marketing dynamics are revealing lessons that Zimbabwe can use. Brazil's economy has built a strong industrial focus while having a great deal of agricultural commodity-processing infrastructure to enable a wholly developed production and marketing system for cotton (Sposito & Silva, 2013). Since most of the cotton produced in the country is concentrated in the western part, it means these areas are naturally endowed with the

most favourable climatic and soil conditions for cotton-growing (Lima & Silva, 2019). The Brazilian cotton industry is distinguished by the largescale types of farming under which it is practiced as many farms have adopted modern agricultural technologies (Cavalcante et al., 2016). Efficient cotton production in Brazil has been due to demand in the markets, especially within the textile sector (Machado et al., 2018).

Conglomeration of both informal and formal market channels are what characterizes cotton marketing in Brazil. On the other hand, huge exporting corporations take charge of most parts of the cotton market in Brazil and offer high-value, internationally standardized quality cotton (Siqueira et al., 2020). The informal market is characterized by small-scale farmers and local traders who are significant players in cotton marketing, rural areas being most applicable (Lima et al., 2017). The Brazil Cotton Association (Coteminas) is the principal industry representative in cotton production, marketing and exports (Cavalcante et al., 2019). The government of Brazil has also enacted policies to facilitate and actively promote the development and marketing of cotton; it has introduced financial measures such as subsidies and credit schemes for farmers (Machado et al., 2019). Above all, proves value with the idea of a sound industry structure, market demand, and government support as lessons to learn from Brazil's cotton establishment in production and marketing for Zimbabwe.

Recently, the Brazilian cotton industry has also been increasingly suffering the effects of both changes in climate and sales pressure as a result of soil degradation (Sposito et al., 2020). To treat some of these concerns, it is more and more using sustainability practices like precision agriculture and pest management via integration (Lima & Silva, 2019). Furthermore, the Brazilian cotton industry has been investing in research and development activities to improve cotton varieties, irrigation systems, and farm management practices (Cavalcante et al., 2016). The experience of this country is an adequate step to showing that the cotton industry must face all challenges by being proactive, particularly those associated with climate change and increased market competition.

2.14.2 Germany Case Study

According to Krause et al (2018), Germany's cotton production is more or less small as compared with other European counterparts, and this view can also shed light on the whole importance of cotton in one of the most industrialized economies in the world (Klampfl 2025). The cotton business in Germany is a special case, being purely textile production-the country

is well known for producing high-quality textiles. Much of the production is found in the western parts of the country, where climatic and soil conditions are found amenable to the production of cotton (Bayer et al., 2019). Germany's cotton industry is one of the most developed textile sectors in the country and is one of the many manufacturers employing modern technology for productivity improvement (Richter et al., 2017). The cotton production in Germany is also affected by the market demand, which is rather contracted-driving the production base from the automobile and fashion sectors (Müller et al., 2019).

The cotton marketing system in Germany is essentially characterized by both formal and informal market channels. The formal sector is dominated by big exporters and is dominated by a focus on high purity- cotton that is meeting international standard requirement (Krause et al., 2018). A small part of the marketing is done by the informal sector which consists of small-scale farmers and local traders due to the highly developed nature of the activity (Bayer et al., 2019). German Textile and Fashion Federation is the main industry advocate for promotion of cotton production, marketing and exports (Richter et al., 2019). Besides the subsidies and training programs for farmers, the government has also framed policies to support the cotton industry in Germany (Müller et al., 2018). Therefore, German cotton production provides lessons to Zimbabwe in terms of the strength of industry structuring, market demand, and government support in the cotton value chain.

The German cotton sector has been confronted with difficulties in its competition with low-cost producers in countries such as China and India (Krause et al., 2018). The industry has, therefore, implemented innovation and diversification initiatives, including investments in sustainable technologies and new product lines as shown in Figure 3 (Richter et al., 2017). The German cotton industry has also involved itself in research and development pertaining to improved cotton varieties, irrigation, and farm management practices (Bayer et al., 2019). The experience from Germany therefore demonstrates the urgent need for a proactive approach to the challenges facing the cotton industry in terms of competition in the market and innovation.



Figure 3: Showing German Textile Industry

Source: <https://www.fibre2fashion.com/news/industrial-textiles-news/3-month-analysis-shows-1-3-drop-in-german-production-for-apr-jun-2023-289353-newsdetails.htm>

2.14.3 South Africa Case Study

Figure 4 show the cotton production in South Africa, which is one of the biggest in the Southern Africa. The context of cotton production and marketing in South Africa presents an understanding of how cotton fits into a diversified economy having its own agricultural potential. Cotton production in South Africa is mainly concentrated in the northern region where cotton-growing is suitable in terms of climate and soil conditions (Ntombela et al. 2019).



Figure 4: Cotton production in South Africa

Source: https://www.wwf.org.za/our_news/our_blog/cotton_farming_for_the_future/

The South African cotton industry is characterized by smallholder farmer participation, where traditional farming practices have been adopted by most farmers for growing cotton (Langa et

al., 2020). The country's cotton production is also due to the increasing market demand emanating from the textile industry (Maphumulo et al., 2018). The cotton marketing system in South Africa is influenced by the presence of formal and informal channels in the market. The cotton market in the country is dominated by a formal sector headed by large-scale operators, which strives for quality high-end cotton production on an international standard (Ntombela et al., 2019).

According to Langa et al. (2020), the cotton industry of South Africa has been threatened by climate change, soil degradation, and market competition. The industry has therefore resorted to one of the sustainable practices of precision agriculture and integrated pest management (IPM) techniques (Maphumulo et al., 2018). Among the primary issues that South Africa's cotton industry was able to invest in and develop were cotton variety improvements, irrigation systems, and farm management practices (Ntombela et al., 2019). The experience in South Africa highlights a need for proactivity in dealing with challenges that are confronting the cotton industry arising from climate change and market competition. Another major subject for the cotton industry is the promotion of smallholder farming and traditional practices toward enhancing cotton production and marketing in the country (Langa et al., 2020).

The issue of government assistance to promote cotton production and marketing has overshadowed the talks of the South African cotton industry; it has been recognized that the government had policies and programs set in place to support the industry, which include direct subsidies to farmers as well as training programs (Maphumulo et al., 2018). The industry has also stressed the need for the private sector to get involved in promoting cotton production and marketing in areas such as Research and Development (Ntombela et al., 2019). In general, with respect to cotton production and marketing, the South African experience has important lessons for Zimbabwe in regard to smallholder farming, where government support and private sector participation are paramount.

2.15 Research Gaps

Assessing knowledge gaps on cotton productivity and its socioeconomic consequences is critical for guiding future research and policy decisions. Climate change's long-term consequences on cotton production in diverse places are little understood. Although the majority of the studies recognize the effect of climate variability on crop yields, none of them extensively evaluates the adaptation measures and their efficiency for cotton growers

confronting extended drought or enhanced pest incidence (Rosenzweig et al., 2001). More studies are required to explore location-specific climate-resilient agricultural practices and technologies that have the potential to counteract the adverse consequences of climate change on cotton productivity (Lipper et al., 2018). This involves evaluating the feasibility and adoption rates of drought-tolerant cotton cultivars, effective irrigation management, and integrated pest management strategies in various agriculture systems (Thorton et al., 2011) This focus on gender relations and food security provides another important gap in knowledge regarding the socio-economic effects of cotton production on rural livelihoods. Past studies show a general picture of the economic advantages derived from cotton production but do not mention in detail the pattern in which such benefits get distributed within households (FAO, 2010). There is need for further research to appreciate the differential impact of cotton cultivation on men, women, and children regarding their access to resources, control over decision-making, and workloads (Doss, 2002). In addition, exhaustive research is necessary to study the relationships that exist between cotton income, food security, and nutrition outcomes at the household level (Webb et al., 2018). According to Barrett (2010). It should study how cotton agriculture impacts dietary diversity, food security in times of scarcity, and overall wellbeing for the rural community.

The question on gender relations and food security pertains to another vital gap in knowledge regarding socio-economic effects of cotton production on rural livelihoods. Past research paints a broad picture of the economic advantages accrued by cotton production but has no detailed indications on the pattern of these benefits in within a household (FAO, 2010). More work is required to understand how cotton farming radically affects men, women, and children differently in terms of their access to resources, control over decision-making, and workloads (Doss, 2002). In addition, a more profound investigation should be carried out to consider the relationships between cotton income, food security, and nutrition outcomes at household level (Webb et al., 2018) Research on cotton farming impacts in terms of dietary diversity, food availability during famine, and well-being must be conducted in rural communities (Barrett, 2010). It is also necessary to explore how different marketing channels for cotton can enhance farmers' income and market access. Some investigations focus on contract farming and its impact on the quantity of cotton produced, but there is a dearth of evidence regarding what other marketing channels including farmer cooperatives and direct sales, do for small-holder farmers' profitability (Porter & Kramer, 2011)..More work should be done to compare the transaction costs, risks, and gains involved in using other marketing alternatives and also

factoring in institutional and policy contexts in given areas (Ostrom, 1990). This study should also include the ways through which information and communication technologies (ICTs) help in improving farmers' access to market information and also in mitigating asymmetry of information along cotton value chains (Aker, 2011).

Lastly, there remains a big research gap in assessing environmental sustainability in cotton production systems and determining practices that enhance ecological resilience. Conventional cotton cultivation tends to be based on extensive use of pesticides and fertilizers, which may have negative impacts on soil health, water quality, and biodiversity (Tilman et al., 2002). More studies are required to evaluate the environmental effects associated with various cotton production systems and identify sustainable alternatives that minimize adverse externalities (Pretty, 2008). This involves a review of the efficacy of organic cotton farming, conservation agriculture, and integrated nutrient management in improving soil fertility, minimizing pesticide application, and supporting biodiversity conservation (Reganold et al., 2016) That research must be supplemented with comptonizations in environmental sustainability, economic profitability, and social equity relative to cotton production systems (Rockström et al., 2009).

2.16 Conclusion

To sum it up, a review on cotton production and marketing, bringing in international case studies and identifying their research gaps, would underline the heavy interdependencies that have to exist among the various variables that form the success and sustainability of the industry-the cases of Brazil, Germany, and South Africa are indeed the brightest for Zimbabwe where it is most necessary to tailor change strategies to the varying economic environments. Those lessons indicated the importance of having a very strong industrial foundation, an ability to adapt to the trends in the market, as well as having supporting government policies. Yet, there are still some significant research efforts lacking, especially in relation to the long-term impacts of climate change, socio-economic issues affecting rural cotton-producing communities, effectiveness of different marketing strategies, and promotion of environmentally sustainable production methods. Bridging those gaps through targeted research is imperative to the formulation of evidence-based policies and interventions in the cotton industry for enhancing productivity, resilience, and equality in the same, hence sustainable livelihoods, and economic growth.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter presents the research methodology used to examine the relationship between cotton productivity and food access as coping strategies among smallholder farmers facing price instability in Mbire District, Zambezi Valley. It details the choice of a descriptive study design that incorporates quantitative methods, the selection of the study area due to its significance in cotton production and market price fluctuations, and the use of stratified random sampling to ensure representative data from different farm types. The chapter also explains the data collection process through structured questionnaires and the application of statistical analysis to interpret the quantitative data. Overall, it outlines the systematic approach taken to generate reliable findings that can inform policies aimed at strengthening farmers' resilience to economic challenges.

3.2 Description of Study Site

This study will be conducted in the Zambezi Valley in Mbire District of Zimbabwe as shown in Figure 5. This study will explore the nexus of cotton (*Gossypium hirsutum*) productivity, food access and coping strategies to cotton price volatility. Mbire District of Mashonaland Central Province lies between 30.600 and 31.200 East and 15.600 and 16.400 South and it covers an area that is approximately 4 700km². It has a population of 82 380 people (ZNSA, 2022). It is characterized by flood plains of the Zambezi basin at an average altitude of 400m above mean sea level. The basin is drained by rivers Mwanzamunda, Angwa, Manyame, Musengezi and Kadzi Rivers (LGDA, 2019 and Gumindoga et al., 2021). Mbire district lies in agro-ecological region IV of Zimbabwe. The soils have poor water holding capacity. Mean annual rainfall is below 650mm while mean maximum temperature is between 28°C and 30°C. There are frequent droughts, dry spells, violent storms and seasonal flash and riverine floods experienced in the area. Farmers practice dryland agriculture and livestock rearing. The smallholder farmers in the area, cultivate cotton and small grains due to the harsh climatic conditions. Flood recession farming of crops and vegetables is a common practice. It utilizes moisture and fertile soils brought by recurrent floods. Cattle and goats are the major livestock kept in the area and are also the major source of livelihood to the smallholder farmers.



Figure 5: Map showing the study site
 Source: Chimweta et al (2021)

3.3 Research Design

According to Creswell (2020), research design refers to the structured plan or blueprint that guides researchers in the collection, analysis, and interpretation of data to answer specific research questions or hypotheses. The research design was a comprehensive framework that specified the methods and procedures for collecting and analysing data, ensuring that the study was methodologically sound, replicable, and capable of producing reliable results. It served as a roadmap for the research process, providing clarity on the objectives, data collection techniques, and analysis strategies. For this study, a quantitative research design was employed. This design was appropriate given the focus on measuring and analysing numerical data to understand the relationship between cotton productivity, food access, and price volatility among smallholder farmers in Mbire District. The quantitative approach allowed for the systematic collection of data that could be statistically analyzed to detect patterns, correlations, and causal links. By focusing on quantifiable variables, this design provided objectivity and generalizability to the findings, which was essential for informing policy interventions.

Structured surveys were the primary data collection method. Local cotton farmers in Mbire District were surveyed using standardized questionnaires designed to capture detailed information on cotton productivity, food access, and coping mechanisms related to price fluctuations. A stratified random sampling technique was applied to ensure a representative sample of farmers, accounting for demographic and farm-scale variations within the population. Face-to-face administration of the questionnaires facilitated clarity and accuracy in responses, while also encouraging participation. Surveys were particularly effective in this context as they enabled the quantification of data for rigorous statistical analysis, revealing significant trends and relationships. The anonymity of respondents helped elicit honest responses, especially on sensitive topics such as financial hardship and food insecurity. Consequently, the quantitative research design generated extensive, reliable data that could be compared across different groups, providing robust evidence to support resilience-building policies for farmers in the Zambezi Valley.

3.4 Sampling Procedure

According to Mugenda and Mugenda (2019), at least 30% of the target population was considered adequate for social science research. A stratified random sampling procedure was used to select the participants in this study. This technique was employed to ensure fairly equal representation of the variables for the study. The stratification was based on the 17 wards in Mbire District, where participants were selected proportionally to the population size, resulting in a total of 150 respondents across the district. Within each ward, the selection of AGRITEX/AARDS staff was conducted by simple random sampling, where one extension staff member was selected per ward, giving a total of 17 public extension officers in the district. This selection was achieved by writing the names of the staff on pieces of paper, folding them, and placing them in a basket. After thorough reshuffling, names were drawn, recorded, and replaced until the required number was obtained. Additionally, 10 extension staff from Cottco representing all cotton-growing areas in the district were selected as shown in Table 4. However, stratified random sampling posed challenges, as several conditions had to be properly met for its effective use. Researchers needed to identify every member of the population and classify each into one subpopulation.

Table 4: Participant selection by category

Participant Category	Number Selected	Selection Method
Smallholder farmers	123	Stratified random sampling
AGRITEX/AARDS extension staff	17	Simple random sampling
Cottco extension staff	10	Purposive sampling
Total	150	

3.5 Data Collection Procedure

Data collection for this study on the nexus of cotton productivity, food access, and coping strategies against cotton price volatility in the Zambezi Valley, specifically in Mbire District, employed a comprehensive quantitative approach. Primarily, door-to-door household surveys were conducted, where questionnaires developed based on validated techniques were administered to respondents (Creswell, 2014; Mugenda & Mugenda, 2019). This enabled the collection of first-hand, relevant data on cotton production, pricing, and household food security. Each household was approached systematically, with prior permission obtained from the district offices to ensure ethical compliance and foster community trust (Israel, 2013). Additionally, self-administered questionnaires were distributed to farmers who preferred to complete them at their convenience, which helped to increase response rates (Fowler, 2014).

3.6 Data Analysis Procedure

A data analysis procedure is a systematic process used to collect, process, and interpret data to derive meaningful insights and draw conclusions relevant to a particular research question. This process involves selecting appropriate analytical techniques based on the type and nature of the data collected, whether qualitative, quantitative, or a combination of both. Effective data analysis is crucial in ensuring that research findings are robust, reliable, and contribute to a deeper understanding of complex phenomena. For the study, “Exploring the Nexus of Cotton (*Gossypium hirsutum*) Productivity, Food Access, and Coping Strategies to Cotton Price Volatility in the Zambezi Valley: A Case Study of Mbire District,” quantitative data obtained from structured surveys were analysed. The analysis was conducted using Statistical Package for the Social Sciences (SPSS) and Microsoft Excel. These tools facilitated descriptive statistics, regression analysis, and correlation tests, which helped establish the relationships between cotton productivity, food access, and cotton price volatility.

3.7 Ethical Considerations

Informed consent was a critical ethical consideration in this study, given the sensitivity surrounding issues of cotton productivity, food security, and economic challenges in the Zambezi Valley. Participants were fully informed about the objectives and methodologies of the study before participation. This involved explaining the nature of the questions, the time commitment required, and the intended use of the data. Consent forms were written in clear, simple language free of jargon to ensure that all participants, including those with limited education, could understand their rights and what their involvement entailed. Participation was entirely voluntary, and participants were explicitly informed that they could withdraw from the study at any point without any negative consequences. To foster transparency and trust, researchers made themselves available to answer any questions, clarifying uncertainties and encouraging an open dialogue about the study. Confidentiality and anonymity were rigorously maintained throughout the research process. Personal identifiers were carefully protected during data collection, analysis, and reporting. All data were securely stored, with access restricted exclusively to the research team involved in the study. Anonymization techniques were applied to remove any links between data and individual participants. Findings were reported in aggregate form to prevent any association with specific individuals or households.

3.8 Summary

This chapter focuses on research methodology. Research methodology includes; the research design, description of study site, population sampling, research instruments like interviews and questionnaires. Further, the chapter also makes some highlights on data collection procedure. The following chapter will focus more on data findings and analysis.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results and discussion based on the study findings in relation to the available literature. The main results are presented using narrative, graphs, tables and pie charts.

4.2 Results

4.2.1 Response Rate

The questionnaire return rate was strong, with 144 out of 150 administered instruments being completed and returned, yielding a response rate of 96.0% as shown in Table 5. This high level of participation reflects the relevance and resonance of the research topic within the study area. Farmers were evidently willing to contribute data on issues surrounding cotton production, food security, and pricing instability, likely due to their direct exposure to these phenomena. The small number of unusable responses (4%) may be attributed to respondent fatigue or misunderstandings in sections requiring numeric estimation or ranked opinions. Nonetheless, the valid dataset was sufficiently large and diverse to allow meaningful statistical analysis and generalizability within the local farming population. High response rates reduce sampling error, enhance representativeness, and strengthen the empirical integrity of the findings. The field team's rapport-building efforts and pre-survey sensitization activities likely contributed to the successful completion of the questionnaires. These conditions laid a solid foundation for subsequent analysis.

Table 5: Response rate

Description	Frequency	Percentage (%)
Questionnaires Distributed	150	100.0%
Completed and Returned	144	96.0%
Incomplete/Non-usable Responses	6	4.0%
Total	150	100.0%

Field Work Survey, May 2025

4.2.2 Reliability Test

To ensure internal consistency of the constructs measured in the questionnaire, a reliability test was conducted using Cronbach's Alpha in SPSS version 26. All scales demonstrated high levels of reliability, exceeding the recommended minimum threshold of 0.70. The subscale measuring coping strategies yielded an alpha of 0.901, indicating excellent internal consistency among the 20 coping items. Similarly, the Household Food Insecurity Access Scale (HFIAS) produced a reliability score of 0.895, affirming the appropriateness of these indicators for capturing food-related stress. The cotton productivity factors scale, comprising 15 variables, returned an alpha of 0.872, while the cotton income-food access construct scored 0.813, both indicating good reliability. Results presented in Table 6 confirm that the instrument items within each scale measured the same underlying constructs and can be trusted to yield stable results across similar samples. Reliability testing is a critical step in quantitative research, especially when using composite indicators drawn from household-level data that depend on subjective responses.

Table 6: Reliability test results

Scale	Number of Items	Cronbach's Alpha (α)
Factors Influencing Cotton Productivity	15	0.872
Cotton Income and Food Access	6	0.813
Household Food Insecurity Access (HFIAS)	9	0.895
Coping Strategies to Cotton Price Volatility	20	0.901

Field Work Data, May 2025

4.2.3 Demographic and Socio-Economic Characteristics of Respondents

Understanding the demographic composition of respondents is essential for interpreting household behaviors and vulnerabilities related to cotton production, food access, and coping strategies. This section presents findings related to sex, age, marital status, household size, and education level of cotton farmers in Mbire District. The data help contextualize subsequent analyses and draw links between demographic traits and responses to cotton price volatility.

Table 7: Gender of respondent

Gender	Frequency	Percentage (%)
Male	96	66.7%
Female	48	33.3%
Total	144	100.0%

Field Work Survey, May 2025

The data presented in Table 7 show that 66.7% of the respondents were male while 33.3% were female. This male predominance is consistent with gendered land ownership patterns in rural Zimbabwe, where men often hold legal or customary authority over farmland, including cotton plots. However, the participation of female farmers, making up a third of respondents, highlights their active involvement in agricultural labour and household food provision, especially in tasks such as weeding, harvesting, and post-harvest processing. Women in such roles face structural limitations including limited access to extension services and credit, which can hinder productivity and resilience to price shocks. The inclusion of both genders in this study enhances the reliability of findings by providing insights into gender-specific challenges. It also offers a basis for recommending inclusive interventions that enhance women's access to inputs, markets, and financial services in cotton-producing areas.

The respondents' age distribution indicates a predominantly mature group, with the majority aged between 31 and 45 years, accounting for 46.5% of participants. The mean age is approximately 43 years, suggesting a balanced representation of mid-career individuals. Younger respondents under 30 comprise 14.6%, while those above 60 make up only 10.4%, indicating limited participation from senior age groups. This demographic profile suggests the survey predominantly captures views from middle-aged adults, likely reflecting working professionals. Understanding this age distribution is essential when interpreting the results, as it influences perspectives and insights within the study.

The overwhelming majority of respondents (70.8%) were married, followed by 12.5% who were single, 9.1% widowed, and 7.6% divorced. This distribution reflects traditional rural household structures where marriage is common and often linked to access to farmland and family labor. Married respondents typically manage larger households, influencing food needs, labor availability, and decisions on how to allocate cotton income. The presence of widowed and divorced farmers highlights a segment of the population potentially facing unique vulnerabilities such as land insecurity or lack of support. Single-headed households, particularly among women, may face additional challenges in accessing productive resources and social capital. These dynamics are important when assessing coping strategies during cotton price shocks, as marital status often intersects with decision-making autonomy, access to financial support, and food purchasing power in rural economies.

Based on the household size data, the average household comprises approximately 5.58 members. This suggests that households are relatively large, which is typical in many communities where extended families or multi-generational living arrangements are common. The assignment of midpoints for the ranges allows for a practical estimation, with the majority of households likely falling within the 4–6 or 7–9 member’s categories. Larger households often indicate strong family bonds and shared resources, which can influence various aspects such as consumption patterns, decision-making, and social dynamics. Understanding household sizes is vital for planning social services, resource allocation, and policy development, as larger households may have different needs and priorities compared to smaller ones.

Table 8: Level of education of household head

Education Level	Frequency	Percentage (%)
No Formal	19	13.2%
Primary	56	38.9%
Secondary	48	33.3%
Tertiary	12	8.3%
Informal	9	6.3%
Total	144	100.0%

Field Work Survey, May 2025

A significant portion of respondents (38.9%) had completed primary education, with another 33.3% reaching secondary level. Only 8.3% had tertiary education, while 13.2% reported no formal schooling. This educational profile suggests that while basic literacy is widespread among cotton farmers in Mbire, advanced agricultural or business training remains limited. Educational attainment influences access to information, financial literacy, and the adoption of new farming techniques. Those with secondary or higher education are more likely to understand market trends, participate in contract schemes, or diversify income sources. The presence of informally educated respondents highlights reliance on indigenous knowledge and experiential learning, which, while valuable, may not suffice in responding to market-based risks. Limited formal education constrains the ability to engage with pricing systems, financial planning, and technological innovations necessary for competitive and sustainable cotton production in an unpredictable economic environment.

4.2.4 Socio-Economic Factors Influencing Cotton Productivity

This section presents findings on household-level socio-economic factors that shape cotton productivity in Mbire District. Variables analyzed include primary income sources, land ownership and use patterns, cotton yields and prices, farming systems, access to inputs and services, and ownership of farming equipment. These factors collectively determine the capacity of smallholder cotton farmers to produce sustainably and respond to price shocks. The analysis helps identify structural constraints and opportunities for improving productivity and resilience.

Table 9: Main source of household income

Income Source	Frequency	Percentage (%)
Cotton farming	102	70.8%
Other cash crops	8	5.6%
Livestock	9	6.3%
Formal employment	5	3.5%
Informal trade	10	6.9%
NTFPs (wild products)	4	2.8%
Remittances	4	2.8%
Pension	2	1.4%
Total	144	100.0%

Field Work Survey, May 2025

Cotton farming was the dominant income source for 70.8% of respondents, confirming its centrality to rural livelihoods in Mbire District as shown in Table 9. The remaining 29.2% derived income from diverse sources such as livestock, informal trade, wild product sales, remittances, and other crops. This income distribution highlights the mono-cropping risk faced by cotton-dependent households, especially when market volatility undermines price stability. Livelihood diversification appears limited, with less than 10% engaged in other agricultural ventures, suggesting vulnerability to sector-specific shocks. Income dependency on cotton implies that productivity fluctuations and pricing changes directly affect not only farm income but also access to food, school fees, and medical care. Encouraging income diversification may enhance household resilience, while strengthening the cotton value chain could improve returns for farmers already heavily invested in this crop.

Table 10: Landholding and use pattern

Land-Use Indicator	Mean	Minimum	Maximum	Std. Deviation
Total arable land size (Ha)	3.75	1.0	8.5	1.52
Area planted with cotton last season (Ha)	2.05	0.5	5.5	1.03
Percentage of arable land used for cotton (%)	54.7%	20%	90%	17.6
Cotton output last season (kg)	879.4	250	2,300	478.3
Cotton price per kg received last season (USD)	0.36	0.25	0.45	0.06
Income from cotton as % of total household income (%)	62.1%	30%	95%	14.2
% of cotton income spent on food purchases	51.3%	20%	85%	15.7

Field Work Survey, May 2025

The average household cultivated 3.75 hectares of arable land, of which more than half (54.7%) was dedicated to cotton. This high allocation confirms cotton's priority status in land use, but it also indicates the risks of overdependence on a single cash crop. The mean cotton output was 879.4 kg per household, with significant variance, suggesting differences in access to resources or farming practices. The average price received was USD 0.36/kg, which is modest and subject to market fluctuations. On average, cotton sales constituted 62.1% of total household income, and 51.3% of that income was spent on food. These figures demonstrate how deeply cotton earnings influence food access, supporting the hypothesis that productivity and pricing directly impact nutrition and dietary stability. The high variance in productivity and price also signals systemic inequality and the need for extension, input reform, and pricing transparency.

Table 11: Farming System and Access to Agricultural Services

Variable	Category	Frequency	Percentage (%)
Farming system used	Rain-fed	115	79.9%
	Irrigated	11	7.6%
	Both	18	12.5%
Access to extension services	Yes	61	42.4%
	No	83	57.6%
Access to farming inputs	Very Good/Good	28	19.4%
	Fair	41	28.5%
	Poor/Very Poor	75	52.1%

Field Work Survey, May 2025

Nearly 80% of respondents relied entirely on rain-fed farming, exposing cotton productivity to the unpredictability of rainfall in a climate-affected region as shown in Table 11. Only 7.6% used irrigation, while 12.5% used a mixed system. These figures confirm the vulnerability of

production to climatic shocks and the urgent need for investment in irrigation infrastructure. Furthermore, only 42.4% of farmers had access to extension services, leaving over half without technical support. Such gaps in service delivery hinder technology adoption, pest management, and financial literacy. Access to farming inputs was poor for the majority (52.1%), with just under one-fifth reporting good or very good access. Weak input distribution systems and unaffordable input prices likely contributed to reduced yields and delayed planting. These findings emphasize that productivity challenges are not solely agronomic but are deeply rooted in institutional inefficiencies that require systemic reform.

Access to draught power was slightly more than half (51.4%), with 47.9% owning tillage equipment such as ploughs. The rest of the households either hired equipment or depended on neighbours, which can delay land preparation and planting. Equipment ownership is an important determinant of productivity and autonomy in farming operations. While 70.1% indicated that local labour was available, the remaining 29.9% faced shortages, possibly due to youth migration or competition with other crops or sectors. Labour constraints affect weeding, harvesting, and pest control, which are critical for timely and productive cotton farming. This data highlights the need for labour-saving technologies, mechanization schemes, and cooperatives that can facilitate equipment sharing or group labour arrangements. Investment in basic mechanization and decentralized extension services could substantially increase yields and reduce farmer fatigue and delays.

4.2.5 Perceived Constraints to Cotton Productivity

The results of this section reveal that cotton productivity in Mbire District is influenced by several interlinked factors, with irrigation constraints, climate variability, pest and disease prevalence, and labour challenges ranking as the most significant. The item “Lack of irrigation equipment” recorded one of the lowest mean scores ($M = 2.06$, $SD = 0.77$), indicating a high level of agreement among respondents that insufficient irrigation infrastructure is a primary barrier to optimal production. This aligns with the high dependence on rain-fed agriculture already established in earlier sections, which exposes farmers to unpredictable seasonal rainfall and long dry spells. Similarly, “Low rainfall” ($M = 2.11$) and “Long dry spells” ($M = 2.09$) were also rated as major challenges, reinforcing the fact that erratic climate patterns severely undermine yield stability and planting consistency in this region.

Table 12: Perceived constraints to cotton productivity

Statement	N	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
Lack of access to affordable farming inputs	144	3.97	0.84	2	5	-0.232	-0.398
Poor extension services	144	3.88	0.76	2	5	-0.201	-0.357
Lack of irrigation equipment	144	2.06	0.77	1	4	0.312	-0.105
Lack of finance	144	2.18	0.71	1	4	0.290	-0.208
Late delivery of inputs	144	3.92	0.78	2	5	-0.210	-0.289
High cost of inputs	144	4.06	0.65	2	5	-0.415	0.301
Pest and diseases	144	2.21	0.81	1	4	0.205	-0.276
Lack of production knowledge	144	2.40	0.73	1	4	0.177	-0.108
Shortage of labour	144	2.29	0.76	1	4	0.210	-0.132
High cost of labour	144	2.18	0.82	1	4	0.327	-0.241
Low rainfall	144	2.11	0.71	1	4	0.389	0.190
Long dry spells	144	2.09	0.69	1	4	0.405	0.246
Very high rainfall	144	2.36	0.75	1	4	0.167	-0.202
High temperature	144	2.44	0.71	1	4	0.158	-0.189
Very low temperature	144	2.57	0.67	1	4	0.121	-0.231
Wildlife invasion	144	2.33	0.88	1	4	0.210	-0.142
Other	144	2.28	0.79	1	4	0.265	-0.121

Field Work Survey, May 2025

Access to finance (M = 2.18) was another prominent constraint, confirming that capital limitations restrict farmers from scaling operations, acquiring inputs, or hiring labour. Most smallholder farmers operate without formal financial support, which affects their ability to invest in yield-enhancing technologies or to absorb price shocks when market returns are low. Labour-related factors such as “*Shortage of labour*” (M = 2.29) and “*High cost of labour*” (M = 2.18) further compound production challenges, particularly during land preparation and peak weeding periods when demand for hired help exceeds supply. These constraints reflect a combination of demographic shifts, youth migration, and seasonal wage inflation, which intensify the cost of cotton production and delay essential field activities.

Pest and disease pressure (M = 2.21) also emerged as a frequently cited constraint, emphasizing biological threats to productivity. In the absence of regular pest surveillance and access to effective agrochemicals, infestations can significantly reduce yields and quality. Although “*Lack of production knowledge*” (M = 2.40) had a slightly higher mean, suggesting less widespread concern, it still points to the need for ongoing farmer education, especially in pest identification and integrated crop management practices. While a few respondents also cited

other specific challenges (wildlife intrusion, theft, unstable markets), these did not dominate the rankings.

Collectively, the findings point toward a complex productivity landscape shaped primarily by environmental stressors, capital scarcity, biological threats, and human resource gaps. These constraints must be addressed through coordinated efforts that combine infrastructure development (particularly smallholder irrigation), financial inclusion programs, community labour-sharing systems, and consistent extension support in pest and moisture management. Enhancing adaptive capacity at the farm level will require both state-led and community-based responses tailored to the resource realities of Mbire's smallholder cotton growers.

4.2.6 Link between Cotton Production and Food Security in Mbire

The descriptive statistics in Table 13 highlight the complex interplay between cotton production and household food security. Statement C1.1, with a mean of 2.08 and a standard deviation of 0.75, suggests that respondents moderately agree higher cotton yields enable them to purchase more food, highlighting cotton's crucial role in ensuring access to food. Similarly, statement C1.2, with a mean of 2.21 and low skewness (0.285), indicates that cotton sales improve household food variety, reflecting the broader impact of cotton income on dietary diversity.

Statement C1.3, showing a mean of 2.13, reveals that poor cotton harvests result in household food shortages, reinforcing the vulnerability of households to agricultural yield fluctuations. Statement C1.4, with a mean of 2.16, further underlines that cotton farming is the main source of money to buy food, while statement C1.5, with a mean of 2.33, highlights the link between cotton income and household dietary diversity. In contrast, statement C1.6, with a mean of 3.14, suggests respondents disagree that cotton farming has negatively affected food access over the past three years. The slight negative skewness for C1.6 (-0.108) highlights that despite challenges, cotton farming has remained a critical livelihood for ensuring household food security. Overall, the data suggest that cotton farming remains a key pillar for household food security and dietary diversity. These findings highlight the importance of supporting cotton farmers through better access to inputs and markets to maintain and strengthen food security outcomes in these households.

Table 13: Interplay between cotton production and household food security

Code	Statement	N	Mean	Std. Deviation	Minimum	Maximum	Skewness	Kurtosis
C1.1	Higher cotton yields allow me to buy more food	144	2.08	0.75	1	4	0.321	-0.219
C1.2	Cotton sales improve household food variety	144	2.21	0.77	1	4	0.285	-0.201
C1.3	Poor cotton harvests cause household food shortages	144	2.13	0.81	1	4	0.307	-0.164
C1.4	Cotton farming is my main source of money to buy food	144	2.16	0.73	1	4	0.264	-0.283
C1.5	Cotton income affects dietary diversity in my household	144	2.33	0.72	1	4	0.191	-0.132
C1.6	Cotton farming negatively affected household food access (last 3 yrs)	144	3.14	0.79	1	5	-0.108	

Field Work Survey, May 2025

Table 14: Household Food Insecurity Access Scale

Code	Question	Mean	S.D	Minimum	Maximum	Skewness	Kurtosis
H1	Did you worry that your household would not have enough food?	1.94	0.87	0	3	0.432	-0.188
H2	Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	1.78	0.84	0	3	0.397	-0.216
H3	Did you or any household member have to eat a limited variety of foods due to a lack of resources?	1.83	0.85	0	3	0.408	-0.152
H4	Did you or any household member have to eat some foods that you really did not want because of a lack of resources?	1.59	0.88	0	3	0.321	-0.272
H5	Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	1.76	0.86	0	3	0.401	-0.195
H6	Did you or any household member have to eat fewer meals in a day because there was not enough food?	1.71	0.83	0	3	0.382	-0.215
H7	Was there ever no food to eat of any kind in your household because of lack of resources?	1.20	0.82	0	3	0.276	-0.303
H8	Did you or any household member go to sleep at night hungry because there was not enough food?	1.08	0.79	0	3	0.213	-0.338
H9	Did you or any household member go a whole day and night without eating anything because there was not enough food?	0.92	0.76	0	3	0.192	-0.356

Source: Field Work Survey, May 2025

The findings from the HFIAS items reveal a concerning pattern of food insecurity in the cotton farming households of Mbire District as shown in Table 14. The highest mean of 1.94 for question H1 suggests that food-related anxiety is a significant issue, with many households regularly worrying about inadequate food access. This aligns with the broader challenge posed by cotton price volatility, as households depending on cotton income experience fluctuations in their purchasing power. The consistently high means for questions H2 to H6, ranging from 1.59 to 1.83, indicate that households often face dietary compromises, including eating limited varieties of food and smaller meals. Such dietary adjustments highlight the direct impact of cotton price and yield fluctuations on household food consumption. As cotton productivity declines or prices fall, families cut back on food choices, threatening nutritional adequacy.

Severe food insecurity indicators such as no food in the household (H7, mean=1.20), going to bed hungry (H8, mean=1.08), and going a whole day and night without eating (H9, mean=0.92) also show worrying averages. Although these are lower than the means for dietary compromise items, their presence highlights the extreme vulnerability faced by a subset of these households. Such experiences likely correlate with periods of acute cotton price drops or failed harvests, when household incomes are especially constrained. The positive skewness in all items suggests that while many respondents reported moderate to high levels of food insecurity, there is a tail of households with very high frequencies of these experiences. The slightly negative kurtosis across most items indicates a wider spread of experiences, revealing that while some households may have mild food access issues, others face extreme and repeated challenges. Within the context of your dissertation which explores how cotton productivity and price volatility affect food access these findings are critical. They highlight that fluctuations in cotton income have a direct and tangible impact on household food security, pushing many families into cycles of dietary compromise and hunger. Moreover, the data highlights the urgency of investigating and strengthening coping strategies to cushion these households from the volatile cotton market. This picture of food insecurity not only reflects the economic instability tied to cotton farming but also reinforces the need for interventions that diversify income streams and enhance household resilience in the Zambezi Valley.

Table 15: Household dietary diversity

Code	Food Group	Frequency (Yes)	Frequency (No)	Percentage Consuming (%)
D1	Cereals (maize, rice, sorghum)	144	0	100
D2	Roots/tubers (sweet potatoes)	85	59	59
D3	Vegetables	120	24	83
D4	Fruits	65	79	45
D5	Meat/poultry	50	94	35
D6	Eggs	40	104	28
D7	Fish or dried fish	30	114	21
D8	Legumes, nuts, seeds	75	69	52
D9	Milk or dairy products	48	96	33
D10	Oils/fats	90	54	62
D11	Sugar/honey	70	74	49
D12	Other foods (coffee, tea, condiments)	100	44	69

Source: Field Work Survey, May 2025

The dietary diversity data presented above highlights the patterns of household food consumption in Mbire District, reflecting the context of cotton farming livelihoods and the challenges these communities face. All households (100%) consumed cereals (D1), demonstrating that staples like maize remain the core component of diets, ensuring basic caloric intake in the face of fluctuating cotton prices. Consumption of vegetables (D3) was relatively high at 83%, likely due to the ability to cultivate or gather these items locally, which provides some dietary variety despite income instability. However, the intake of nutrient-rich foods such as fruits (45%), legumes/nuts/seeds (52%), and animal-source proteins (meat/poultry at 35%, eggs at 28%, and fish at 21%) was considerably lower. These figures suggest that many households face significant barriers to accessing more diverse and nutritious foods, which could be linked to limited financial resources or seasonal constraints on food availability, both of which are influenced by the cyclical nature of cotton income.

Milk and dairy product consumption (33%) further illustrates dietary gaps and may reflect prioritization of more affordable foods over dairy during times of financial hardship. Oils/fats (62%) and other condiments or beverages like coffee and tea (69%) appeared more regularly in diets, indicating a balance between nutritional and cultural preferences within the constraints of household budgets. These dietary diversity scores align with the broader picture of the coping strategies employed in response to cotton price volatility. Households appear to prioritize staple foods while cutting back on higher-cost, more nutrient-dense foods when resources are scarce. Such dietary patterns raise concerns about potential micronutrient

deficiencies, particularly for vulnerable populations like children and pregnant women. The evidence supports the dissertation’s central focus on the intersection of cotton productivity, price volatility, and household food security. It suggests that while cotton farming remains the backbone of livelihoods in Mbire District, households are compelled to adjust their food choices in ways that compromise dietary diversity during periods of price decline. This points to the need for interventions that enhance resilience and promote sustainable food systems to ensure consistent access to a more balanced diet, even in the face of unpredictable cotton market shifts.

Table 16: Correlation Matrix between Cotton Production Perceptions, Food Insecurity, and Dietary Diversity

Variables	Cotton Production & Food Security (C)	Household Food Insecurity (H)	Dietary Diversity (D)
Cotton Production & Food Security (C)	1	-0.62	0.57
Household Food Insecurity (H)	-0.62	1	-0.68
Dietary Diversity (D)	0.57	-0.68	1

Note: Correlation is significant at the 0.01 level (2-tailed).

Source: Field Work Survey, May 2025

The correlation analysis reveals statistically significant relationships among perceptions of cotton production and food security, household food insecurity experiences, and dietary diversity scores among cotton-dependent households in Mbire District as shown in Table 16. These findings provide critical insights into the dynamics underpinning household food security in the context of cotton price volatility.

Relationship between Cotton Production and Food Security (r = 1, baseline)

The variable measuring household perceptions of cotton production’s influence on food security reflects a moderate consensus that cotton farming is central to livelihoods, supporting household food access and diversity. Descriptive statistics showed means between 2.08 and 2.33 for statements regarding cotton income enabling food purchases and improving dietary variety, while households moderately disagreed (mean 3.14) that cotton farming negatively affected food access over the past three years. This highlights that despite market volatility, cotton remains a key income source that facilitates food access.

Negative Correlation between Cotton Production and Food Access ($r = -0.62, p < 0.01$)

A strong negative correlation exists between cotton production perceptions and household food insecurity scores, indicating that households perceiving better cotton production outcomes experience lower levels of food insecurity. This aligns with the HFIAS descriptive data where food anxiety (mean = 1.94) and dietary compromises (means ranging 1.59 to 1.83) were prevalent. Households that reported higher cotton yields or sales also tended to experience fewer incidences of reduced meal sizes, limited variety, or going to bed hungry. This correlation highlights the direct link between fluctuations in cotton income and food insecurity. When cotton yields decline or prices fall, households' purchasing power decreases, leading to compromises in meal size, food variety, and in severe cases, food absence. The data suggest that cotton income acts as a buffer against food insecurity, but its volatility exposes households to cycles of vulnerability.

Positive Correlation between Cotton Production and Dietary Diversity ($r = 0.57, p < 0.01$)

The positive and statistically significant correlation between cotton production and dietary diversity demonstrates that higher perceived cotton productivity is associated with greater household consumption of diverse food groups. As shown in Table 4.8, cereals are universally consumed, but consumption rates for nutrient-rich foods such as vegetables (83%), fruits (45%), legumes (52%), and animal-source proteins like meat (35%) and eggs (28%) vary widely, reflecting income constraints. Households with better cotton yields are more able to afford a wider variety of foods, mitigating nutritional deficiencies. This finding is critical given the dietary patterns observed, where households prioritize staples but reduce intake of higher-cost foods during cotton price dips, leading to potential micronutrient deficiencies. Hence, stable cotton income appears essential for maintaining dietary quality.

Negative Correlation between Food Access and Dietary Diversity ($r = -0.68, p < 0.01$)

There is a strong inverse relationship between household food access and dietary diversity. As food insecurity increases, dietary diversity declines markedly. This relationship reflects the coping strategies households employ during times of cotton income instability, which often involve restricting food variety and quantity. The descriptive data illustrated this through indicators such as eating fewer meals (mean = 1.71), smaller portions (mean = 1.76), and in some cases, experiencing no food at all (mean = 1.20). This correlation emphasizes that food insecurity is not only about quantity but also quality and variety of food consumed, highlighting a crucial aspect of household nutrition affected by agricultural income volatility. It stresses the

importance of addressing food insecurity holistically, incorporating both access and dietary adequacy.

4.2.7 Coping Strategies to Cotton Price Volatility

This section presents findings on how cotton-producing households in Mbire District adapt to periods of cotton price volatility. The data draws from Section D of the questionnaire and is categorized into two main parts: short-term household-level coping strategies (D1) and broader strategic adaptations used to manage longer-term cotton market risks (D2). The analysis also incorporates additional qualitative comments from respondents under Section D3.

4.2.7.1 Short-Term Household Coping Practices When Cotton Prices Are Low

Table 17 summarizes the frequency of adoption for each of the short-term coping strategies identified in the questionnaire (D1.1 to D1.20). Respondents were asked to indicate all options that applied to their households.

Table 17: Short-term household coping mechanisms

Coping Strategy	Frequency (Yes)	Percentage (%)
Borrow food from shops	97	67.4%
Borrow money from friends/relatives	84	58.3%
Dispose of household goods/assets	62	43.1%
Use credit cards	4	2.8%
Sell other crops	73	50.7%
Reduce non-food household spending	88	61.1%
Reduce number of meals per day	101	70.1%
Resort to prostitution/external relations	11	7.6%
Move to cheaper residence	18	12.5%
Practice gardening	92	63.9%
Rely on food aid	76	52.8%
Look for petty jobs	94	65.3%
Engage in petty trading	81	56.3%
Sell livestock	69	47.9%
Get loans from money lenders/banks	58	40.3%
Reduce quantity of food consumed	103	71.5%
Avoid repaying existing debts	36	25.0%
Overuse natural resources	54	37.5%
Illicit trading	13	9.0%
Begging	24	16.7%

Field Work Survey, May 2025

The most commonly reported coping strategies included reducing meal quantity (71.5%), cutting the number of meals per day (70.1%), borrowing food (67.4%), and seeking petty jobs

(65.3%). These findings reflect acute consumption-based adjustments and income-seeking behaviors, highlighting the impact of cotton price instability on daily survival strategies. Notably, gardening (63.9%) emerged as a critical buffer, especially for households with access to small irrigation plots or wetlands. Reduction in non-food expenditures (61.1%), such as school fees or health costs, shows how price shocks can force households into difficult trade-offs affecting long-term wellbeing.

The sale of other crops (50.7%) and livestock (47.9%) indicates asset-based responses, though these can undermine long-term resilience if repeatedly employed. Alarming, a small but significant number of respondents (7.6%) admitted to resorting to transactional sex or external relationships, pointing to extreme and risky survival behaviors, particularly among vulnerable groups. The use of illicit trade (9.0%), begging (16.7%), and avoiding debt repayment (25.0%) further illustrates the moral and economic stress household's experience. The minimal use of credit cards (2.8%) reflects poor access to formal financial instruments in rural contexts. Overall, the data illustrates a wide range of strategies, many of which compromise food security, asset stability, and personal dignity, highlighting the urgent need for protective social and economic interventions.

4.2.7.2 Long-Term Coping Strategies for Cotton Price Volatility

Respondents were also asked to rank long-term strategies adopted to manage cotton price volatility (Section D2). The most commonly ranked strategies are shown in Table 18. The two most frequently prioritized strategies were crop diversification (34.0%) and income diversification (29.9%), indicating that farmers are increasingly aware of the risks posed by overdependence on cotton. These approaches allow households to spread risk across different income streams and agricultural products, making them less vulnerable to single-market fluctuations. Adoption of improved agricultural practices (14.6%) also reflects a shift towards sustainability and yield maximization, though its lower ranking suggests that resource constraints limit uptake. Formal market tools such as contract farming (2.8%), crop insurance (1.4%), and financial hedging (0.7%) are poorly adopted, indicating a lack of institutional support or awareness. The use of technology (0%) and supply chain innovations (0%) were not ranked by any respondent, reflecting critical gaps in capacity or access. This emphasizes the need for stronger extension services, financial education, and technological integration tailored to rural realities.

Table 18: Long-Term Coping Strategies for Cotton Price Volatility

Strategy	Frequency Ranked #1	Percentage (%)
D2.1 Crop diversification	49	34.0%
D2.2 Income diversification	43	29.9%
D2.8 Adopting better practices	21	14.6%
D2.11 Training programs	7	4.9%
D2.12 Networking with farmers	5	3.5%
D2.4 Storing cotton	4	2.8%
D2.3 Contract farming	4	2.8%
D2.10 Market research	3	2.1%
D2.6 Government programs	3	2.1%
D2.13 Crop insurance	2	1.4%
D2.14 Side marketing	2	1.4%
D2.5 Financial hedging	1	0.7%
D2.7 Technology use	0	0.0%
D2.9 Supply chain improvements	0	0.0%

Field Work Survey, May 2025

4.3 Discussion

4.3.1 Demographic Characteristics of Respondents

The demographic profile of the respondents in Chapter 4 offers critical insights that underpin the entire analysis of cotton productivity and household resilience. The results indicates that approximately 66.7% of farmers are male, while women constitute 33.3%, reflecting typical gendered land and resource ownership patterns in rural Zimbabwe as discussed in the literature (FAO, 2010; Doss, 2002). The average age of 43 years suggests a predominantly middle-aged farming population, which may influence their willingness or capacity to adopt new agricultural practices, aligning with the literature’s emphasis on the importance of youth involvement for innovation (Moyo et al., 2020). Household sizes averaging about 5 to 6 members imply significant dependency ratios, which directly affect food security and resource allocation within families. The demographic structure, including education levels most respondents having only primary or secondary education further influences their access to

extension services and modern farming techniques, reinforcing the systemic barriers described in Chapter 2. Overall, these demographic factors shape household resilience, decision-making, and capacity to adapt to market shocks, making them essential for contextualising the study's findings.

4.3.2 Theoretical Framework and Data Analysis

The theoretical framework adopted in this research, the Sustainable Livelihoods Framework (Chambers & Conway, 1992), provides a comprehensive lens through which the empirical data can be analysed. This framework emphasises the interaction between livelihood assets such as land, labour, capital, and social networks and the strategies households employ to achieve outcomes like food security and income stability. It underscores that external shocks, environmental factors, and institutional support influence asset access, which in turn determines livelihood strategies. The data aligns well with this model, revealing that limited access to inputs, poor infrastructure, and climatic variability constrain farmers' assets, forcing them into reactive coping mechanisms like asset sales or reduced consumption. The framework's holistic perspective highlights that sustainable improvements in productivity and food access require addressing both resource constraints and systemic vulnerabilities, reinforcing the importance of integrated interventions.

4.3.3 Social Economic factors influencing Cotton.

The first objective focuses on analysing socio-economic factors influencing cotton productivity in Mbire District. The literature establishes that variables such as landholding size, access to inputs, extension services, and capital are pivotal determinants (Rukuni et al., 2019; Kavhosy et al., 2020). The data confirms this, showing an average land size of 3.75 hectares, with over half dedicated to cotton, and a significant proportion of farmers reporting poor access to inputs and extension services. These constraints directly impede yield potential, as limited fertiliser use, pest management, and mechanisation reduce productivity (Cavalcante et al., 2016). The demographic profile, including education levels, also influences farmers' capacity to adopt new practices, aligning with the literature's emphasis on capacity building. Therefore, addressing socio-economic barriers through targeted support and infrastructure development is critical for enhancing productivity in the region.

4.3.4 Cotton Productivity, Household Food Access and Dietary Diversity

The second objective examines the relationship between cotton productivity and household food access. The literature indicates that fluctuations in cotton yields and market prices have direct repercussions on household nutrition and dietary diversity (Mutoko et al., 2019). The data supports this, showing that lower yields and income from cotton sales correlate with increased food insecurity, reduced meal frequency, and limited access to nutrient-rich foods. The negative correlation between food insecurity and dietary diversity underscores that income shocks translate into compromised nutrition, especially among vulnerable groups. This aligns with the literature's assertion that market instability exacerbates household vulnerabilities and that diversification of income sources is vital for resilience. The findings suggest that improving cotton productivity could buffer households against food insecurity, but only if systemic constraints are simultaneously addressed. The correlation analysis affirmed a positive relationship between cotton income and dietary diversity ($r = 0.57, p < 0.01$), a negative correlation between cotton income and food access ($r = -0.62, p < 0.01$) and a strong negative correlation between food access and dietary diversity ($r = -0.68, p < 0.01$). These results validate the assertion by Maxwell et al. (2022) that dietary outcomes are directly influenced by household purchasing power, itself driven by market conditions.

4.3.4 Coping Strategies

The third objective investigates the coping strategies employed by farmers during periods of cotton price volatility. The literature describes both short-term reactive measures such as borrowing food, asset sales, and meal reduction and longer-term adaptations like crop diversification and income diversification (Devereux, 2000; Barrett & Carter, 2013). The empirical data reflects this, revealing that most households resort to immediate responses like reducing meal sizes (70%) and borrowing food (67%), which threaten long-term food security and asset stability. Long-term strategies, including crop diversification, are less frequently adopted, mainly due to resource limitations and lack of institutional support. The reliance on reactive strategies highlights systemic vulnerabilities and emphasizes the need for safety nets like crop insurance and market stabilisation mechanisms, as recommended in the literature. Without addressing these structural issues, households remain trapped in cycles of vulnerability, undermining resilience.

The analysis of these three objectives highlights the intertwined nature of demographic factors, systemic constraints, and household strategies in shaping resilience outcomes. Demographics influence access to resources and decision-making capacity, while the theoretical framework underscores that asset access and systemic vulnerabilities are central to understanding livelihood outcomes. The empirical data confirms that addressing socio-economic barriers, improving productivity, and facilitating adaptive strategies are essential for fostering sustainable livelihoods. Overall, the comparison reveals that comprehensive, multi-sectoral interventions targeted at systemic constraints, demographic realities, and household behaviours are necessary to build resilience against cotton market shocks and ensure food security in Mbire District.

4.4 Summary

This study illustrates that cotton price volatility in Mbire District has far-reaching implications for smallholder household welfare, particularly in terms of food access and adaptive capacity. While cotton remains a dominant source of income, reliance on it in the absence of adequate institutional and infrastructural support deepens vulnerability. The empirical evidence confirms strong interlinkages between agricultural income, food insecurity, and dietary quality. Households employ both reactive and proactive coping strategies, though many lack access to sustainable and formal safety nets. Conclusively, a paradigm shift is needed from viewing cotton merely as a cash crop to understanding its broader socio-economic implications on nutrition, resilience, and human development. Strengthening institutional support systems and promoting diversified, climate-resilient livelihoods is essential to safeguard food security and economic stability in rural Zimbabwe.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Research Summary

The study explored the nexus between cotton productivity, food access, and coping strategies in the face of cotton price volatility among 144 cotton-farming households in Mbire District, located in Zimbabwe's Zambezi Valley. The research was prompted by increasing concerns over how global commodity price fluctuations, coupled with domestic production constraints, are undermining rural livelihoods and nutritional outcomes. The methodology adopted a mixed-methods approach, but this study's core relied on structured quantitative data analyzed through SPSS version 26. Key findings revealed that 70.8% of households relied primarily on cotton for income, and over half their arable land was dedicated to cotton. Productivity was undermined by limited access to irrigation, unaffordable inputs, pest pressures, and inadequate extension services. Regarding food security, the Household Food Insecurity Access Scale (HFIAS) showed high levels of food-related anxiety, reduced meal frequency, and limited dietary diversity. Most households consumed only cereals and vegetables, while access to proteins and dairy was low. Coping strategies were largely short-term and reactive, including food borrowing, meal skipping, and asset sales. Long-term strategies such as crop diversification and petty trading were adopted, but institutional mechanisms like crop insurance, contract farming, and financial hedging remained underutilized or unavailable.

5.2 Conclusions

From the empirical evidence gathered and analyzed, several conclusions emerge that highlight the multidimensional challenges faced by cotton farmers in Mbire District. Firstly, the heavy reliance on cotton as the primary income source leaves households vulnerable to market-induced income shocks. Cotton price volatility directly correlates with food insecurity and declining dietary diversity, as most households lack alternative income buffers. Secondly, production remains largely subsistence-level due to structural deficiencies including weak access to agricultural inputs, poor mechanization, and limited extension support. This reflects systemic underinvestment in smallholder agriculture. Thirdly, the study confirmed that food insecurity is not merely about food availability but also closely linked to income reliability and expenditure patterns, especially in mono-crop economies. The correlations observed between

cotton productivity and food access, and between food insecurity and dietary diversity highlight that the agricultural sector cannot be divorced from food and nutrition policy discourse. Lastly, the coping strategies adopted by households are largely unsustainable. The erosion of household assets, reliance on informal borrowing, and increased exposure to social risks such as transactional relationships reveal a pattern of vulnerability that calls for comprehensive policy interventions to build long-term resilience.

5.3 Policy Implication and Recommendations

The study offers critical policy implications that are relevant to both national and local governance structures. First, policy-makers must prioritize diversification of income and cropping systems by supporting smallholders through targeted subsidies, microfinance services, and training programs. Second, there is a pressing need to invest in irrigation infrastructure to reduce dependency on unpredictable rainfall, especially in climate-sensitive districts like Mbire. These investments can be community-based and integrated into public-private partnership models to enhance sustainability. Third, access to affordable and timely inputs such as seeds, fertilizers, and pest control chemicals must be streamlined through cooperative networks and rural input distribution schemes. Fourth, the revitalization of agricultural extension services is imperative. Extension officers should be adequately trained and resourced to disseminate knowledge on climate-smart agriculture, market forecasting, and financial literacy. Fifth, institutional coping mechanisms such as crop insurance, minimum price guarantees, and contract farming should be introduced and expanded. These tools can cushion farmers against market and production risks. Finally, nutrition-sensitive agriculture should be mainstreamed into rural development policies to ensure that income improvements lead to better dietary outcomes, especially for vulnerable groups like children, pregnant women, and the elderly.

5.4 Areas for Further Research

While this study made significant contributions to the understanding of how cotton farming interacts with food access and coping mechanisms in a rural Zimbabwean context, several gaps remain that future research can address. Firstly, further studies should conduct longitudinal analysis to assess how these relationships evolve over multiple growing seasons and in response to market or climatic shocks. This would help distinguish between cyclical and

structural vulnerabilities. Secondly, more qualitative research is needed to explore gender-specific coping strategies and intra-household decision-making dynamics that shape food access and resource allocation. Women, despite constituting a third of cotton farmers in the study, often face barriers that are not easily captured by quantitative data. Thirdly, research could expand to comparative district-level analysis to determine whether the observed vulnerabilities in Mbire are replicated elsewhere or whether they are specific to its ecological and economic context. Fourthly, an evaluation of the effectiveness of pilot programs such as community-based irrigation schemes, agro-insurance, and digital extension platforms would provide valuable insights into scalable interventions. Finally, future research should integrate climate modeling and scenario planning to understand how shifts in rainfall patterns and temperature extremes may influence cotton productivity and rural food security over the next decade.

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Appendices 1
Research Questionnaire
QUESTIONNAIRE

Title of Project: Exploring the Nexus of Cotton Productivity, Food Access, and Coping Strategies to Cotton Price Volatility in the Zambezi Valley: A Case Study of Mbire District.

INTRODUCTION

This project, titled "Exploring the Nexus of Cotton Productivity, Food Access, and Coping Strategies to Cotton Price Volatility in the Zambezi Valley: A Case Study of Mbire District," is being undertaken by Margaret Doro as part of her Master of Science Degree in Food Security and Sustainable Agriculture at Bindura University of Science Education. The aim of this study is to investigate the complex relationships between cotton production, food access, and the coping strategies that farmers employ in response to the challenges posed by fluctuating cotton prices. Your participation in this research is invaluable, and I want to assure you that all responses will be treated with the utmost confidentiality. Your insights will contribute to a better understanding of these issues while ensuring your privacy and anonymity throughout the process. Thank you for considering being part of this important study.

SECTION A: DEMOGRAPHIC INFORMATION (Codes: A1–A5)

Code	Question	Options
A1	Sex	<input type="checkbox"/> Male (1) <input type="checkbox"/> Female (2)
A2	Age of farmer (Years)	
A3	Marital Status	<input type="checkbox"/> Single (1) <input type="checkbox"/> Married (2) <input type="checkbox"/> Divorced (3) <input type="checkbox"/> Widowed (4)
A4	Highest level of education completed	<input type="checkbox"/> No Formal (1) <input type="checkbox"/> Primary (2) <input type="checkbox"/> Secondary (3) <input type="checkbox"/> Tertiary (4) <input type="checkbox"/> Informal (5)
A5	Household Size	

SECTION B: SOCIO-ECONOMIC FACTORS INFLUENCING COTTON PRODUCTIVITY (Codes: B1–B2)

B1: Socio-Economic Details

Code	Question	Options (Tick 1 option)
B1.1	Main Household Income Source	<input type="checkbox"/> Cotton farming (1) <input type="checkbox"/> Other cash crops (2) <input type="checkbox"/> Livestock (3) <input type="checkbox"/> Formal employment (4) <input type="checkbox"/> Informal trade (5) <input type="checkbox"/> Formal trade (6) <input type="checkbox"/> Formal trade (7)

		<input type="checkbox"/> NTFP (8) <input type="checkbox"/> Remittances (9) <input type="checkbox"/> Pension (10)					
B1.2	Size of arable land (Ha)						
B1.3	Area planted with cotton last season (Ha)						
B1.4	Average percentage of arable land utilised for cotton production last season (Ha)						
B1.5	Average output of cotton last season (Kgs)						
B1.6	Average price of cotton last season(USD)						
B1.7	Average percentage of income from cotton sales to total household income (%)						
	Percentage of income from cotton sales spent on food purchase (%)						
B1.8	Farming System Used	<input type="checkbox"/> Rain-fed (1) <input type="checkbox"/> Irrigated (2) <input type="checkbox"/> Both (3)					
B1.9	Access to Extension Services	<input type="checkbox"/> Yes (1) <input type="checkbox"/> No (2)					
B1.10	Access to Farming Inputs	<input type="checkbox"/> Very Good (1) <input type="checkbox"/> Good (2) <input type="checkbox"/> Fair (3) <input type="checkbox"/> Poor (4) <input type="checkbox"/> Very Poor (5)					
B1.11	Ownership of draught power	<input type="checkbox"/> Yes (1) <input type="checkbox"/> No (2)					
B1.12	Ownership of tillage equipment e.g. Plough	<input type="checkbox"/> Yes (1) <input type="checkbox"/> No (2)					
B1.13	Labour availability locally	<input type="checkbox"/> Available (1) <input type="checkbox"/> Not Available(1)					
B1.14 What type of livestock species do you keep? (Rank specie)							
Class	Cattle	Goats	Sheep	Chickens	Pigs	Donkeys	Other (specify)
Number							

B2: Factors Affecting Cotton Productivity

Instructions: Tick the most appropriate option.

Code	Statement	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
B2.1	Lack of access to affordable farming inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.2	Poor extension services	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.3	Lack of irrigation equipment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.4	Lack of finance.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.5	Late delivery of inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.6	High cost of inputs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

B2.7	Pest and diseases	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.8	Lack of production knowledge	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.9	Shortage of labour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.10	High cost of labour	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.11	Low rainfall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.12	Long dry spells	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.13	Very high rainfall	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.14	High temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.15	Very low temperature	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other (Specify)					
B2.16		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B2.17		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

SECTION C: COTTON PRODUCTIVITY, FOOD ACCESS & DIETARY DIVERSITY

(Codes: C1–C3)

C1: Link between cotton production and food security

Code	Statement	Strongly Agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly Disagree (5)
C1.1	Higher cotton yields allow me to buy more food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1.2	Cotton sales improve household food variety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1.3	Poor cotton harvests cause household food shortages.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1.4	Cotton farming is my main source of money to buy food.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1.5	Cotton income affects dietary diversity in my household.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C1.6	Cotton farming negatively affected household food access over the last 3 years?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C2: Household Food Insecurity Access Scale (HFIAS)

(Based on past 30 days)

Code	Question	Never (0)	Rarely (1–2×)	Sometimes (3–10×)	Often (>10×)
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H1	Did you worry that your household would not have enough food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H2	Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H3	Did you or any household member have to eat a limited variety of foods due to a lack of resources?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H4	Did you or any household member have to eat some foods that you really did not want because of a lack of resources to obtain other types of food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H5	Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H6	Did you or any household member have to eat fewer meals in a day because there was not enough food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H7	Was there ever no food to eat of any kind in your household because of lack of resources to get food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H8	Did you or any household member go to sleep at night hungry because there was not enough food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
H9	Did you or any household member go a whole day and night without eating anything because there was not enough food?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

C3: Household Dietary Diversity Score (HDDS)

Instructions: Please indicate which of the following foods were consumed by anyone in your household in the past **24 hours**.

Code	Food Group	Yes (1)	No (0)
D1	Cereals (maize, rice, sorghum)	<input type="checkbox"/>	<input type="checkbox"/>
D2	Roots/tubers (sweet potatoes)	<input type="checkbox"/>	<input type="checkbox"/>
D3	Vegetables	<input type="checkbox"/>	<input type="checkbox"/>
D4	Fruits	<input type="checkbox"/>	<input type="checkbox"/>
D5	Meat/poultry	<input type="checkbox"/>	<input type="checkbox"/>
D6	Eggs	<input type="checkbox"/>	<input type="checkbox"/>
D7	Fish or dried fish	<input type="checkbox"/>	<input type="checkbox"/>
D8	Legumes, nuts, seeds	<input type="checkbox"/>	<input type="checkbox"/>
D9	Milk or dairy products	<input type="checkbox"/>	<input type="checkbox"/>
D10	Oils/fats	<input type="checkbox"/>	<input type="checkbox"/>

D11	Sugar/honey	<input type="checkbox"/>	<input type="checkbox"/>
D12	Any other foods such as coffee, tea and condiments	<input type="checkbox"/>	<input type="checkbox"/>

SECTION D: COPING STRATEGIES TO COTTON PRICE VOLATILITY (Codes: D1–D3)

D1: Coping practices employed by your household when cotton prices are low

Code	Coping Strategy	Tick the option that applies
D1.1	Borrow food from shops for future payments	
D1.2	Borrow money from friends or relatives	
D1.3	Dispose household goods or other assets	
D1.4	Use credit cards	
D1.5	Sale crops	
D1.6	Reduction in non-food household expenditure	
D1.7	Reduce the number of meals per day	
D1.8	Resort to prostitution and external relationships to secure food	
D1.9	Changed area of residents (moved to a cheaper place)	
D1.10	Practice gardening	
D1.11	Rely on food aid	
D1.12	Look for petty jobs	
D1.13	Petty trading	
D1.14	Sale livestock	
D1.15	Get loans from money lenders and banks	
D1.16	Reduce in the amount of food	
D1.17	Do not pay credits already owed	
D1.18	Over-use of natural resources (e.g. excessive fishing and collection of firewood)	
D1.19	Illicit Trading	
D1.20	Begging	
	Other (Specify):	
D1.21		
D1.22		

D2: Coping strategies adopted by cotton farmers to manage the risks associated with cotton price volatility

Code	Coping Strategy	Rank 1 as the most frequently used strategy
D2.1	Diversification of Crops: Planting multiple types of crops to reduce reliance on cotton alone.	
D2.2	Diversifying Income Sources: Engaging in alternative income-generating activities, such as livestock farming.	
D2.3	Contract Farming: Engaging in agreements with buyers to secure prices before harvesting.	

D2.4	Storing Cotton: Implementing proper storage techniques to hold onto cotton until prices improve	
D2.5	Financial Hedging: Using financial instruments like futures contracts to lock in prices.	
D2.6	Government Programs: Utilizing government support programs for price stabilization or subsidies.	
D2.7	Using Technology: Implementing agricultural technologies for better yield predictions and market analysis.	
D2.8	Adopting Better Practices: Improving agricultural practices to enhance yield and reduce costs.	
D2.9	Improving Supply Chain Management: Enhancing logistics to reduce costs and improve market access.	
D2.10	Market Research: Staying informed about market trends and price forecasts to make timely decisions.	
D2.11	Participating in Training Programs: Attending workshops or seminars to learn about risk management strategies.	
D2.12	Networking with Other Farmers: Sharing information and experiences with peers to develop adaptive strategies.	
D2.13	Crop Insurance: Purchasing insurance to protect against significant losses due to price drops.	
D2.14	Side marketing	
D2.15	Other (Specify)	
D3: Any additional comment with regard to cotton production and marketing?		

THANK YOU