

**The Impact of Multidimensional Financial Inclusion on Welfare Outcomes: Empirical
Evidence from Smallholder Farmers in the Eastern Cape, South Africa**

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Master of Economics

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RHODES UNIVERSITY
Where leaders learn

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DEDICATION

To my family.

DECLARATION: PLAGIARISM

I, Bonolo Xhakaza, declare that:

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Dr Sandie Phakathi (Supervisor)

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LIST OF ABBREVIATIONS

ATE - Average Treatment Effect.

ATM- Automated Teller Machine.

ATT - Average Treatment effect on the Treated.

CASP- Comprehensive Agricultural Support Programme.

CDF- Cumulative Distribution Function.

ECA- Europe and Central Asia.

FAO- Food and Agriculture Organisation.

GDP- Gross Domestic Product.

HDDS- Household Dietary Diversity Score.

HFIAS- Household Food Insecurity Access Scale.

ICA- International Cooperative Alliance.

IDP- Integrated Development Plan.

LED- Local Economic Development.

MAFISA- Micro-Agricultural Finance Institutions of South Africa

MLE- Maximum Likelihood Estimation.

MFII- Multidimensional Financial Inclusion Index.

OLS- Ordinary Least Squares.

PAR- Participatory Action Research.

PSM- Propensity Score Matching.

SADC- Southern African Development Community.

SDG- Sustainable Development Goals.

SRD- Social Relief Distress.

SRS- Simple Random Sampling.

StatsSA - Statistics South Africa.

ABSTRACT

This study investigates the factors influencing financial inclusion among smallholder farmers in Makhanda, South Africa, and assesses its impact on household welfare. To provide a more comprehensive understanding than traditional single-indicator measures, the study employs a Multidimensional Financial Inclusion Index (MFII) constructed across five key domains including access, usage, quality, financial literacy, and resilience. Data were gathered from 100 smallholder farmers through a structured questionnaire using a simple random sampling. Analytical methods included Poisson and Probit models to identify determinants of financial inclusion, and Propensity Score Matching (PSM) to evaluate its effects on welfare.

Findings reveal that overall financial inclusion among these farmers remains low due to challenges such as limited access to credit, inadequate financial literacy, dependency on informal financial systems, and insufficient institutional support. Key factors positively influencing financial inclusion include extension services, education, access to markets, farming experience, and participation in farmer groups. The PSM analysis indicated that financial included farmers tend to experience better welfare outcomes, such as higher dietary diversity, increased ownership of livestock and assets, and improved food security compared financially excluded farmers.

The study suggests enhancing extension services with tailored financial awareness programs, expanding access to microcredit and microinsurance tailored for smallholder farmers, and introducing targeted financial literacy initiatives. These strategies could enhance resilience, encourage investments in productive activities, and contribute to improved welfare for smallholder farmers in the Eastern Cape region.

Keywords: Multidimensional financial inclusion, smallholder farmers, financial literacy, vulnerable group theory, food security

CHAPTER 1: INTRODUCTION

1.1. Background of the Study

The agricultural sector is a vital vehicle toward achieving several Sustainable Development Goals (SDGs), such as ending poverty (SDG 1) and hunger (SDG 2). The sector accounts for 4% of the world's gross domestic product (GDP) and more than 25% of the GDP of developing nations (Abraham & Pingali, 2020; World Bank, 2022). Globally, the agricultural sector employs approximately 1.3 billion people (FAO, 2024). Moreover, the sector is estimated to have a market value of over \$3.2 trillion as of 2024 (Agriculture Market Report, 2024).

In Sub-Saharan Africa (SSA), agriculture holds significant socio-economic importance, serving as both an economic engine and a vital support system for the livelihoods of millions of households (Egbetokun & Fraser, 2023). The sector contributes approximately 17% to the region's GDP and employs nearly 43% of the working population, making it one of the largest and most labour-absorbing sectors in SSA (Statista, 2022). In many SSA countries, agriculture's contribution exceeds 30% when agro-processing, informal trading, and agricultural services are considered. Smallholder farmers dominate the agricultural landscape in SSA, constituting close to 80% of the farming population and providing as much as 90% of domestically produced food in some countries (Kamara et al., 2019). Smallholders play a fundamental role in sustaining rural livelihoods, preventing extreme poverty, and enhancing local food security systems through diverse cropping patterns, livestock production, and mixed farming systems (Kamara et al., 2019). However, despite this centrality, agricultural productivity in SSA remains relatively low compared to global averages. Yield gaps are widening, poverty levels remain high among rural households, and vulnerability to climatic, economic, and market-related shocks continues to erode the sector's resilience (Bagheramiri & Keshvarz, 2020).

The South African agricultural sector mirrors these global and regional patterns but displays a unique dualistic structure deeply rooted in the country's apartheid history. South Africa's agricultural sector contributed approximately 13% (R117.5 billion) to national GDP in 2023, reflecting its continued economic significance (Statista, 2023). The sector also plays a key role in employment, rural development, food supply, and export earnings, particularly in high-value

commodities such as fruits, wine, maize, and livestock products. However, the sector remains characterised by a stark divide between a highly mechanised, capital-intensive commercial farming subsector and many under-resourced smallholder farmers, mostly operating in former homeland areas. Commercial farmers control most of the arable land, dominate national markets, possess advanced technological capabilities, and make significant contributions to agricultural exports. By contrast, smallholder farmers account for a growing share of agricultural households, face limited access to land, water, financial services, extension support, and markets (Aliber & Cousins, 2013; Buchana et al., 2025; Jonas et al., 2025). This dualism continues to shape agricultural outcomes, reinforcing historic inequalities and constraining the ability of smallholders to participate meaningfully in high-value agricultural value chains.

Despite numerous government-led interventions aimed at strengthening smallholder agriculture, including land reform, input subsidy programmes, extension services, and rural development initiatives, financial inclusion and financial resilience remain among the most critical impediments to smallholder farmers' productivity and welfare outcomes, such as improved productivity, food security and asset ownership. In South Africa, policies such as the Comprehensive Agricultural Support Programme (CASP), the Micro-Agricultural Finance Institutions of South Africa (MAFISA), and the Smallholder Support Programme were explicitly designed to expand access to credit, markets, and extension services. However, evidence shows that the majority of smallholder farmers continue to operate in cash-based, informal environments with limited access to formal credit, savings, insurance, or digital financial services (Aliber & Hall, 2012; Cousins, 2015; Jonas & Christian, 2025).

Financial inclusion is widely recognised as a driver of poverty reduction and economic development (Ozili, 2020). Over the past decade, the proportion of adults holding bank accounts has increased globally from 51% in 2011 to 76% in 2021 (Demirgüç-Kunt et al., 2022). However, despite progress, over 1.4 billion people worldwide remain unbanked (Shipalana, 2019). These discrepancies are most prominent among low-income individuals and rural communities such as smallholder farmers, highlighting the ongoing challenge of achieving equitable financial access (Shipalana, 2019). Traditional metrics typically focus on the ownership of financial products, neglecting more profound indicators of genuine financial inclusion, such as resilience. Financial inclusion is a multifaceted concept that extends beyond

mere access to bank accounts, and this paper argues for multidimensional financial inclusion to improve farmers' welfare. Multidimensional financial inclusion entails the utilisation, quality, affordability, financial resilience, and capacity to use financial services to enhance one's quality of life (Cáamara & Tuesta, 2014). It goes beyond access alone and integrates a holistic approach to financial inclusion, which is vital as the smallholder farming sector faces numerous challenges, including climate shocks. Even though there has been national advancement in broadened financial access in South Africa, with 76% of adults utilising formal financial services in 2021, numerous smallholder farmers still depend significantly on informal systems, function in cash-driven settings, and face challenges in obtaining credit, savings, insurance, and digital financial services (World Bank, 2024; Jonas et al., 2025).

Lack of access to credit and financial services constrains the purchase of key inputs such as fertilisers, seeds, irrigation infrastructure, and livestock feed, thereby reinforcing low agricultural productivity (Abraham & Pingali, 2020; Buchana et al., 2025; Phakathi & Sinyolo, 2025). Without access to savings instruments or insurance, farmers are highly vulnerable to shocks, resulting in unstable incomes, reduced food consumption, and a reliance on negative coping strategies, such as asset depletion, distress sales, or reduced dietary diversity. Financial exclusion also restricts participation in formal value chains, as farmers struggle to meet the quality, quantity, and consistency requirements of high-value markets (Jonas & Christian, 2025). Thus, multidimensional financial inclusion is crucial in alleviating poverty among smallholder farmers, as this sector has been identified as a key vehicle toward achieving the SDG goals of reducing poverty and hunger.

In South Africa, the Eastern Cape is widely recognised as the most impoverished province, characterised by high levels of poverty, unemployment, and underdevelopment (Stats SA, 2020). In particular, Makhanda, formerly known as Grahamstown, faces significant issues related to poverty, unemployment, and food insecurity. Therefore, agriculture in Makhanda has emerged as a critical strategy for addressing food insecurity and promoting sustainable livelihoods, particularly in the town's poorer communities (Ngumbela, 2021). However, limited multidimensional financial inclusion continues to undermine agricultural growth and rural livelihoods, highlighting a persistent gap between policy and the lived realities of smallholder farmers, thus remaining unable to build resilience or transition into sustainable, market-integrated production systems.

1.2. Problem Statement

Financial inclusion and resilience are crucial for smallholder farmers. However, because agricultural production is inherently risky, given the increasing effects of climate change, access to financial inclusion alone is insufficient. Farmers also need to be resilient in difficult times because, in the absence of resilience, smallholder farmers often find it more challenging to adopt improved agricultural inputs, such as fertilisers, irrigation equipment, and seeds, which lower productivity and reduce yields (Mapanje, 2003; Savoy, 2022; Phakathi et al., 2021). Moreover, Savoy (2022) highlighted that financial exclusion can impede access to necessary infrastructure, such as transportation facilities, which are crucial for reaching markets and selling crops at competitive prices. Additionally, the inability to store harvested crops correctly often leads to substantial post-harvest losses, forcing farmers to sell the produce immediately at unfavourable prices (Jonas et al., 2025). Furthermore, without financial resources or insurance, smallholder farmers are particularly vulnerable to agricultural shocks caused by climate change, as emphasised by Savoy (2022). Farmers' capacity to engage in economic activity is subsequently hindered, forcing farmers to revert to subsistence farming. In Makhandla, Eastern Cape, a town renowned for its cultural and educational significance, physical water scarcity poses a critical challenge (Makana Municipality, 2021). This problem is exacerbated by farmers' limited access to financial services, which hinders farmers' ability to invest in essential infrastructure, such as water tanks, thereby affecting agricultural resilience and productivity. To promote sustainable farming practices in this area, it is imperative that financial obstacles be addressed.

According to Ozili (2020), the vulnerable group theory of financial inclusion posits that a country's financial inclusion measures should prioritise the weaker sectors of society, such as the elderly, women, and the marginalised, such as smallholder farmers, that bear the greatest burden of economic crises and suffering. According to the theory, prioritising vulnerable individuals in the formal financial system is critical because these individuals are frequently the most affected by financial crises and economic downturns, such as smallholder farmers (Ozili, 2020). These measures must be implemented sustainably and responsibly in a controlled environment (Shihadeh, 2021). This is because marginalised groups in society, such as women, the elderly, and individuals with low incomes, are forced to rely on limited resources to meet basic needs (Shihadeh, 2021).

To quantify and address these issues, a comprehensive, multifaceted index (such as a multidimensional financial inclusion index) is needed that encompasses the various aspects of resilience and financial inclusion. The method provides a deeper insight into the challenges smallholder farmer's encounter. Therefore, this study aims to assess the impact of multidimensional financial inclusion on the welfare of farmers, addressing the following two research questions.

1. What factors influence the access to multidimensional financial inclusion among smallholder farmers in Makhanda, South Africa?
2. What impact does financial inclusion have on farmers' welfare (such as food security and asset ownership)?

1.3. Research Goals

The primary objectives were to measure the level of financial inclusion among smallholder farmers in South Africa using a Multidimensional Financial Inclusion Index (MFII) and to evaluate whether financial inclusion affects household welfare outcomes, such as food security, livestock ownership, and asset ownership, as a proxy for wealth. To achieve this, the study was guided by the following specific goals:

1. To determine factors influencing access to multidimensional financial inclusion (MFI index) in smallholder farmers in Makhanda, South Africa.
2. To investigate the impact of financial inclusion on farmers' welfare (such as food security and asset ownership).

1.4. Justification of the Study

Agriculture makes a significant contribution of 25% GDP in developing countries and is crucial to achieving the Sustainable Development Goals. However, smallholder farmers have limited economic potential and are more vulnerable to financial shocks due to weak access to multidimensional financial inclusion. This study focused on Makhanda to highlight the unique challenges that smallholder farmers face in South Africa's poorest region. The findings will contribute to the broader discussion about financial inclusion, providing stakeholders and

policymakers with the knowledge to develop more effective programs for assisting excluded groups.

Furthermore, the study aimed to contribute to a more comprehensive understanding of multidimensional financial inclusion by gathering primary data through questionnaires and interviews. Additionally, the study sought to adopt and apply a comprehensive financial inclusion measurement among smallholder farmers. Unlike previous studies, such as Mhlanga & Dunga (2020) and Akande et al. (2023), which focused on access, usage, and availability, this study incorporated additional indicators to measure financial inclusion more comprehensively. Traditional financial inclusion measures often focus on a single dimension, such as access to a bank account; however, a multidimensional index considers multiple dimensions to provide a more comprehensive view of financial inclusion (Cáamara & Tuesta, 2014). Therefore, by utilising the MFII, the study aimed to identify and understand the heterogeneous complexities that hinder marginalised communities from achieving financial security and resilience. Few studies, particularly in South Africa, have utilised the multidimensional financial inclusion index to comprehend the heterogeneous complexities that hinder marginalised communities, such as smallholder farmers (Matsebula & Yu, 2020; Akande et al., 2023). The MFII has been used in previous studies in Nigeria and Eswatini to assess various dimensions of financial inclusion, including access, usage, literacy, planning, control, resilience, and overall financial health (Adegbite et al., 2021; Nkambule, 2022; Ayinde et al., 2024).

1.5. Structure of the Thesis

This thesis is structured into seven chapters, each focusing on an important aspect of the research process. The first chapter provides the background and context of the study, outlines the problem statement, and explains the research objectives, as well as the rationale for conducting the research. Chapter two offers an overview of the Agricultural Sector. This chapter reviews existing literature on the agricultural sector both globally and within South Africa, investigates the dual nature of South Africa's agricultural landscape, defines smallholder farmers, and examines the roles played by home gardeners and cooperatives. It wraps up with a summary of the key findings. Chapter Three outlines the conceptual and theoretical frameworks that underlie the study. It defines financial inclusion and financial resilience, and presents the theoretical foundations of the research, including Public Good

Theory, Institutional Theory, and Vulnerable Group Theory. The chapter details various methods for measuring financial inclusion and resilience, addresses challenges that smallholder farmers encounter, reviews relevant policy interventions, and analyses the factors affecting multidimensional financial inclusion. A summary of the theoretical implications concludes this chapter.

Chapter four details the methodological approach and research paradigm that drive the study. It outlines the study's location, the data collection methods (questionnaires and focus group discussions), and the empirical techniques utilised. These include creating the Multidimensional Financial Inclusion (MFI) index, descriptive statistics, Poisson and Probit models, as well as Propensity Score Matching (PSM). The chapter concludes with a summary of the methodology. Chapter 5 presents a descriptive analysis of the collected data. It reviews the levels of financial inclusion and resilience among smallholder farmers, followed by an assessment of socio-demographic characteristics, farming-related factors, and welfare indicators, including food security, dietary variety, assets, and livestock ownership. The chapter concludes with a summary of the descriptive results. Following that, Chapter 6 presents the empirical results derived from the Poisson, Probit, and PSM models. It begins with an overview of key factors influencing multidimensional financial inclusion, followed by the model's results and interpretations. This chapter also presents matching quality and sensitivity analysis outcomes from PSM and wraps up with a summary of the primary empirical results. The final chapter revisits the research aims and condenses the key discoveries from the study. It draws conclusions based on the empirical findings, proposes policy and practical recommendations, and acknowledges the study's limitations. The chapter ends by proposing directions for future research.

CHAPTER 2: OVERVIEW OF AGRICULTURAL SECTOR LITERATURE REVIEW

2.0. Introduction

Chapter 2 provides an overview of the agricultural sector discussing the importance of the sector for millions of individuals. The chapter then narrows its focus to South Africa, outlining the structure and performance of the national agricultural sector before examining the historically entrenched dualism that distinguishes a well-resourced commercial farming subsector from a structurally disadvantaged smallholder subsector. This discussion leads to a clarification of how smallholder farmers are defined in the South African context, emphasising the heterogeneity in terms of resource access, market participation, and production objectives. The chapter further discusses important categories of small-scale agricultural activities, including home gardening and agricultural cooperatives, highlighting the roles they play in household food security, income generation, and community-based economic development.

2.1. An Overview of the Role of the Agricultural Sector

The agricultural sector remains central to global employment and livelihoods, particularly in developing economies. In 2023, agriculture, forestry and fishing employed around 916 million people, representing 26.1% of total world employment, and when broader agri-food systems are included, as many as 1.23 billion people work within agri-food value chains while 3.8 billion depend on this sector for livelihoods (FAO, 2025; FAO, 2024). The agricultural sector contributes below 2% of GDP in high-income economies but exceeds 25% in low-income agrarian states, where it also dominates employment (FAO, 2023; World Bank, 2024).

More than 570 million farms exist worldwide, of which 84% are smaller than 2 hectares, yet these small farms control only 12% of global agricultural land (Lowder et al., 2016; Ritchie, 2022). Despite this imbalance, smallholders produce approximately one-third of the world's food, making a significant contribution to domestic food systems in the Global South (FAO, 2021). This dualistic structure where many farmers operate small plots with limited resources explains persistent financial exclusion in the sector. Smallholder farmers face systematic barriers to formal finance due to lack of collateral, irregular cash flows, high transaction costs for small loans, and perceived risk by financial institutions (Chisasa & Makina, 2013; Kirsten, 2017). Yet these same households experience critical financial needs: seasonal income patterns create liquidity constraints during planting seasons, weather shocks and price volatility generate income risk requiring insurance and emergency credit, and investments in

productivity-enhancing inputs require access to affordable credit. The mismatch between financial needs and financial access makes agricultural households particularly vulnerable to poverty traps and welfare shocks (CBN, 2025).

In Sub-Saharan Africa, these dynamics are especially pronounced. In Nigeria, the sector contributed between 24.45% and 25.70% of GDP between 2016 and 2020 (African Development Bank, 2023). Ethiopia's agriculture employs a substantial share of the workforce, with crop production accounting for 65% of agricultural GDP and livestock 25% (International Trade Administration, 2024). In Tanzania, agriculture employs three-quarters of the workforce and accounts for more than 30% of GDP (International Trade Administration, 2022). However, the region faces compounding challenges: the colonial legacy favoured export commodities over local food production, undermining sustainable practices and displacing smallholder farmers (Bjornlund et al., 2021). Contemporary obstacles include climate change with erratic weather patterns, inadequate infrastructure hindering product marketing, limited access to finance and credit for smallholders, and absence of robust extension services (Shimeles et al., 2018; Adeniyi, 2010). These barriers simultaneously constrain agricultural productivity and household welfare while limiting financial inclusion creating a context where expanding access to financial services could yield substantial welfare gains if services are appropriately designed for agricultural livelihoods.

2.2. South Africa's Agricultural Sector

2.2.1 Dual Nature of the Agricultural Sector in South Africa

South Africa's agricultural economy remains deeply divided, characterised by a capital-intensive commercial sub-sector alongside a large, resource-constrained smallholder sub-sector. This inequality stems from historical factors such as land dispossession, spatial fragmentation, and unequal state support (Meza et al., 2021). Commercial producers benefit from strong market connections, assets that can be used as collateral, and customised financial products (Chisasa & Makina, 2013; Kirsten, 2017). In contrast, smallholders, particularly those in former homeland regions, face significant barriers to accessing formal credit, insurance, savings, and digital payment systems (Chisasa & Makina, 2013; Kirsten, 2017).

Initiatives like CASP, MAFISA, and more recently introduced blended finance instruments were intended to combat rural financial exclusion (Department of Agriculture, Forestry and Fisheries, 2005; National Treasury & GTAC, 2014). However, their impact has been

inconsistent due to administrative challenges, demanding collateral requirements, and weak integration into value chains in remote areas (Department of Agriculture, Forestry and Fisheries, 2005; National Treasury & GTAC, 2014). While national surveys indicate a high rate of account ownership, rural smallholders who largely operate in cash-driven settings continue to depend heavily on informal financial network (World Bank, 2024). Usage of formal financial services remains limited, with aspects such as quality and resilience failing to meet adequate standards. This gap highlights the importance of employing a multidimensional framework for measuring inclusion that goes beyond mere access and considers usage, service quality, financial literacy, and resilience.

Ultimately, smallholders' integration into formal financial systems is hindered not only by income and asset disparities but also by institutional and market inefficiencies, lack of information, and trust issues. These factors are essential components of Institutional Theory and the Vulnerable Group Theory covered in Chapter 3.

2.2.2 Defining Smallholder Farmers

Smallholder farming can be defined in various ways, depending on the context. The diverse topography, agroecology, socioeconomic conditions, and population dynamics across Africa result in a wide range of smallholder farming systems (Kamara et al., 2019). Definitions and characteristics of these systems can vary significantly depending on the specific region and context. Globally, smallholder farms are typically defined as farmers with two hectares or less of land and annual agricultural sales ranging from \$1,000 to \$250,000 (Bagheramiri & Keshvarz Shaal, 2020). In sub-Saharan Africa, farms with less than two hectares of land account for over 78% of all farms and contribute to approximately 90% of the region's agricultural output in certain areas (Kamara et al., 2019). It's essential to recognise that while land area is a key factor in identifying smallholder farms, other factors, such as labour availability, resource access, and market orientation, also play a crucial role. Hence, there is no standard or universal definition.

According to Kristen & Van Zyl (1998), in South Africa, the "conventional" definition of smallholder farming was small-scale farming in the former homelands, which was equated with non-commercial and unproductive subsistence agriculture. This 'conventional' definition was combined with the presumption that white farmers are seen as large-scale commercial farmers that are modern, efficient, and use advanced technologies, in contrast to black farmers, as a result of apartheid as discussed above (Kristen & Van Zyl, 1998). This study focuses on

market-oriented smallholders: farmers that sell a meaningful share of their output, whether through formal channels such as fresh produce markets and wholesalers, or informal ones including local markets, spaza shops and direct sales to neighbours (Neves, 2020).

2.3.1 Home gardeners

Home gardening involves cultivating a small plot of land close to one's residence, where various vegetables, fruits, herbs, and sometimes small animals are raised for personal use and income generation (Galhena et al., 2013; Khan et al., 2021; Carstens et al., 2021; Mdiya & Mdoda, 2021; Gwacela et al., 2024).

Home gardens are important for household food security and income generation. They provide families with steady access to nutritious foods, enhancing dietary variety and reducing malnutrition (Khan et al., 2021; Galhena et al., 2013). In the Eastern Cape province of South Africa, around 74% of households depend mainly on home gardens for food intake (Mdiya & Mdoda, 2021). Home gardens also generate income through sales of surplus produce, with approximately 20% of Eastern Cape households selling produce locally (Mdiya & Mdoda, 2021).

However, home gardeners face significant limitations. Water scarcity affects nearly 96% of home gardeners in the Eastern Cape (Mdiya & Mdoda, 2021). Approximately 86% lack necessary inputs such as quality seeds, fertilisers, and tools due to inability to afford them and limited access to credit, forcing reliance on traditional farming techniques (Mdiya & Mdoda, 2021; Khan et al., 2021; Gwacela et al., 2024). Additional challenges include soil fertility problems, disease outbreaks, high transportation costs limiting market access, and crop theft due to inadequate fencing (Mdiya & Mdoda, 2021; Gwacela et al., 2024; Carstens et al., 2021). Furthermore, financial exclusion remains a critical constraint preventing investment in productivity-enhancing inputs and technologies.

2.3.2 Co-operatives

Agricultural cooperatives are self-governing organisations where individuals voluntarily come together to fulfill economic and social needs through collectively owned enterprises focused on production, processing, and distribution of agricultural goods (Tefera et al., 2017; Zantsi, 2021; Mbokazi & Maharaji, 2024). South Africa has more than 250 registered agricultural cooperatives spanning crop production, vegetables, and livestock sectors (Ortmann & King, 2006; Christian, 2024).

Cooperatives are important for smallholder support, particularly in improving market access through collective marketing, which aggregates produce, reduces transaction costs, and enhances bargaining power (Sikwela et al., 2016). They facilitate access to inputs such as seeds, fertilisers, and veterinary services, and provide shared infrastructure including storage and processing facilities (Christian, 2024; Nyawo, 2023). Cooperatives also serve as platforms for training and knowledge exchange, helping farmers strengthen resilience (Nyawo, 2023).

However, cooperatives face persistent limitations. Weak governance, limited financial management capacity, and inconsistent member participation undermine performance (Tefera et al., 2017; Rena, 2017; Zantsi, 2021; Mbokazi & Maharaji, 2024). Most critically, limited financial inclusion constrains cooperative effectiveness. Most South African cooperatives cannot provide credit or savings services to members due to limited capitalisation, inadequate creditworthiness, and absence of financial instruments tailored to cooperative structures (Nyawo, 2023; Ortmann & King, 2006). Limited working capital constrains investment in productivity-enhancing assets (Mbokazi, 2024). Consequently, only well-functioning cooperatives can meaningfully enhance members' financial access and resilience, while most remain unable to fulfill this bridging function between smallholders and formal financial systems.

2.3. Summary

This chapter provided an overview of the agricultural sector. The focus then shifted to the agricultural landscape in South Africa, detailing its structure, contribution to the national economy, and the notable duality that distinguishes large-scale commercial farming from smallholder and subsistence farming. This dual nature influences resource distribution, market access, productivity rates, and the vulnerability of rural households. Additionally, the chapter examined the definition and characteristics of smallholder farmers. It distinguished between various categories of smallholders, including home gardeners that primarily produce for personal consumption and cooperatives, which often participate in collective production and market activities. These distinctions highlight the diversity within smallholder farming systems and the unique challenges and opportunities faced by different groups.

CHAPTER 3: THEORETICAL AND EMPIRICAL LITERATURE REVIEW ON FINANCIAL INCLUSION

3.0. Introduction

Financial inclusion has emerged as a critical driver of economic participation, poverty reduction, and resilience among marginalised groups, particularly smallholder farmers. The chapter begins by defining financial inclusion and financial resilience, highlighting the importance of the two concepts within agricultural and rural development. The chapter then outlines the theoretical framework underpinning the study, drawing on Public Good Theory, Institutional Theory, and the Vulnerable Group Theory, supported by principles of financial literacy. The theories explain why smallholder farmers often remain excluded and how institutional structures, socio-demographic characteristics, and behavioural factors shape financial participation. The chapter further discusses the measurement of financial inclusion using a multidimensional approach, the measurement of financial resilience, and the challenges that hinder smallholder farmers' ability to access, use, and benefit from financial services. In addition, the chapter examines the factors influencing multidimensional financial inclusion, including gender, age, education, marital status, occupation, household income, access to information, and land ownership. The chapter then concludes by reviewing the policies and programmes implemented to enhance financial inclusion for smallholder farmers in South Africa, before discussing how multidimensional financial inclusion impacts welfare outcomes such as food security, asset accumulation, and resilience.

3.1. Defining Financial Inclusion and Resilience

The concept of financial exclusion, or the inability to obtain necessary financial services, predates the more contemporary term "financial inclusion" (Ravikumar, 2020). It was first proposed by British geographers in the early 1990s (Mhlanga & Dunga, 2020). Initially, the emphasis was on the physical inaccessibility of financial services, particularly in rural and remote areas (Mhlanga & Dunga, 2020). As the research developed, it became clear that financial exclusion is a complex issue driven by a variety of social, cultural, and institutional factors (Sarma, 2016; Mhlanga & Dunga, 2020). These factors included limited access to various financial services, such as banking, savings, credit, and insurance (Sarma, 2016;

Mhlanga & Dunga, 2020). The understanding of the negative consequences of financial exclusion led to the development of the concept of financial inclusion.

The term "financial inclusion" lacks a universally agreed-upon definition. While various interpretations exist, a common thread emerges that encompasses increasing access to, availability of, and usage of formal financial services for individuals and businesses. This includes a range of services such as credit, insurance, savings, and payment systems. Sarma (2016) defines financial inclusion as the process of ensuring that all members of an economy have easy access to, availability of, and use of the formal financial system. Mutambara (2016) provides a similar definition, emphasising the provision of affordable financial services to the majority of the population, allowing individuals to generate revenue and increase economic welfare. A widely accepted definition, shared by Demirgüç-Kunt et al. (2019), Ozili (2020), Ravikumar (2020), Abel et al. (2020), and Ayinde et al. (2023), posits that financial inclusion is the capacity of individuals and businesses to obtain a variety of acceptable, reasonably priced, and sustainably provided financial services. However, an individual must be financially resilient in order to be sustainable, as it plays a crucial role in promoting economic development and social well-being.

Financial resilience, which has gained popularity in both academic and policy circles, refers to an individual's, household's, or organisation's ability to resist, adapt to, and recover from financial shocks and pressures (Salignac et al., 2019). Several scholars have provided definitions of financial resilience, each highlighting a different component of the idea. For example, Zahedi et al. (2021) define financial resilience from an organisational standpoint, emphasising the ability to navigate and emerge stronger from financial crises. This viewpoint prioritises strategic agility, risk management, and decisive action. In contrast, many experts concentrate on individual and household financial resilience. Jayasinghe et al. (2020), using Muir et al.'s (2016) approach, define financial resilience as a multidimensional construct. This approach highlights four critical resource dimensions, including economic resources, financial products and services, financial knowledge and behaviour, and social capital (Jayasinghe et al., 2020). Similarly, Salignac et al. (2019) and Liu and Chen (2023) emphasise the importance of internal strengths and external resources in handling financial difficulties. Bialowolski et al. (2022) provide a more explicit definition, emphasising the ability to sustain a predetermined amount of savings. Bialowolski et al. (2022) claim that having savings equivalent to at least three months of income is a significant predictor of financial resilience. Zeka & Alhassan

(2023) offer a broader definition that includes access to financial products and services, financial literacy, and financial behaviours. From a macroeconomic standpoint, the World Bank (2023) defines financial resilience as the ability to raise emergency finances. This broader approach emphasises a country's overall economic health and its ability to respond to financial crises. Thus, for an individual to be financially included, financial resilience is a crucial component of multidimensional financial inclusion. For the purposes of this study, we adopt the definition provided by Salignac et al. (2019), which defines financial resilience as an individual's ability to utilise internal strengths and external resources to overcome financial difficulties. This allows individuals to recover from setbacks, adapt to changing situations, and deal with environmental stressors (Salignac et al., 2019). The next section provides a theoretical framework for understanding multidimensional financial inclusion.

3.2. Theoretical Framework

3.2.1 Public Good Theory

The theory of public goods regarding financial inclusion posits that formal financial services ought to be available to all individuals and regarded as a public good, benefiting both individuals and society by promoting equality, economic stability, and inclusive development (Ozili, 2020; Damara et al., 2023; Khan & Khan, 2023). The Mzansi account, which was introduced by the South African government in 2004, is an example of a public good in terms of financial inclusion (FinMark Trust, 2009). This account was created as an affordable banking option designed to enhance financial inclusion for individuals that are unbanked or underbanked (FinMark Trust, 2009). A fundamental feature of public goods is the non-excludability and non-rivalry, which implies that one individual's use does not reduce accessibility for others (Khan & Khan, 2023). Viewing financial inclusion as a public good highlights the need to provide access for all, particularly for marginalised communities and small enterprises, to achieve economic equality and reduce financial inequalities (Damara et al., 2023; Khan & Khan, 2023). Numerous research projects have utilised the public good theory to understand financial inclusion. For example, Kouladoum et al (2023) and Khan and Khan (2023) employed this theoretical perspective to investigate the effect of financial inclusion on reducing poverty in developing countries. According to Demirgüç-Kunt and Klapper (2020) and Khan & Khan (2023), conceptualising financial inclusion as a public good

provides both short-term and long-term benefits, including greater access to credit and financial services that empower individuals, along with increased financial literacy and development that help tackle income inequality and lower poverty levels. However, despite its emphasis on the advantages of financial inclusion, the public good theory has several limitations.

The first limitation is that viewing financial inclusion as a public good ignores the root causes of financial exclusion, including systemic disparities, institutional barriers, and a lack of financial literacy (Ozili, 2020). A key challenge encountered by the Mzansi account initiative was its poor performance, primarily due to a substantial number of accounts becoming inactive as a result of insufficient consumer financial education and low-income users rapidly exhausting the funds due to a lack of trust in banks (FinMark Trust, 2009). Secondly, considering financial inclusion as a public good places a significant financial strain on governments and taxpayers, since it assumes that financial services ought to be provided at no cost (Ozili, 2020). Thirdly, public funding for financial inclusion may divert resources from other vital areas, such as healthcare and education, particularly in resource-constrained contexts (Kouladoum et al., 2023). Even with government support, offering free access is frequently unfeasible, particularly in developing economies where financial institutions rely more on private funding than public money (Kouladoum et al., 2023). However, reliance on private funding obstructs the execution of the public goods model (Khan and Khan, 2023).

Therefore, while the public good theory emphasises the shared benefits of financial inclusion, its implementation is limited by financial, structural, and sustainability obstacles. Thus, a more comprehensive framework that integrates contributions from both the public and private sectors is essential for promoting equitable and sustainable financial inclusion, particularly in developing countries.

3.2.2 Institutional Theory

While the public good theory of financial inclusion provides an important foundation by viewing access to financial services as a collective good that generates positive externalities for society, its explanatory power is limited by its narrow focus on supply-side provision and market failures. Public good theory posits that financial exclusion primarily stems from the under-provision of financial services, resulting from high costs, asymmetric information, or

limited incentives for private financial institutions to serve marginalised groups (Ozili, 2023). However, this perspective overlooks the broader social, regulatory, and institutional environments that shape financial behaviour. It does not sufficiently account for why individuals may distrust formal institutions, why regulatory structures perpetuate exclusion, or how normative and cultural constraints influence financial decisions (Ozili, 2023). Consequently, the public good lens alone cannot capture the complexity of financial inclusion dynamics in contexts characterised by historical inequality, institutional fragmentation, or weak governance structures.

Institutional theory provides a more comprehensive framework by emphasising the role of both formal and informal institutions in shaping financial inclusion outcomes. According to Ozili (2023) and Saifurrahman & Kassim (2023), individuals' decisions to participate in or disengage from the financial system are influenced by experiences with institutional arrangements such as laws, regulations, enforcement mechanisms, cultural norms, and community networks. These institutional structures determine the incentives, constraints, trust levels, and perceived legitimacy of financial services. For instance, weak regulatory environments, bureaucratic procedures, or inconsistent enforcement can undermine confidence in financial institutions, discouraging participation even when services are physically available. Likewise, informal institutions such as social capital, collective norms, or culturally embedded saving practices may either complement or substitute for formal financial mechanisms. Empirical evidence suggests that institutional quality is positively correlated with financial inclusion outcomes, as strong institutions facilitate effective contract enforcement, reduce transaction costs, foster trust, and provide a predictable environment that encourages financial engagement (Ozili, 2023; Saifurrahman & Kassim, 2023). Thus, institutional theory advances the understanding of financial inclusion by situating individual financial choices within a broader socio-institutional context, addressing gaps left by public good theory and offering a more realistic account of persistent financial exclusion.

Previous research studies show that the quality of institutions is essential for achieving financial inclusion. For instance, Mutambara (2016), Evans (2018), Xu (2020), and Ali et al (2021) highlight the significance of institutions in achieving financial inclusion goals. For example, Mutambara (2016) explored the impact of government agency policies, financial institution practices, and agricultural organisation strategies on smallholder farmers' access to financial

inclusion. The results indicated that a significant number of farmers' distrust of banks originates from previous experiences, which have led farmers to be reluctant to engage with formal financial services (Mutambara, 2016). Another barrier noted by Syofyan et al (2022) is the informational challenges encountered by both individuals and organisations seeking formal financial services, resulting in financial exclusion. For instance, many people might not possess the understanding of how to utilise these services, whereas some may be unaware of particular requirements or circumstances that hinder individuals from obtaining banking access (Ozili, 2023). Additionally, certain customers may be unaware of potential risks and limitations, including discrimination based on income and ethnicity, potential losses resulting from bank failures, or higher fees associated with different transactions (Ozili, 2023). This absence of information can pose major challenges to financial inclusion. These findings highlight the significance of systemic changes and efforts to build trust, demonstrating how institutional structures can influence financial behaviours (Mutambara, 2016).

However, the institutional theory alone does not provide an adequate account for financial inclusion in this research. The theory primarily emphasises how institutional interactions impact the choice to participate in the formal financial sector but fails to address the structural inequalities and systemic obstacles that perpetuate financial exclusion, especially for marginalised populations, such as smallholder farmers (Ozili, 2023; Saifurrahman & Kassim, 2023). For instance, differences in gender, costs of financial services, and wider socioeconomic issues such as poverty, inadequate infrastructure, and cultural expectations can unfairly impact specific groups (Ozili, 2023). Ultimately, a more comprehensive approach is necessary to adequately address the research questions posed in this study. The vulnerable group theory and the financial literacy theory capture the socioeconomic and behavioural impacts on financial inclusion and resilience. This framework gives a deeper understanding of the distinct challenges faced by smallholder farmers.

3.2.3 Vulnerable Group Theory and Financial Literacy Principles

The vulnerable group theory of financial inclusion emphasises the importance of targeting marginalised groups such as women, seniors, and less fortunate individuals. The vulnerable group theory of financial inclusion posits that governments should prioritise initiatives targeting marginalised groups, such as women, seniors, and less fortunate individuals (Ozili, 2020). These initiatives should be carried out in a controlled setting, in a responsible and

sustainable manner (Shihadeh, 2021). Vulnerable groups are often forced by financial exclusion to rely on a limited number of resources to meet financial needs. This can undermine financial security and restrict social mobility by developing a dependence on unregulated and frequently exploitative financial services such as loan sharks (Shihadeh, 2021). Financial exclusion increases poverty by limiting access to capital. This makes it more difficult to cope with economic shocks and hinders activities that generate revenue (Shihadeh, 2021). Limited access to credit hinders innovation, productivity, and resilience to climate change in the rural and agricultural sectors (Shihadeh, 2021). Furthermore, a lack of financial inclusion can hinder a country's progress, as it has the potential to boost economic growth and alleviate poverty (Shihadeh, 2021). Therefore, by providing access to capital, financial inclusion can stimulate job creation and reduce vulnerability to shocks (Shihadeh, 2021).

Once an individual has access to financial resources, financial literacy is crucial. Financial literacy refers to the ability to comprehend financial concepts and practices, enabling individuals to make informed and informed financial decisions (Demirgüç-Kunt et al., 2019). This idea emphasises the necessity of providing individuals with the knowledge and skills needed to understand financial products and services, thereby improving the capacity to make informed financial choices (Sarma, 2016). Whereas the vulnerable group theory suggests that financial inclusion efforts should focus on marginalised segments of society, such as the poor, women, and the elderly, as these populations encounter greater difficulties in times of economic decline and financial strain (Ozili, 2020). Thus, enhancing financial literacy in these disadvantaged groups is a crucial approach for empowering the marginalised and promoting financial inclusion.

Enhancing financial literacy raises awareness of the access and benefits of formal financial services, encouraging people, particularly from underprivileged backgrounds, to establish formal accounts (Kovács & Terták, 2019). This can enhance people's financial well-being by providing access to secure and dependable financial services (Ozili, 2020). Additionally, individuals with financial literacy can utilise offerings from the formal financial sector, including investment options and mortgage services, to enhance financial security and development (Ibor, 2023). Additionally, financial literacy equips individuals with the essential knowledge and skills to achieve self-reliance and economic security (Ozili, 2020; Ibor, 2023). It instructs people on how to differentiate between essential needs and desires, manage

finances, set aside money for upcoming expenses, and prepare for long-term objectives such as retirement (Ozili, 2020). Essentially, financial literacy boosts economic stability and improves household welfare (Ibor, 2023). This approach provides numerous advantages, and multiple research projects have utilised financial literacy theory and vulnerable group theory to examine financial inclusion.

For example, Zeka & Alhassan (2023), together with Reddy et al (2024), utilised the financial literacy theory to examine financial inclusion. These studies emphasise the significance of financial literacy in promoting financial inclusion and resilience, particularly for vulnerable populations, such as micro, small, and medium-sized enterprise owners. Zeka & Alhassan (2023) demonstrated that financial literacy has a statistically significant positive impact on three key areas of financial inclusion, including access, usage, and the quality of financial services. The findings suggest that individuals with higher financial literacy are more likely to interact with formal financial institutions, utilise a wider range of financial services, and derive greater benefits (Zeka and Alhassan, 2023). This highlights the significant effect of financial education in closing financial inclusion gaps (Zeka and Alhassan, 2023). These findings reinforce the financial literacy theory as a basis for analysing and tackling obstacles to financial inclusion (Reddy et al., 2024). Consequently, incorporating the financial literacy theory and the vulnerable group theory offers a comprehensive framework for examining the multidimensional financial inclusion index for smallholder farmers.

Table 1.1 and Figure 3.1 summarises and presents an integrated theoretical framework that demonstrates how multiple theoretical perspectives collectively explain the mechanisms through which financial inclusion can enhance the welfare of smallholder farmers. Public Choice Theory conceptualises financial inclusion as a public good that generates positive externalities, thereby requiring coordinated state action to overcome market failures and ensure the provision of accessible financial services in rural areas (Musgrave & Musgrave, 1989). Yet access alone is insufficient, and Institutional Theory extends the analysis by emphasising that farmers' financial decisions are shaped by the quality of formal institutions such as regulatory systems, legal frameworks, financial governance and informal institutions, including social norms, trust, and cultural expectations, all of which influence participation in the formal financial sector (North, 1990; Ozili, 2023). Vulnerable Group Theory further situates smallholder farmers as structurally disadvantaged actors exposed to multidimensional

vulnerabilities such as climatic shocks, income instability, and weak market power, which both heighten the need for financial services and constrain access to them (Moser, 1998). Literacy Theory complements these insights by highlighting that financial literacy is essential for converting access into effective use, enabling informed decision-making and improving financial behaviour (Lusardi & Mitchell, 2014). Collectively, these theoretical strands explain how financial inclusion enhances financial capability, which in turn strengthens financial resilience and leads to improved welfare outcomes, including higher incomes, enhanced food security, and reduced poverty among smallholder farmers.

Table 3.1: Integrated Theoretical Framework for Multidimensional Financial Inclusion.

Theoretical Foundation	Core Proposition	Implications for Smallholder Farmers
Public Choice Theory	Financial inclusion generates positive externalities and behaves like a public good requiring state support.	Highlights the need for collective provision of affordable, accessible financial services in rural areas.
Institutional Theory	Formal and informal institutions (laws, regulations, norms, trust structures) shape financial behaviour and access.	Institutional quality, trust, and regulatory clarity have a significant influence on farmers' willingness to participate in formal financial services.
Vulnerable Group Theory	Vulnerable groups (e.g., smallholders) face structural constraints, increasing exposure to shocks and reducing access to resources.	Recognises smallholders' multidimensional vulnerabilities (income shocks, climate risks, weak market access).
Literacy Theory	Financial literacy empowers individuals to comprehend and utilise financial products and services effectively.	Builds decision-making ability and reduces misinformed choices, improving financial behaviour and uptake.
Financial Inclusion	Access to credit, savings, insurance, mobile money, and payment systems.	Enables farmers to invest, save, insure, and participate safely in financial markets.
Financial Resilience	Ability to withstand, absorb, and recover from shocks (climatic, economic, social).	Strengthens adaptive capacity and reduces vulnerability to income/business disruptions.

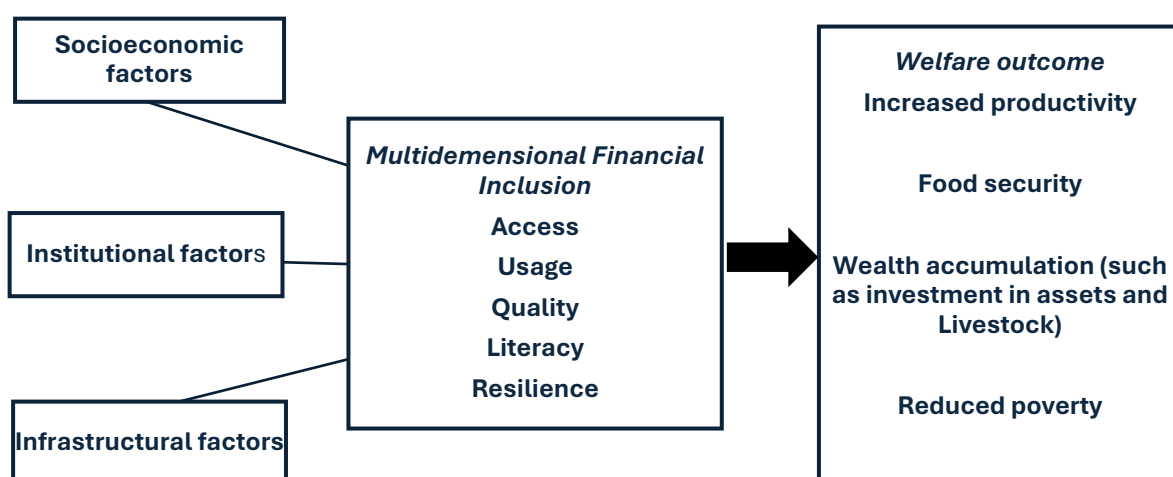


Figure 3.1: Framework for Multidimensional Financial Inclusion

Therefore, financial inclusion is crucial because access to credit and loans empowers individuals to participate in economic growth. By providing crucial financial resources, farmers can invest in high-quality inputs, including seeds, modern equipment, and training programs.

Multidimensional financial inclusion, encompassing access to financial services, effective use, financial literacy, and resilience, lays the groundwork for greater economic engagement among smallholder farmers. Improved financial inclusion facilitates investments in productive assets, such as farming machinery, high-quality inputs, training, and natural resources, necessary for effective agricultural practices. Additionally, financial inclusion permits the acquisition of resources that mitigate risks, such as water tanks, leading to better water security and enhanced capacity to manage climate-related challenges. These investments boost agricultural productivity by promoting more efficient and reliable production methods. Increased productivity results in higher incomes, reduced vulnerability, and greater household stability. Ultimately, this development fosters enhanced welfare outcomes, including improved food security, reduced poverty, increased livestock and crop yields, and overall improved household wellbeing.

3.3. Measuring Financial Inclusion: A Multidimensional Approach

Traditionally, measures of financial inclusion have focused on traditional banking services, such as the quantity of bank accounts, branches, and ATMs, as well as the amounts of credit and deposits (Demirgüç-Kunt et al., 2020). However, over the years, as financial inclusion is studied more, there has recently been a transition toward a broader evaluation of the accessibility, utilisation, and standard of financial services. The Multidimensional Financial Inclusion Index (MFII) is a modern method for measuring financial inclusion. The MFII is a composite measure that represents various aspects of financial inclusion, extending beyond mere access to financial services (Cáamara & Tuesta, 2014). Conventional financial inclusion metrics typically focus on a single aspect, such as having a bank account. However, a multidimensional index considers multiple factors to provide a more comprehensive view of financial inclusion (Cáamara & Tuesta, 2014).

For example, current indicators encompass financial literacy, service affordability, and transaction frequency (Demirgüç-Kunt et al., 2020). Vital data sources, such as the World Bank's Global Findex and FinScope, have played a crucial role in gathering this data and guiding targeted financial inclusion efforts. The Global Findex, for instance, provides a detailed examination of financial inclusion by measuring key indicators, including account ownership, the use of digital payments, saving and borrowing behaviours, and financial resilience (World Bank, 2019). Similarly, Mhlanga & Dunga (2020) utilised a multidimensional framework to assess financial inclusion, employing various data sources and indicators for an extensive evaluation. The research examined several aspects of financial inclusion, including cost, quality, availability, usage, and accessibility. To construct the index, Sarma's index was applied. Sarma's index ranges from 0 to 1, where a score of 0 signifies total financial exclusion, while a score of 1 indicates full financial inclusion (Mhlanga & Dunga, 2020). In contrast, Adegbite et al. (2021) and Ayinde et al. (2023) developed a multifaceted framework for financial inclusion, comprising three primary components: financial participation, financial capability, and financial well-being. Financial participation refers to the accessibility and usage of financial services (Ayinde et al., 2023).

Financial capability emphasises financial literacy and consumer protection (Ayinde et al., 2023). Financial wellness assesses an individual's overall financial condition, including the

ability to manage finances and address financial challenges (Ayinde et al., 2023). This comprehensive framework provides an integrated perspective on financial inclusion and its impact on individuals and society. To construct the multidimensional index, Ayinde et al. (2023) employed a three-stage standardisation method to develop a multidimensional financial inclusion index (MFII) in conjunction with a welfare index (MWI). The Financial Inclusion Index (FII) was calculated using a weighted average method, ensuring that each indicator had an equal influence on the overall index. Conversely, Adegbite et al. (2021) utilised the Alkire–Foster methodology to create the MFII. Firstly, Adegbite et al. (2021) coded rural smallholder farmers as 1 if the farmers met the criteria for each financial inclusion indicator and 0 otherwise. To ensure that policy efforts do not compensate for achievements in one area with shortcomings in another, the research applied equal weighting across the domains and related indicators, ensuring that the total weights equalled 1. Cámara & Tuesta (2014) focused on three dimensions when measuring financial inclusion, including usage, barriers, and access to financial services, assigning weights to these dimensions through a two-stage principal component analysis (PCA) to compile the MFII. In the initial stage, Cámara & Tuesta (2014) calculated the three sub-indices: usage, barriers, and access, which defined financial inclusion. The second stage involved estimating the weights of the dimensions and the overall financial inclusion index by utilising the dimensions as explanatory variables. Likewise, Sarma (2016) also employed PCA to compile the MFII, with dimensions including banking penetration, availability of banking services, and usage. Notably, numerous studies have utilised PCA to construct the MFII, including Hanivan & Nasrudin (2019), Gharbi & Kammoun (2023), Ejaz & Hasan (2023), Nguyen (2021), and Hmaied et al. (2024).

3.4. Measuring Financial Resilience

Financial resilience must be viewed as a complex concept that extends beyond easy access to financial resources to be accurately measured. Salignac et al. (2019) argue that limiting the concept to a single dimension, such as access alone, makes it more challenging to identify individuals that are most vulnerable to financial shocks and to comprehend the factors that contribute to that vulnerability.

According to Salignac et al (2019), there are four essential elements that should be considered when defining financial resilience. Economic resources, the first component, includes elements

pertaining to money that affect a person's capacity to deal with financial hardship (Salignac et al., 2019). Income levels, savings, debt management, living expenses, and emergency fund-raising capabilities are all included in this (Salignac et al., 2019). The second element is financial products and services, which represent the availability and accessibility of financial services and products that people can use in times of financial difficulty (Salignac et al., 2019). The third component, financial knowledge and behaviour, focuses on individuals' financial literacy, encompassing proactive financial habits, knowledge, beliefs, and skills (Salignac et al., 2019). Increased financial literacy encourages actions that directly contribute to the development of financial resilience, such as seeking financial advice and making confident investment decisions (Salignac et al., 2019). The relational resources that enable people to utilise social networks and contacts to manage financial difficulties are evaluated by the fourth component, social capital (Salignac et al., 2019).

In the same perspective, Liu & Chen (2023) divide financial resilience into four parts, including social capital, financial knowledge and behaviours, financial resources, and financial access. Moreover, these authors also categorise financial resilience into four levels: severe vulnerability, high vulnerability, low vulnerability, and financial resilience. Similar to current assets, the economic resources component includes elements such as income, savings, debt, living expenditures, and emergency money (Liu & Chen, 2023). Current assets are a crucial indicator of short-term financial flexibility in accounting and finance. In line with Salignac et al.'s (2019) emphasis on financial products and services, financial access refers to the ease of access to financial products and services. Similar to the section on financial knowledge and behaviour by Salignac et al. (2019) financial literacy emphasises people's financial understanding and the capacity to successfully navigate the financial system. Last but not least, social capital directly correlates with the fourth component identified by Salignac et al. (2019) and represents the degree of a person's supporting social contacts. On the other hand, financial resilience, as defined by Bialowolski et al. (2022), refers to the ability to maintain one's standard of living in the face of unforeseen financial setbacks.

The development of adequate liquid assets to cover unforeseen costs is essential for this (Bialowoski et al., 2022). Bialowolski et al. (2022) paradigm places a strong emphasis on the savings-to-income ratio, influenced by O'Connor et al. (2019) and Anderloni et al. (2012). Greater resilience is indicated by a larger ratio, which demonstrates a better capacity to tolerate financial shocks and maintain lifestyle stability (Bialowolski et al., 2022). Bialowolski et al

(2022) do, however, warn that having money is not always a sign of resilience because illiquid assets might not provide adequate defence in unexpected financial crises. Although Bialowolski et al (2022) focus especially on liquidity, this method is consistent with Salignac et al.'s (2019) emphasis on economic resources.

According to Zeka and Alhassan (2023), assessing financial resilience requires an understanding of the availability and accumulation of savings. Savings offer a first step toward resilience by allowing people to manage individual spending in times of crisis and serving as a buffer against unforeseen difficulties (Zeka & Alhassan, 2023). Whether through official or informal channels, having access to funds enables individuals to manage both expected and unexpected financial challenges (Zeka & Alhassan, 2023). This emphasis on the value of saving aligns with the focus on liquid assets and the savings-to-income ratio as indicators of financial resilience, as noted by Bialowolski et al. (2022). This is supported by research by Belayeth Hussain et al. (2019), which shows that individuals with savings are almost three times more likely to be financially resilient than individuals that don't save (Zeka & Alhassan, 2023). The importance of savings as a key measure of financial resilience is further supported by similar findings by Tinta et al. (2022), Erdem and Rojahn (2022), and Zeka & Alhassan (2023).

Bialowolski et al. (2022) focus on liquid assets and income ratios, whereas Salignac et al. (2019) provide a more comprehensive perspective that considers relational resources. Despite dividing resilience into levels of vulnerability, Liu & Chen (2023) agree with Salignac et al. (2019). Zeka & Alhassan's (2023) emphasis is on the core function of savings as a buffer, which is most consistent with the liquidity-focused features described by Bialowolski et al. (2022). In sum, financial resilience is determined by the combination of knowledge-based, social, and economic resources that people can utilise to maintain stability in the face of financial losses.

In this study, financial resilience is considered a key dimension of the MFII rather than an outcome or control variable. The MFII consists of five equally weighted domains: access, usage, quality, financial literacy, and resilience. Financial resilience is incorporated due to its critical role in enabling individuals to handle shocks such as emergencies, climate events, or income volatility. Factors that are particularly significant for smallholder farmers who face substantial risks. As part of the MFII scoring process, indicators like access to emergency funds, coping mechanisms, and preparedness for climate-related financial challenges are included. While financial resilience is conceptually analysed in depth, its indicators are directly integrated into the construction of the MFII. This integration helps classify farmers as

financially included or excluded using the Alkire–Foster method which will further explain in chapter 4.

3.5. Challenges in Financial Inclusion and Resilience Among Smallholder Farmers

Financial inclusion continues to gain global traction, yet access to financial services remains markedly uneven, particularly within the agricultural sector, where smallholder farmers face distinct and entrenched barriers. Although progress has been made in extending financial products and services to underserved populations, smallholder farmers constitute a substantial proportion of rural populations in developing regions remain largely excluded from the formal financial system. Globally, only a small share of smallholder farmers have access to essential services such as credit, savings, and insurance, all of which are critical for managing risk, smoothing consumption, and enhancing agricultural productivity (World Bank, 2024). Persistent rural–urban disparities further deepen this exclusion, with rural farmers disproportionately underserved due to geographical isolation, high service delivery costs, and institutional limitations (World Bank, 2024). In this context, examining global evidence helps highlight the advancements made, the persistent gaps that remain, and the implications for the economic stability and long-term productivity of smallholder farmers.

Empirical studies across Africa and Latin America reveal consistently low levels of financial inclusion among smallholders. Adegbite et al. (2021) present a concerning picture of financial exclusion in Nigeria, where approximately 78% of rural smallholder farmers remain outside the formal financial system. Although 27.07% of farmers have formal access, only 25.43% actively use these services, signalling a significant gap between access and effective utilisation (Adegbite et al., 2021). The Multidimensional Financial Inclusion Index (MFII) score of 0.22 highlights not only the scarcity of financial services but also their inadequacy in meeting the needs of farmers. The study further emphasises that even when accounts exist, financial well-being and capability remain limited, indicating that access alone does not automatically translate into improved financial behaviour or stability (Adegbite et al., 2021). High transaction costs, weak identification systems, long distances to financial institutions, and inconsistent service quality further deter participation, reinforcing structural exclusion.

Similar challenges are observed elsewhere in Southern Africa. Mutambara’s (2016) study of Zimbabwean smallholder irrigation farmers found severe levels of financial exclusion, with

70% of farmers lacking bank accounts and 74% having no access to loans. Beyond limited access, the study documented negative experiences, mistrust, and strained interactions with financial institutions, which discouraged farmers from seeking financial support and eroded confidence in formal finance systems (Mutambara, 2016). These institutional shortcomings, combined with inadequate product design and limited collateral, constrain the financial engagement necessary for productive agricultural investment. Evidence from Peru mirrors these challenges. Ramos-Sandoval & Mendiburu-Díaz (2024) observed that smallholder farmers face significant obstacles in accessing credit, receiving markedly less support than larger-scale farmers. Only about 10% of small-scale farmers in their study had access to credit, with sharp geographical disparities disadvantaging rural and Andean communities relative to urban and coastal regions. The study attributes these gaps to small farm sizes, limited assets, and unfavourable credit histories, which weaken farmers' eligibility for formal finance (Ramos-Sandoval & Mendiburu-Díaz, 2024).

These constraints in financial inclusion have direct consequences for financial resilience, which is essential for the long-term viability and adaptive capacity of smallholder farmers. Farmers across Zimbabwe, Zambia, and South Africa continue to face substantial financial obstacles that weaken the ability to absorb, manage, and recover from economic, climatic, and market-related shocks. In Zimbabwe, the lack of tailored financial products, complex loan procedures, and inadequate collateral requirements remain central barriers to resilience-building (Mutambara, 2016). Poor infrastructure and high utility costs further limit farmers' capacity to invest in agriculture or diversify income streams. In Zambia, Ngoma et al. (2024) report that 76% of smallholder farmers experience recurrent financial shocks, reflecting both structural vulnerability and limited access to financial buffers such as savings, credit, or insurance. In South Africa, a small percentage of smallholder farmers have access to crop insurance, leaving them vulnerable to production risks and climate variability (Mukwevho et al., 2023). Collectively, these findings demonstrate that limited access to formal financial services, combined with systemic vulnerability and weak institutional support, undermines financial resilience and intensifies the risks faced by smallholder farmers across multiple contexts.

3.6. Policies and Programs Implemented to Improve Financial Inclusion Among Smallholder Farmers in South Africa

Post-apartheid agricultural and financial sector reforms in South Africa have developed a range of policies and programmes explicitly designed to address financial exclusion among smallholder farmers, following early diagnostic work such as the White Paper on Agriculture (1995), the Strauss Commission into the Provision of Rural Financial Services (1996) and the Strategic Plan for South African Agriculture (2001), which highlighted inadequate access to affordable rural finance for historically disadvantaged producers (GTAC, 2020). One of the flagship responses, the Comprehensive Agricultural Support Programme (CASP), introduced in 2003, sought to create a favourable environment for smallholder farmers through six pillars including infrastructure support, knowledge and information, technical and advisory services, training and capacity building, market and business development, and a dedicated financial services pillar (CASP financial services branded as MAFISA) targeted at previously disadvantaged subsistence, smallholder and commercial farmers (Department of Agriculture, 2014). CASP funding, channelled as conditional grants to provincial departments of agriculture, has been used to support land-reform beneficiaries and emerging farmers with production loans, production infrastructure and market-oriented investments, frequently in conjunction with Ilima/Letsema grants and other provincial support schemes (Western Cape Department of Agriculture, 2023).

Within the CASP framework, the Micro-Agricultural Financial Institutions of South Africa (MAFISA) programme was conceptualised as a state-underwritten microfinance mechanism intended to provide working capital and small loans to smallholder and micro-producers in agriculture, forestry and fisheries through accredited financial intermediaries, thereby addressing long-standing gaps in affordable rural credit (Department of Agriculture, Forestry and Fisheries, 2005; National Treasury & GTAC, 2014). MAFISA design documentation emphasised short- to medium-term production loans, interest rates below prevailing commercial rates, and close integration with extension services, with extension officers responsible for identifying beneficiaries, assisting with loan applications, and monitoring loan performance (GTAC, 2014; Department of Agriculture, 2016). Evaluation studies of MAFISA-funded farmers in KwaZulu-Natal report improved access to seasonal finance for some smallholders but also highlight challenges such as collateral requirements imposed by

intermediaries, administrative bottlenecks, and repayment risks that have constrained the reach and sustainability (Ramashia, 2019).

More recent policy initiatives have promoted blended finance and partnership-based models to deepen financial inclusion for emerging and smallholder farmers. The Blended Finance Scheme (BFS), relaunched in 2022 through a partnership between the Land Bank and the Department of Agriculture, Land Reform and Rural Development (DALRRD), combines concessional loans with grant funding with the explicit objective of improving access to, and affordability of, finance for historically disadvantaged and emerging black farmers and supporting participation in higher-value agricultural value chains (Land Bank, 2022; DALRRD, 2022). The scheme forms part of a broader blended-finance architecture that includes the Industrial Development Corporation's Agri-Industrial Fund, which provides concessional and grant-blended funding to high-impact, black-owned agricultural and agro-processing enterprises to address funding constraints and break entry barriers to commercial production and processing (IDC, 2023).

Parallel to agricultural programmes, financial-sector-wide reforms, such as the Financial Sector Charter, the National Credit Act, and the 2020 Financial Inclusion Policy, have promoted access to transaction accounts, credit, savings, and insurance for vulnerable groups, including rural households and microenterprises, thereby providing an enabling environment for farmer-focused schemes (Mhlanga, 2019).

However, empirical literature assessing these policies and programmes reports partial success in expanding formal financial access for smallholder farmers, but also identifies persistent gaps. Evaluation of CASP and associated spending reviews conclude that support programmes have increased the number of land-reform and emerging farmers receiving infrastructure and some financial support, yet access remains uneven across provinces and often biased towards better-resourced projects, with many smallholders in former homeland areas still relying on informal finance or own savings for production (GTAC, 2020). Studies on MAFISA implementation indicate that production credit has reached segments of the smallholder population that previously had no relationship with formal banks; however, relatively modest loan sizes, stringent collateral requirements imposed by intermediaries, and delays in loan disbursement have limited impact on sustained financial inclusion and investment (Ramashia,

2019). Early assessments of the Blended Finance Scheme and related IDC funds highlight strong potential for unlocking larger-scale investments and supporting black commercialising farmers, but also suggest that relatively complex application procedures and due diligence requirements constrain accessibility for poorer and less connected smallholders (IDC, 2023; Land Bank, 2022). In the Eastern Cape, empirical work on financial literacy and inclusion among rural agrarian settlers shows statistically significant positive associations between financial literacy, financial inclusion and sustainable livelihoods, yet also documents low baseline levels of inclusion, indicating that national financial-sector reforms and agricultural credit schemes have not fully translated into deep financial engagement among poorer rural producers (Akande, 2023). The literature suggests that South African policies and programmes have established significant institutional platforms for enhancing financial inclusion among smallholder farmers. However, design features, implementation constraints, and structural inequalities in the rural economy continue to limit the extent to which these interventions have reduced financial exclusion and its adverse effects on productivity and welfare outcomes. Several factors continue to influence individual farmers' access to multidimensional financial inclusion within the smallholder sector, which are discussed in the next section.

3.7. Factors Influencing Multidimensional Financial Inclusion (MFI index)

Several factors influence multidimensional financial inclusion, including economic, institutional, social, and political dimensions. Hence, it is crucial to examine these factors to address the underlying reasons for financial inequality and vulnerability.

3.7.1. Gender

Gender remains an issue that persists today, not just a thing of the past. Even in the present day, women continue to face numerous cultural and social barriers that impact financial stability and security. For instance, Tetteh et al. (2015) found that women were more likely than men to obtain loans, but they typically borrowed smaller sums due to the banks' requirements. This suggests that women may face societal and cultural barriers to securing larger loans, despite potentially having superior creditworthiness and the ability to repay (Tetteh et al., 2015). In contrast, men tend to seek larger loans for farming activities, as they generally have greater social and political influence, along with authority over household resources (Tetteh et al.,

2015). Hence, the bank grants male farmers larger sums of money. Similarly, Ayinde et al (2023) and Zeka & Alhassan (2023) highlight inequalities in gender regarding financial inclusion and resilience. Ayinde et al. (2023) demonstrated that male farmers had notably greater financial inclusion, as indicated by a multidimensional financial inclusion index (MFII) of 0.38, whereas female farmers had an index of 0.31. Zeka & Alhassan (2023) found that men demonstrate more financial resilience than women, citing various factors responsible for this difference. Such as discriminatory banking practices, restrictions on inheritance, and limitations on property rights collectively restrict women's financial opportunities (Naicker, 2009).

3.7.2. Age

Numerous studies, by Kiplimo et al. (2015), Mhlanga & Dunga (2020), and Chandio et al. (2021), have shown that the age of smallholder farmers significantly influences access to credit and financial stability. For instance, more experienced and asset-rich older farmers are generally more likely to secure loans (Kiplimo et al., 2015; Mhlanga & Dunga, 2020; Chandio et al., 2021). Kiplimo et al. (2015) suggest that older farmers are more likely to obtain financial support, probably because they possess assets that can act as collateral. In a similar vein, Chandio et al. (2021) emphasised the importance of age and experience in obtaining credit, suggesting that middle-aged farmers with substantial experience and education are more likely to receive loan approvals. In Abel et al. (2018) and Mhlanga & Dunga (2020), a positive relationship between age and financial inclusion was demonstrated, indicating that financial participation increases with age. Likewise, regarding financial resilience, Tinta et al (2022) and Hamid et al (2023) identified a positive relationship between age and financial resilience, indicating that older individuals are more adept at handling financial disruptions. Salignac et al. (2019) revealed a more complex connection between age and financial stability. In Salignac et al.'s (2019) research, the study found that although older adults tend to be more resilient, young adults aged 18-24 are expected to show higher resilience than individuals aged 30-49. This is because factors such as job situation, educational background, and psychological well-being can significantly impact the financial resilience of younger individuals (Salignac et al., 2019).

In conclusion, age has a significant influence on access to credit and financial stability, although the connection is complex and varies by context. Usually, senior farmers gain from expertise,

resources, and established relationships with banks. In contrast, younger farmers may possess unique advantages, including flexibility, technological savvy, and a willingness to adopt new farming methods.

3.7.3. Education Level

Various studies suggest that education improves smallholder farmers' ability to access agricultural financing and contributes to farmers' financial stability. Research by Sebbata et al. (2014), Kiplimo et al. (2015), Wentzel et al. (2016), Mhlanga and Dunga (2020), and Ayinde et al. (2023) identified a significant positive correlation between academic success and the chances of securing credit or loans. Farmers with higher levels of education demonstrated greater success in obtaining credit, attributable to improved understanding of financial concepts such as interest rates, assets, and liabilities. Mhlanga & Dunga (2020) reported coefficients ranging from 0.077 to 0.23, with p-values less than 0.05, further corroborating this connection. This evidence suggests that education fosters better decision-making and enhances confidence in seeking funding.

In contrast, Tetteh et al. (2015) and Chissa (2016) found that education does not consistently predict borrowing behaviour. The results suggest that farmers with multiple income streams may rely less on loans. However, education remains a crucial factor in enhancing financial inclusion by facilitating access to beneficial financial products. Additionally, possessing multiple income sources enables the ability to save in interest-earning accounts, demonstrating that financial inclusion extends beyond merely acquiring loans.

Concerning financial resilience, Tinta et al. (2022) and Hamid et al. (2023) discovered a positive link with educational attainment. Tinta et al. (2022) noted a 23.3% rise in financial resilience among farmers with higher education, while Hamid et al. (2023) emphasised the protective effects of education against financial insecurity, particularly for marginalised groups. On the other hand, Salignac et al. (2019) found no statistically significant differences in financial resilience among different educational levels. In general, while education is often considered a vital element affecting smallholder farmers' access to finance and resilience, its effects may vary according to contextual factors such as the availability of alternative income sources and the overall level of financial literacy within farming communities.

3.7.4. Marital Status

Marital status is one of the elements that does not ensure financial resilience. However, regarding financial inclusion, there is an increased likelihood of being approved for a loan due to marital status. For example, Mhlanga et al. (2021) found a significant positive relationship between marital status and financial inclusion in South Africa. Mhlanga et al.'s (2021) research indicated that married individuals were 1.916 times more likely than singles to open investment accounts, highlighting a higher demand for financial services. This could be linked to improved financial stability and joint decision-making in marriages (Mhlanga et al., 2021). Likewise, Kiplimo et al. (2015) observed that marital status had a notable impact on access to financing for smallholder farmers in Kenya. Married farmers were more likely to obtain loans due to the tendency to make collective decisions and distribute tasks, which led to banks perceiving married farmers as more trustworthy borrowers (Kiplimo et al., 2015). This highlights the significance of family support and social networks in obtaining financial services. Conversely, concerning financial resilience, Tinta et al. (2022) discovered a link between marriage and enhanced financial resilience, emphasising the possible social and financial support from spouses and broader family members. In contrast, Hamid et al. (2023) found that marriage had a weaker influence on overall financial resilience. Although single people experienced more financial stress and demonstrated a lower willingness to handle finances, no significant difference in resilience was found between married and single individuals (Hamid et al., 2023).

3.7.5. Occupation and household income

Individuals that are employed and earn income are more likely to receive credit from banks compared to unemployed individuals. Additionally, a smallholder farmer that has sources of income beyond just farming is also more likely to gain access to credit. Mhlanga & Dunga (2020) identified a significant positive correlation between off-farm earnings and financial incorporation among smallholder farmers in Zimbabwe. A one-unit rise in off-farm income correlated with a 0.205 increase in financial inclusion (Mhlanga & Dunga, 2020). This suggests that people with greater incomes are more likely to save and invest via formal financial organisations and not 'save their money under the bed at home'. These findings align with the research of Wentzel et al. (2016), Priyadarshini (2020), Gichuki & Kamu (2022), Seluhinga (2023), and Ayinde et al. (2023), all of which have demonstrated that income significantly affects access to financial services and financial inclusion. Conversely, both income and job status have a considerable impact on financial resilience. Tinta et al. (2022) noted a significant

39.8% increase in financial resilience for high-income individuals compared to farmers with lower incomes. This disparity can be linked to the greater capacity of higher-income individuals to save, invest, and adeptly handle unforeseen financial challenges. Similarly, Salignac et al (2019) state that people with low income typically encounter difficulties related to financial resilience. However, this element has a dual nature, as although full-time employment may enhance financial security, the relationship is more complex. Tinta et al (2022) suggest that full-time work, particularly for individuals with family and community responsibilities, can intensify financial pressure. In contrast, Salignac et al. (2019) viewed it from another angle, as Salignac et al. (2019) discovered that full-time employees exhibited greater resilience than other workforce groups, excluding part-time or casual workers that are satisfied with working hours.

3.7.6. Access To Information

Access to information is affected by whether a person is financially included or excluded. Sebatta et al. (2014) state that around 80% of borrowers possess mobile phones, whereas 71% do not. This suggests that the presence of information is a crucial element in securing funding (Sebatta et al., 2014). For example, providing information on the accessibility of financial services or linking people to places with better loan terms can be beneficial (Sebatta et al., 2014). In line with Sebatta et al. (2014), Tetteh et al. (2015) observed that missing or incorrect information can have adverse effects on lenders and borrowers, leading to moral hazard and adverse selection. Sebatta et al. (2014) and Tetteh et al. (2015) also found a significant positive relationship between access to credit and information. Mhlanga & Dunga (2020) observed that grasping financial products, or financial literacy, improved financial inclusion with a P-value of 0.039. This indicates that a one-unit increase in financial literacy corresponded with a 0.08 increase in financial inclusion (Mhlanga & Dunga, 2020). Furthermore, having access to information enables one to be financially resilient, as it helps smallholder farmers obtain information on ways to save and invest. Through improved information exchange and financial literacy, farmers can make more informed decisions, close knowledge gaps, and ultimately improve financial health.

3.7.7. Land Size and Land Ownership

Regarding land size and ownership, various studies have identified a notable link to financial inclusion. Kiplimo et al. (2015) found that the size of farming households ranged from 0.25 to 96 acres, indicating that households without access to credit generally had smaller landholdings, averaging 2.66 acres, whereas farmers with access to credit possessed marginally larger holdings, averaging 2.84 acres. This supports Marge's claim that larger farms are more likely to secure financial loans due to economies of scale and an improved ability to repay (Kiplimo et al., 2015). Additionally, Priyadashini (2020) and Ayinde et al (2023) examined how land ownership affects financial inclusion. Priyadashini (2020) found a link between land ownership and financial inclusion, suggesting that farmers owning land are more likely to seek loans and additional financial services. Similarly, Ayinde et al. (2023) found that legal land ownership improved access to financial services for male farmers. Furthermore, Chisasa (2019) highlighted the importance of land being used as collateral for bank loans in South Africa. Chissa's (2019) research suggests that the dimensions and conditions of operational land influence agricultural output and potential profitability. However, Chissa (2019) notes that relying exclusively on land ownership as an indicator of creditworthiness can be misleading, as it may not accurately reflect reliability or the capacity to repay.

3.8. The Impact of Multidimensional Financial Inclusion On Farmers' Welfare

Access to financial services and the development of financial resilience have been widely demonstrated to yield positive welfare outcomes for smallholder farmers, particularly in the areas of food security, asset accumulation, agricultural productivity, and poverty reduction. (Demirgüç-Kunt et al., 2018; Balana et al., 2024). Empirical evidence from Nigeria shows that higher levels of financial inclusion are associated with increased use of productivity-enhancing inputs and improvements in household food and nutrition security, as households with stronger financial access adopt fertiliser and improved seeds more intensively and report better food security outcomes relative to financially excluded (Balana et al., 2024). Similar patterns are observed in several African and Asian settings, where access to microfinance, agricultural credit, savings groups or weather-index insurance increases farm investment, reduces vulnerability to shocks and improves household welfare indicators, although with considerable

heterogeneity in magnitudes and pathways across contexts (Cole et al., 2013; Karlan et al., 2014; Chilimba, 2020; Sani Heidary et al., 2025).

Food security outcomes linked to financial inclusion and resilience are increasingly measured using experience-based and dietary indicators such as the Household Food Insecurity Access Scale (HFIAS) and the Household Dietary Diversity Score (HDDS). The HFIAS, is a nine-item experience-based scale that captures the frequency and severity of food access problems over the previous four weeks, yielding both a continuous score and categorical classification of food security status (Coates et al., 2007). By contrast, HDDS measures the number of different food groups consumed by the household over a reference period typically 24 hours or 7 days serving as a proxy for food access and diet quality (Swindale & Bilinsky, 2006; FAO, 2011). In combination, HFIAS and HDDS provide a more complete picture of food security as HFIAS captures the psychosocial and experiential dimensions of anxiety, insufficient quantity and compromised quality, while HDDS reflects actual dietary diversity and potential micronutrient adequacy. This complementary is increasingly exploited in empirical studies that examine how financial inclusion and resilience interventions affect food security. For example, Khumalo & Sibanda (2019) use both HFIAS and HDDS to demonstrate that participation in urban and peri-urban agriculture in South Africa improves food access and dietary diversity, thereby reducing household food insecurity. Balana et al. (2024) similarly argue that combining experience-based measures such as the Food Insecurity Experience Scale with HDDS allows a more nuanced assessment of the impact of financial inclusion on food security across farming seasons. Validation work in Burundi and Bangladesh confirms that HFIAS reliably discriminates food security status across time and socio-economic groups, strengthening its use in impact evaluation designs (Desiere et al., 2015; Salman et al., 2023).

When smallholder farmers gain access to financial services and develop financial resilience, empirical studies generally report improvements in these food security indicators. Microfinance and credit programmes targeting rural households in Malawi, Ethiopia, Iran and Uganda, for example, have been found to reduce the prevalence and severity of food insecurity as measured by HFIAS or related scales, and to increase dietary diversity, though results are not universally positive across all programme designs (Chilimba, 2020; Morel et al., 2024; Sani Heidary et al., 2025). In Malawi, participation in microfinance programmes significantly improved household food security and reduced the probability of severe food insecurity,

suggesting that access to credit and savings helps smooth consumption and buffer seasonal food shortages (Chilimba, 2020). In Nigeria, greater financial inclusion, measured through a composite index of access to bank accounts, formal credit, insurance and digital financial services, is associated not only with improved food security scores but also with higher HDDS, indicating diversification in household diets alongside improved access (Balana et al., 2024). Conversely, studies also caution that the relationship is not automatic as some microcredit schemes show limited or no impact on HDDS or HFIAS where loan sizes are small, repayment pressure is high or where credit is used predominantly for short-term consumption rather than productivity-enhancing investment (Morel et al., 2024; Sani Heidary et al., 2025). Overall, however, the weight of evidence suggests that when financial inclusion is accompanied by supportive institutional conditions and appropriate product design, it can improve both the experiential and dietary dimensions of food security as captured by HFIAS and HDDS.

Financial inclusion and resilience also influence wealth accumulation, which is often measured in rural livelihoods research through livestock holdings (e.g., Tropical Livestock Units) and asset indices derived from ownership of durable goods, housing quality, and productive equipment. Access to credit, savings, and insurance enables households to invest in livestock, which serve as both productive assets, buffers against shocks, and stores of value (Barrett et al., 2010; Balana et al., 2024). Studies from South Africa and other African contexts find that livestock ownership and broader asset indices are positively associated with household food security and dietary diversity, indicating that financially resilient households are better able to maintain adequate consumption in the face of shocks (Nengovhela, 2022; Ibrahim, 2024; Hlatshwayo & Ngidi, 2023). For instance, analyses of rural households in Limpopo identify livestock assets and monthly income as key determinants of food security, with more asset-rich households significantly less likely to be food insecure (Nengovhela, 2022). Similarly, evaluations of land tenure and livelihood strategies in West and Southern Africa show that households with secure tenure and access to finance accumulate higher asset scores (including livestock and farm equipment), which correlate positively with HDDS and other food security measures (Ibrahim, 2024; Balana et al., 2024). These findings suggest that financial inclusion contributes to building a stock of tangible assets that underpin both current consumption and future adaptive capacity, thereby reinforcing financial and food system resilience.

The productivity and poverty-reduction effects of financial inclusion and resilience have also been documented in a range of micro-level studies. Access to credit and microfinance often enables farmers to purchase improved seeds, fertiliser, labour and irrigation technologies, leading to higher yields and increased marketed surplus (Kikulwe et al., 2014; Sekabira & Qaim, 2017; Chilimba, 2020; Balana et al., 2024). In Tanzania, microfinance participation increased agricultural productivity among smallholders in Iramba district, with credit recipients reporting significantly higher yields and incomes than non-participants (Chilimba, 2020). Similarly, studies of mobile money and digital finance in East Africa show that households using these services are more likely to adopt fertiliser and other inputs, allocate more land to cash crops and increase labour hiring, translating into higher farm incomes and improved living standards (Kikulwe et al., 2014; Demirgüç-Kunt et al., 2018). In Nigeria, financial inclusion significantly increases the probability of using yield-enhancing technologies and improves both input use intensity and household food security, reinforcing the link between financial access, productivity and welfare (Balana et al., 2024).

At household level, impact evaluations in Malawi and other low-income countries show that access to credit reduces poverty headcount and depth, increases per capita expenditure and improves multidimensional poverty indicators, particularly when combined with complementary interventions such as training or market access support (UNCDF, 2013, Faith, 2017; Zimani, 2025). The body of literature suggests that financial inclusion serve as important levers for enhancing the welfare of smallholder farmers across multiple dimensions. Access to and effective use of financial services enable households to stabilise and diversify food consumption, as reflected in lower HFIAS scores and higher HDDS, while also building livestock holdings and other assets that serve as both wealth indicators and risk-management tools. At the same time, subsidised or appropriately structured credit, savings and insurance products support adoption of productivity-enhancing technologies and more market-oriented production, thereby increasing farm incomes and contributing to poverty alleviation. However, outcomes are not uniform where financial products are poorly designed, where institutional trust is low or where markets remain thin, access alone may not translate into improved food security, asset accumulation or poverty reduction. The emerging consensus is that the greatest gains occur when financial inclusion is integrated into broader rural development strategies that simultaneously address structural constraints, strengthen institutions and build the capabilities required for smallholders to translate financial access into sustained improvements

in food security, productive capacity and poverty reduction (Sibanda, 2019; Balana et al., 2024; Khumalo & Omotayo et al., 2025).

3.9. Summary

This chapter provided the theoretical and conceptual foundations for understanding financial inclusion and financial resilience among smallholder farmers. The chapter began by defining the concepts and highlighting the multidimensional nature of financial inclusion, which includes access, usage, quality, financial literacy, and resilience. These dimensions were linked to the characteristics and vulnerabilities of rural households, highlighting the need for a broad and integrated measurement approach. The theoretical framework drew on public good theory, institutional theory, and vulnerable group theory, supported by principles of financial literacy. These theories collectively explained how structural constraints, institutional arrangements, and socio-economic vulnerabilities shape farmers' participation in the financial system. The chapter then explained how financial inclusion and financial resilience are measured, emphasising the relevance of a multidimensional index.

Key challenges hindering financial inclusion and resilience were outlined, including limited access to information, weak financial capability, socio-economic barriers, inadequate infrastructure, and restrictive institutional processes. The discussion then examined the demographic and socio-economic factors influencing multidimensional financial inclusion, including gender, age, education, marital status, occupation, household income, land size, and ownership, highlighting how these variables can either facilitate or restrict financial participation. The chapter also reviewed policies and programmes aimed at enhancing financial inclusion among smallholder farmers in South Africa, demonstrating ongoing institutional efforts to support rural financial access. Finally, the chapter discussed the theoretical pathway linking multidimensional financial inclusion to improved welfare outcomes, setting the stage for the empirical analysis in the next chapter.

CHAPTER 4: RESEARCH METHODOLOGY

4.0. Introduction

This chapter outlines the methodological framework adopted to investigate the determinants of the multidimensional financial inclusion among smallholder farmers in Makhanda, South Africa. Guided by a post-positivist paradigm, the study employs a mixed-methods approach that integrates quantitative and qualitative techniques to capture both the measurable and experiential dimensions of financial inclusion. The chapter begins by discussing the research paradigm and positioning the study within the post-positivist worldview. It then provides a description of the study area, followed by detailed explanations of the data collection methods, including the multidimensional financial inclusion questionnaire and the focus group discussions. The chapter further presents the empirical methods used to analyse the data. These include the construction of the multidimensional financial inclusion index, descriptive statistics, and the application of econometric models using the Poisson and Probit models, along with the variables included in the models and the expected relationships based on empirical literature. The chapter also explains the use of Propensity Score Matching (PSM) to assess the causal effects of the multidimensional financial inclusion on welfare outcomes.

4.1. Research Paradigms

According to Deshpande (1983), Mertens (2012), and Khatri (2020), a research paradigm acts as the theoretical or philosophical foundation for a research project. The concept of a paradigm was first introduced by the American philosopher Thomas Kuhn in 1962, referring to a philosophical framework in research. This framework proposes that a researcher's convictions and perspectives regarding the subject influence the subject's behaviour (Khatri, 2020). The research paradigm guides the researcher throughout the entire research process, encompassing the selection of a research topic, the development of research questions, and the identification of aspects and categories of reality, knowledge, methodology, and significance within the research project (Khatri, 2020). As a result, a well-defined paradigm is crucial to ensure that the research process clarifies the study, enhances the quality of the study's methodologies and analysis, and is guided by a consistent and meaningful framework, thereby increasing the rigour and validity of the findings (Yong et al., 2021). There are four main research paradigms, including positivism, interpretivism, critical theory, and realism. This section discusses these

paradigms and justifies why the post-positivist paradigm serves as the underlying paradigm for this study.

4.1.1 Positivism

Positivism is consistent with the hypothesis-deductive paradigm of science (Park et al., 2020). Positivism often uses pre-existing theories to produce hypotheses that will be examined throughout the study (Yong et al., 2021). According to the positivist paradigm, events in the real world can be rationally explained and witnessed empirically (Kaboub, 2008). To put it differently, the findings of positivist research are employed to bolster theory and contribute to the existing literature, thereby closing the loop in which theory generates hypotheses, which subsequently result in operationalising variables, which then lead to experimentation, which ultimately circles back to theory (Park et al., 2020). The empirical study's conclusions can support or improve theory (Park et al., 2020). At its core, positivism prioritises objective facts and data over the interpretive bias of the human mind (Yong et al., 2021). For this reason, the positivist approach to research focuses on micro-level tests in scenarios that aim to replicate lab-based scenarios, where functional relationships between independent variables and dependent variables can be determined (Park et al., 2020). This approach minimises the inherent complications of the world, including all social, psychological, economic, and relational links (Kaboub, 2008; Park et al., 2020). Furthermore, to reduce bias, the researcher and participants are separated during the design and data gathering phases of the study (Park et al., 2020). However, despite its advantages, the positivist paradigm has some limitations. For example, understanding the world from an impartial perspective can lead to sweeping generalisations that might overlook individual motives and behaviours, which are essential to understanding the root causes of social issues (Alharahsha & Pius, 2020). Consequently, the author's research requires additional in-depth examination to tackle the primary question of the study from the participants' perspectives (Alharahsha & Pius, 2020).

Hence, positivism, with its focus on objectivity, measurement, and hypothesis testing, is relevant to this study due to its alignment with the quantitative analytical methods used. The development of the MFII, the implementation of descriptive statistics, and the application of econometric models like Poisson and Probit regressions illustrate positivist principles. These approaches depend on observable and measurable variables, operating under the assumption that financial inclusion patterns can be objectively assessed and generalised across the sample.

4.1.2 Interpretivism

Interpretivism emerged as a subjective critique of positivism. Positivism seeks to comprehend the world objectively, whereas interpretivism emphasises understanding it through the subjective meanings constructed by individuals and groups (Alharahsha & Pius, 2020). Interpretivism considers elements such as culture, context, and time that influence the development of various social realities (Alharahsha & Pius, 2020). Moreover, the interpretive viewpoint posits those collective ideas, such as norms, shape human actions, thereby informing the researchers' perspective (Yong et al., 2021). Researchers cannot function as entirely impartial observers of the social realm like a positivist researcher might, since the researcher's individual values and experiences inherently shape the research process (Alharahsha & Pius, 2020). Thus, a relationship exists between the researcher and the research process, which is very crucial for understanding the topic under examination, as the researcher is surrounded by these social elements (Yong et al., 2021). Hence, interpretive researchers rely on qualitative data to highlight the subjectivity in the findings. It is a technique for achieving a thorough comprehension of meaning by focusing on specific details (Yong et al., 2021). However, while the interpretivism concept has numerous advantages, it also poses several obstacles for researchers. One of the most significant challenges is the question of trustworthiness and representativeness (Alharahsha & Pius, 2020). Interpretive research frequently utilises small sample sizes and focuses on specific circumstances (Prime, 2024). Therefore, its conclusions cannot be easily extended to larger groups (Prime, 2024). Another issue with interpretivism philosophy is the potential for researcher bias (Prime, 2024). While this approach emphasises reflexivity, the researcher's personal judgements may influence the outcomes (Prime, 2024). This requires that the researcher be highly self-aware and honest (Prime, 2024).

Interpretivism underpins the qualitative aspect of this study, specifically through the use of focus group discussions. These discussions serve to explore the lived experiences of farmers, their perceptions, and the contextual challenges they face regarding financial inclusion and resilience. Factors that cannot be adequately represented by numerical data alone. By applying interpretivist reasoning, the study incorporates subjective insights to complement the outcomes of the MFII and regression models. This approach ensures that statistical results are interpreted in alignment with the social and cultural realities of smallholder farmers.

4.1.3 Critical Theory

Critical theory scholars seek to challenge and modify social, political, cultural, economic, ethnic, and gender norms (Yong et al., 2022). Hence, research questions often encompass extensive ethnographic and historical studies of organisational processes and frameworks (Yong et al., 2022). Assumptions are basically subjective (Yong et al., 2022). As a result, knowledge is reliant on social and historical routines, making it value-dependent rather than valueless (Healy & Perry, 2000). Another key feature of this theoretical framework is that social theory, as found in educational research, should play a significant role in shaping the world and improving humanity's conditions (Nuryatno, 2003). Thus, the basic approach of critical qualitative research is participatory action research (PAR) (Nuryatno, 2003). However, like other frameworks, critical theory has limitations. Firstly, the desire for political reform among critical theorists may conceal hidden intentions (Hussain et al., 2013). This raises questions regarding objectivity and whether the research is motivated by a genuine desire to understand or by a predetermined political purpose (Hussain et al, 2013). Essentially, it implies that the desire for transformation may outweigh the objective pursuit of knowledge (Hussain et al., 2013). Secondly, critical theory's emphasis on social transformation can be limited by opposition to change from different sources, including institutions (Hussain et al, 2013). Therefore, hidden institutional resistances might impede desired outcomes, potentially rendering the entire research project and efforts to effect change a waste of both time and resources (Hussain et al, 2013). This underscores the practical challenges of adopting critical theory-based improvements (Hussain et al, 2013).

4.1.4 Realism

According to realism, reality exists independent of the researcher's consciousness, meaning that there is an external reality (Sobh & Perry, 2005). This external reality is composed of abstract concepts that arise from people's minds but exist independently of one another (Sobh & Perry, 2005). Realists recognise differences between the real world and personal view of it, and they attempt to build various representations of reality based on which ones are relevant in time and place (Sobh & Perry, 2005). As a result, the underlying structures studied in social science are only indirectly related to the researcher's field experiences, which include both quantitative and qualitative research methods (Sobh & Perry, 2005). Therefore, realists believe

that there is a real universe out there to be discovered (Sobh & Perry, 2005). However, the true external world is only partially and probabilistically understandable (Sobh & Perry, 2005; Yong et al., 2005). Second, unlike positivism, which seeks clear cause-and-effect correlations, realism accepts open and complex systems in which causal mechanisms vary depending on context (Healy & Perry, 2000). This makes it more difficult to establish obvious causal relationships (Healy & Perry, 2000). Third, realism prioritises analytic generalisation (theory development) over statistical generalisation (Healy & Perry, 2000). This diminishes the capacity to generalise results across extensive populations (Healy & Perry, 2000).

4.1.5 Post-Positivist

The post-positivist paradigm contrasts with the positivist paradigm in its approach to strict objectivism and determinism (Fox, 2014). The post-positivism approach represents a diverse perspective, combining positivist and interpretivist methods (Panhwar et al., 2017). Essentially, the post-positivist theoretical framework is an adaptable research approach that allows researchers to explore topics utilising different methodologies suited to the distinct research inquiries (Panhwar et al., 2017). Consequently, it seeks to reduce the impact of individual biases and prior beliefs from both the researcher and participants by incorporating various research methods and strategies to investigate topics from multiple perspectives (Panhwar et al., 2017). This method entails shifting from a neutral viewpoint of an uninvolved observer to an active perspective that incorporates a compassionate interaction with the everyday experiences of the subjects under examination (Fox, 2014). Hence, post-positivism emphasises the restrictions of every observation and recognises the inevitable influence of researchers' perspectives on findings, understanding that reality exists yet can only be understood in a probabilistic and flawed way because of inherent human biases and limitations in research methods (Panhwar et al., 2017). In short, this framework adopts critical realism, integrating empirical observation with theoretical assessment to achieve a more comprehensive understanding of reality (Panhwar et al., 2017).

Considering the complex objective of the studies to explain the multidimensionality of financial inclusion in smallholder farmers, a post-positivist framework seems to be the most suitable methodology. The study examines various factors that affect financial inclusion. Therefore, a mixed approach is essential to provide a more comprehensive representation of reality. Qualitative data gathered from questionnaires with smallholder farmers provided important contextual insights into the farmers' experiences regarding financial inclusion,

resilience, and service quality, which were subsequently supplemented by quantitative data analysis that employed a Poisson and a probit model to analyse binary dependent variables derived from the MFII. The combination of diverse data sources enhanced the validity of the study, enabling a more thorough understanding of the experiences of smallholder farmers (Fox, 2014).

4.2. Study Area Description

Makhanda, formerly known as Grahamstown, is a town situated in the Eastern Cape region of South Africa (Makana Municipality Integrated Development Plan 2021–2022). It is part of the Makana Local Municipality and lies within the Sarah Baartman District Municipality (Makana Municipality Integrated Development Plan 2021-2022). The location of Makhanda is identified by its geographic coordinates of 33°18'36" S and 26°31'36" E (Pamla et al., 2021). This medium-sized town covers an area of 1690 square kilometres and is home to more than 70,000 residents (Makana Municipality Integrated Development Plan 2021-2022). The town enjoys a moderate and temperate climate due to its altitude of approximately 550 meters (Pamla et al., 2021). It is particularly susceptible to drought conditions, with average summer temperatures ranging from 27°C (October to March) and winter temperatures of around 19°C (May to July) (Pamla et al., 2021). The annual average rainfall stands at 600 mm, with peak frontal rains occurring in October, November, March, and April (Pamla et al., 2021; Makana Municipality Integrated Development Plan 2021-2022). However, variability in rainfall and droughts is frequent (Pamla et al., 2021). The landscape surrounding the town is diverse, featuring mountains and a variety of vegetation types, including South Coast Renosterveld, Afromontane woodlands, grasslands, and Nama Karoo (Pamla et al., 2021; Makana Municipality Integrated Development Plan 2021-2022). The area surrounding Makhanda is defined by undulating hills and fertile soils that support a wide range of agricultural activities (Pamla et al., 2021).

Famously, Makhanda is recognised as a leading hub for culture, education, and tourism, having been the host of South Africa's National Arts Festival for the last 43 years, which is considered an international event and ranks as the third largest festival in the world (Makana Municipality Integrated Development Plan 2021-2022). Many foreign diplomats attended the festival (Makana Municipality Integrated Development Plan 2021-2022). The celebration is held in nearly every university, school, public hall, church, and township in Makhanda, attracting thousands of visitors to the city (Makana Municipality Integrated Development Plan 2021-2022). Makhanda is also home to Rhodes University, as well as other prestigious primary and

secondary schools/colleges (Makana Municipality Integrated Development Plan 2021-2022). Makhandha also serves as the Eastern Cape's High Court seat (Makana Municipality Integrated Development Plan 2021-2022).

Extensions 7 and 9 are situated on the outskirts of Makhandha, in the peri-urban fringe. Extension 7 is around 10 km from the town centre and experiences higher levels of participation in urban gardening, as many home gardeners and cooperatives are involved with the Umthathi Training Project. Umthathi offers innovative training in sustainable food garden cultivation, integrating educational, health, and livelihood programs designed to empower individuals to enhance quality of life. In contrast, Extension 9 is an older, well-established suburb that is closer to town. The farmers surveyed in Extension 9 primarily included a group of home gardeners aiming to form a community cooperative. In addition, Fort Beaufort, now officially known as KwaMaqoma, is a historic town located in the Eastern Cape of South Africa, founded in 1822. This town lies 40 km from the nearest city, Grahamstown, and is recognised for its fertile lands, especially in citrus farming within the Kat River Valley. The home gardeners in KwaMaqoma cultivate a shared land area of 2 hectares, dividing it into three groups referred to as Group A, B, and C. KwaMaqoma, along with Extension 7 and 9, engages in home gardening, growing vegetables such as spinach, onion, beetroot, cauliflower, pumpkin, potatoes, and cabbage for personal consumption or for income generation. Additionally, they keep livestock, including chickens, goats, sheep, or cattle, which supply protein for households.

However, Makhandha faces considerable issues, including one of the country's highest young unemployment rates, with half of its youth not in education, employment, or training by the age of 25 (Makana Municipality Integrated Development Plan 2021-2022). Makana had a total unemployment rate of 38.34% in 2020 (Makana Municipality Integrated Development Plan 2021-2022). As a result, agriculture is the primary source of income for Makana Municipality (Integrated Development Plan 2021-2022). Essentially, the Makana Municipality faces significant challenges in delivering key services to its residents (Makana Municipality Integrated Development Plan 2021-2022). Some portions of the municipality, such as Makhandha, continue to lack safe drinking water, poor road infrastructure, and inadequate sanitation services (Tshuma, 2024). The quality of life and rights of many people suffer as a result of poor service delivery (Tshuma, 2024). Furthermore, the municipality's lack of financial stability is a crucial factor driving these issues (Hoefnagels et al., 2023). The integrated development plan (IDP) budget constraints have severely impeded the government's

ability to handle the growing backlog of service delivery needs, exacerbating existing socioeconomic gaps (Hoefnagels et al., 2023). Poor strategic planning has also hampered efforts to promote local economic development (LED) (Hoefnagels et al., 2023).



Figure 4.1: Map of the Eastern Cape showing the study area.

Source: SA-Venus (2013)

4.3. Sampling Framework

The study's specific research questions required surveying a sample of smallholder farmers and administering a questionnaire to individuals that share similar characteristics. The target population consists of smallholder farmers residing in the urban township of Makhanda. The selection of this study area is justified by the fact that Makhanda is located in one of the poorest provinces in South Africa, known for its fertile soils that support various agricultural activities (Pamla et al., 2021). A sample of 100 smallholder farmers was surveyed regarding financial inclusion. Although Makhanda has a substantial farming community, selecting a sample of 100 farmers is both methodologically sound and suitable for the statistical techniques applied. It aligns with the scope of a master's study while being robust enough to reflect the diversity and trends associated with multidimensional financial inclusion. To mitigate sampling bias, the sample size was designed to encompass at least 10% of the population (Singh & Masuku, 2014). The list of smallholder farmers was gathered from the extension officers in the

Department of Agriculture in Makhanda. Subsequently, a random sample was selected for a focus group interview to explore in greater detail the effects of financial inclusion on the well-being of smallholder farmers. Therefore, a multi-stage sampling approach was employed, utilising both purposive sampling and random sampling in this research context.

This study implemented a multi-stage sampling approach, integrating purposive and simple random sampling methods. Initially, purposive sampling was utilised to deliberately select three study sites: Extension 7, Extension 9, and KwaMaqoma based on their large and active populations of smallholder farmers, as identified by extension officers and the Umthathi Training Project. The same method was applied to acquire farmer lists from the Department of Agriculture in the Eastern Cape, as their records were deemed the most accurate and comprehensive for identifying active farmers, serving as the foundational sampling frames. After compiling the lists, simple random sampling was employed to choose the 100 survey farmers. For the qualitative component, particularly the focus group discussions, purposive sampling was again applied to identify participants who could provide valuable insights, such as group chairpersons. Additionally, ordinary members from each farming group were randomly selected to ensure diverse perspectives were included, combining leadership insights with the everyday experiences of farmers. By blending purposive and random sampling techniques, the study achieved a representative quantitative sample alongside a contextually rich qualitative sample.

4.4. Data collection

4.4.1. The multidimensional financial inclusion questionnaire

To support the data collection process, four enumerators that spoke isiXhosa were hired. It took approximately one hour to complete the questionnaire, and data collection was conducted over the course of one month in August 2025. Ranganathan & Caduff (2023) define a research questionnaire as a tool for collecting data that consists of a series of questions or items designed to gather information from participants, thereby revealing participants' knowledge, opinions, attitudes, beliefs, and behaviours. The questionnaire approach is a flexible and powerful instrument for data collection in various research fields (Kuphanga, 2024). Its organised format promotes consistent data gathering, organisation, and analysis, which is particularly beneficial for quantitative research projects (Kuphanga, 2024). This approach provides researchers with

cost-effectiveness, ease of access, and the capability to engage a wide and diverse audience, facilitating the efficient collection of extensive insights (Kuphanga, 2024). However, the questionnaire also has its drawbacks, such as the tendency for respondents to give socially desirable and idealised responses, especially regarding sensitive topics like alcohol use, drug habits, and sexual behaviours (Ranganathan & Caduff, 2023). Additionally, there is often a low return rate of completed questionnaires, which can create potential bias due to non-responses that can be difficult to measure accurately (Kuphanga, 2024). Lastly, the questionnaire method is often the slowest among data collection methods, which may extend the duration of the research process (Kuphanga, 2024).

The questionnaire acted as the main tool for collecting data in this study and was administered using a structured approach to ensure accuracy and consistency. It was crafted based on existing research regarding financial inclusion and resilience, heavily referencing the Global Findex framework. To gain a more thorough understanding of the elements affecting financial inclusion among smallholder farmers, additional questions concerning climate resilience were incorporated. Given that most smallholder farmers in Makhandla speak isiXhosa, the questionnaire was translated from English to isiXhosa and verified by a native speaker for both precision and contextual appropriateness. Interviews were planned in advance with farmers, facilitated by extension officers from the Department of Agriculture and staff from Umthathi Training. On the predetermined dates, the research team met farmers at the selected locations, such as home gardens or communal farming areas. Before starting each interview, verbal consent was obtained by clearly explaining the study's purpose, confidentiality, and the voluntary nature of participation.

Due to varying literacy levels, questions were frequently read aloud in the respondents' preferred language (either English or isiXhosa), and the enumerator recorded the responses. The duration of each interview was approximately 20 to 35 minutes. Completed questionnaires were reviewed daily to identify any inconsistencies or missing answers, and follow-ups were conducted as necessary. Ethical clearance was acquired from the university's ethics committee, and all data were securely stored to ensure confidentiality. While challenges in the field, such as farmers' availability, weather conditions, and difficulties in locating certain participants, were faced, these were addressed through flexible scheduling and strong support from community members and agricultural extension staff.

4.4.2. Focus Group Discussions

Focus group discussions were conducted with farmers and extension officers to complement the quantitative data. As noted by Nyumba et al. (2018), focus group discussions are often utilised as a qualitative method to gain deeper insights into social issues. This type of discussion involves group interviews with a small number of participants, typically ranging from 10 to 12 individuals, facilitated by a moderator (interviewer) that guides a loosely structured conversation on various relevant topics (Mishra, 2016). The flow of the discussion is usually pre-planned, and most moderators use an outline or a guide to ensure that all pertinent topics are addressed (Mishra, 2016). The goal is to gather information from a deliberately chosen group rather than a statistically representative sample from a larger population (Nyumba et al., 2018). Despite this, analysing the data can be more complex (Mishra, 2016). The group's interaction creates a social environment, and the remarks should be understood within this framework (Mishra, 2016). It requires that moderators be thoroughly trained (Mishra, 2016). Furthermore, organising these groups takes considerable effort (Mishra, 2016). The discussions should occur in a setting that promotes open dialogue (Mishra, 2016). This data enhances the researcher's or analyst's confidence, as it serves as a valuable resource for forming hypotheses or developing frameworks (Nyumba et al., 2018).

Therefore, following the completion of the questionnaires, the next phase of data collection involved conducting focus group discussions to explore issues that could not be entirely addressed through the questionnaire alone. After each farming group had finished the questionnaires, the researcher randomly selected a few members from each group to participate in the focus group discussion. Given that most smallholder farmers in Makhanda operated in organised groups of approximately 8–10 members, choosing 3–4 random participants from each group ensured that the discussions were representative and not swayed by individual opinions or dominant personalities. The focus group discussions were facilitated with the assistance of extension officers and staff from Umthathi Training, that helped coordinate suitable times and venues for the meetings. Prior to starting the discussions, verbal consent was secured, and participants were briefed about the confidentiality and objectives of the session. The discussions were guided by a semi-structured framework that aligned with the questionnaire themes, addressing subjects such as financial inclusion, access to financial services, saving habits, climate resilience, market difficulties, and group farming dynamics.

These focus group discussions yielded valuable qualitative data that enhanced the results from the questionnaires and provided a shared insight into the experiences of smallholder farmers.

4.5. Empirical Methods

This chapter discusses the empirical methods used to investigate the factors influencing financial inclusion and financial resilience among smallholder farmers in Makhanda. The chapter begins by explaining how the Multidimensional Financial Inclusion (MFI) Index was developed to capture various aspects of financial inclusion among smallholder farmers in Makhanda, Eastern Cape. This index combines information on access, usage, and quality of financial services into a single composite measure, facilitating a more comprehensive evaluation of financial inclusion levels among farmers. Next, the chapter provides an overview of how descriptive statistics was utilised in analysing the data, followed by the econometric techniques used in the research. In particular, a Poisson and Probit regression model is applied to explore the factors affecting multidimensional financial inclusion; and the propensity score matching (PSM) technique is employed to assess the welfare effects of multidimensional financial inclusion on the outcomes of smallholder farmers. These methods provide a solid framework for addressing the study's research objectives.

4.5.1 Constructing the Multidimensional Financial Inclusion Index

The multidimensional financial inclusion index is a composite indicator that encompasses various dimensions of financial inclusion, extending beyond mere access to financial services (Cáamara & Tuesta, 2014). To evaluate the level of financial inclusion among smallholder farmers in Makhanda, a multidimensional financial inclusion index was derived using the Alkire–Foster approach. The Alkire-Foster method was developed by economists Sabina Alkire and James Foster in 2007. Sabina Alkire and James Foster's methodology provides a thorough framework for assessing multidimensional poverty (Alkire & Jahan, 2018). It identifies the various deprivations faced by individuals or households in different aspects of household lives (Alkire & Jahan, 2018). The approach computes a poverty index by first pinpointing deprivations across multiple indicators, applying weights to each, and then establishing a poverty threshold to determine which individuals qualify as multidimensionally poor (Alkire & Jahan, 2018).

With this detailed measurement, researchers subsequently tailored the Alkire-Foster methodology to evaluate financial inclusion since it encompasses not merely a singular aspect, such as possessing a bank account, but indicates various interrelated deprivations concerning access, use, and quality of financial services, similar to how poverty includes interconnected deprivations in areas like health, education, and living conditions (Alkire & Jahan, 2018). Consequently, researchers began extensively implementing the style of the Alkire-Foster method for the multidimensional measurement of financial inclusion in the late 2000s, with distinct adaptations of the Alkire–Foster methodology evident in published studies from around 2020 to 2022 (Adegbite et al., 2021; Nkambule, 2022; Ayinde et al., 2024).

For example, Adegbite et al. (2021) specifically modified the Alkire–Foster approach to develop a Multidimensional Financial Inclusion Index for rural smallholder farmers in Nigeria. In creating the MFII, Adegbite et al. (2021) identified three key aspects, the first being financial participation, which encompasses access, usage, and the absence of obstacles. The second aspect is financial capability, covering financial literacy, financial planning, and consumer protection (Adegbite et al., 2021). The final aspect is financial well-being, which pertains to control over finances, financial resilience, and overall financial situation (Adegbite et al., 2021). Similarly, Ayinde et al. (2024) adapted the Alkire-Foster method to adopt both the multidimensional financial inclusion index and the welfare index to assess the financial inclusion among smallholder maize farmers in Nigeria.

In the model for MFII, Ayinde et al. (2024) recognised three aspects, similarly identified by Adegbite et al. (2021), including financial participation, financial capability, and financial well-being. The MWI was constructed based on five domains of the welfare index, namely assets, social amenities, consumption expenditure, water, and employment (Ayinde et al., 2024). Nkambule (2022) employed a multidimensional framework to evaluate the financial inclusion status of rural households in Eswatini. The Alkire-Foster method was applied in this research to create a composite financial inclusion index for rural households. Similar to Adegbite et al. (2021), Nkambule (2022)’s MFI index is founded on three aspects, including financial participation, financial capability, and financial well-being, which encompass a total of nine indicators derived from the Alkire-Foster Method. Drawing inspiration from the approaches of Adegibite et al. (2021), Ayinde et al. (2024), and Nkamule (2022), this study adopted a similar methodology. The MFI index was created based on five key domains, including access, usage, quality, financial literacy, and resilience, as shown in Table 4.1 below.

Table 4.1: Financial Inclusion Domain Indicators Used to Create the MFI Index.

Dimension	Indicator	Questionnaire Items (in the appendix)	Coding Rule (0 = deprived, 1 = not deprived)
Access	Bank account ownership	Q10.A (account at bank/co-op/other)	1 if has account (alone/joint); 0 if none
	Credit card ownership	Q10.B (credit card)	1 if has a credit card; 0 if not
Usage	Use of account (digital or deposits/withdrawals)	Q10.C–10. G (eft for farm expenses, credit card for farm expenses, credit card for personal expenses, paid credit card, deposited money into personal account)	1 if “Sometimes/Often” used for payments, deposits, withdrawals; 0 if “Never”
	Savings practice	Q12.A–C (savings for emergencies, inputs, family)	1 if saved at least once; 0 if never
Quality/Reliability	Timely repayment	Q10.F (paid off credit card balances in full)	1 if “Yes”; 0 if “No”
	Regular balance	Q10.H–10. I (keep savings, rely on credit)	1 if reports keeping balance; 0 if not
	Financial worries	Q15.A–E (worries about emergencies, inputs, bills, education)	1 if “Not worried/Somewhat worried”; 0 if “Very worried”
Financial Literacy	Budgeting	Q13.A (budget for managing expenses)	1 if Yes; 0 if No
	Interest rate knowledge	Q13.B (know how interest rates work)	1 if Yes; 0 if No
	Credit score knowledge	Q13.C (aware of credit score)	1 if Yes; 0 if No
	Distinguish between saving vs. investing	Q13.D (know the difference between savings and investment)	1 if Yes; 0 if No
	Knowledge of account types	Q13.E (know different types of bank accounts)	1 if Yes; 0 if No
	Confidence in financial decisions	Q13.F (confidence in financial decisions)	1 if Yes; 0 if No
Resilience/Risk Protection	Insurance	Q14.I (Couldn’t come up with money)	1 if insurance is listed as coping strategy; 0 if not
	Emergency resources	Q14.A–H, 14.J (savings, family, work, borrowing from a bank, employer, and loan shack, selling assets, insurance, and borrowing from a stockvel)	1 if able to mobilize funds through any source (savings, work, borrowing, insurance); 0 if “I could not come up with the money” (14.J)
	Climate-related savings	Q16.E (savings/resources to manage losses)	1 if “Agree/Strongly Agree”; 0 if Disagree/Strongly Disagree

The first domain, access, evaluates how easily individuals can utilise formal financial services, which include having a bank account, acquiring credit, and obtaining savings and insurance products (Adegbite et al., 2021; Ayinde et al., 2023). The second domain, usage, pertains to the frequency and extent of utilisation of these financial services, encompassing regular deposit and withdrawal activities, as well as engagement in formal savings or credit programs (Adegbite et al., 2021; Ayinde et al., 2023). The third domain, quality, measures the appropriateness, reliability, and satisfaction level of financial services for farmers, as well as the ability to effectively meet financial needs (Adegbite et al., 2021; Ayinde et al., 2023). The financial literacy domain assesses farmers' comprehension, awareness, and knowledge of essential financial concepts, including various account types, credit scores, budgeting capabilities, and the operation of interest rates (Adegbite et al., 2021; Ayinde et al., 2023). Finally, the resilience domain evaluates how financial inclusion enables farmers to cope with financial challenges, considering access to emergency funds, climate-related resources, and available insurance options (Salignac et al., 2019).

The distinguishing feature of this study's approach to formulating the MFI index is the inclusion of five domains, as opposed to the three utilised by Adegbite et al. (2021), Ayinde et al. (2024), and Nkamule (2022). The additional domains are resilience (focusing on emergency funds, insurance, and climate preparedness) and quality (concerning service reliability, suitability, and user satisfaction). This study argues that financial inclusion must encompass not only access and utilisation but also the capacity to withstand financial disturbances caused by climate change and socioeconomic factors, particularly for smallholder farmers, which is referred to as financial resilience in this study.

Each domain was represented by several indicators derived from the household questionnaire, which was adapted from the Global Financial Inclusion Index (Global Findex). The questionnaire focused on account ownership and access, usage, and digital payments (e.g., EFT/internet banking), as well as savings, credit, and insurance. It also explored financial resilience and well-being. However, this study included additional questions related to climate change to assess how smallholder farmers recover from its impacts. To guarantee that policy initiatives aimed at improving financial inclusion do not trade off advancements in one domain for deficiencies in another, this study applied an equal across all five domains—access, usage, quality, financial literacy and resilience as well as across the 29 indicators within these domains. This approach aligns with the Alkire–Foster method, which allows for the application

of equal weights in cases where there is no compelling empirical or theoretical basis for assigning different weights. Thus, the decision to use equal weights is grounded in theoretical consistency rather than being influenced by data following Adegibite et al. (2021), Ayinde et al. (2024), and Nkamule (2022) analysis. The adequacy score a_i is, thus, the weighted sum of the adequate accomplishments across the indicators for every smallholder farmer as:

$$a_i = b_1X_1 + b_2X_2 + \dots + b_{29}X_{29} \quad (1)$$

where X_i and b_i represent the i th indicator and weight of the i th indicator, respectively, and $a_i = 1$ if the respondent is adequate in all indicators, and 0 if not.

The financial adequacy threshold (k) indicates the proportion of weighted adequacies that a respondent must satisfy across all twenty-nine indicators to be regarded as financially sufficient. Using the Alkire–Foster methodology, a cutoff value of 0.66 was set to distinguish between farmers that are financially included and farmers that are excluded. The study adopted this cut-off point from Adegibite et al (2021). Adegibite et al (2021) state that setting a high threshold would imply that few respondents would be categorised as financially adequate, and a low threshold would imply that it is not challenging for most rural smallholder farmers to achieve financial adequacy; hence, a cut-off point of 0.66 is the best cut-off to use because it ensures that a farmer is classified as financially excluded only when it experiences substantial and overlapping deprivations across most financial inclusion indicators.

$$FI_i = \begin{cases} 1 & \text{if } MFII_i \geq 0.66 \text{ (financially included)} \\ 0 & \text{if } MFII_i < 0.66 \text{ (financially excluded)} \end{cases} \quad (2)$$

This binary classification enabled the application of a Probit regression model and a Poisson model, which will be discussed below, to identify the factors associated with financial inclusion among smallholder farmers.

4.5.2 Descriptive statistics

Descriptive statistics are used to summarise data in an organised manner by describing the distribution and relationships between variables within a sample or population (Kaur et al.,

2018). This section provides an overview of the socio-economic and demographic characteristics of the farmers, along with farmers' access to and utilisation of financial services.

Descriptive statistics are a crucial initial step in any empirical investigation and should precede making inferential statistical comparisons (Kaur et al., 2018). The findings are presented using means, percentages, and visual representations, such as bar and pie charts, to provide a clear overview of the data. The mean is arguably the most recognised form of descriptive statistic (Vetter, 2017). It is calculated by dividing the total sum of the values by the number of observations (sample size) (Vetter, 2017). Generally, the mean is reported for continuous data (interval or ratio) that conform to a normal distribution (Vetter, 2017). A percentage conveys a portion as a fraction of 100, and the cumulative percentage of a complete dataset should always total 100% (Kaur et al., 2018).

Visual representations for descriptive statistics are an effective and prevalent way to convey results. The purpose of a graph is to depict data that are too numerous or complex to be effectively described in written form (Slutsky, 2014). As the saying goes, “a picture is worth a thousand words”; therefore, graphs are among the most straightforward and understandable formats for presenting data (Vetter, 2017). Bar graphs are utilised to compare the value of a single variable across various groups (Slutsky, 2014). Additionally, bar graphs can be composed of either horizontal or vertical columns (Slutsky, 2014). The histogram, referred to as a frequency distribution graph, is a specialised variant of a bar graph that resembles a column graph but has no gaps between the columns (Vetter, 2017). It is used to illustrate data from measuring a continuous variable (Slutsky, 2014). Individual data points are organised into classes to demonstrate the frequency of data within each class (Slutsky, 2014). The frequency is assessed by the area of the column (Slutsky, 2014). These can illustrate how a measured category is spread along a measured variable (Slutsky, 2014). In contrast, a pie chart represents classes or groups of data in relation to the entire dataset (Vetter, 2017). The complete pie illustrates all the data, with each slice or segment representing a distinct class or group within the whole (Slutsky, 2014). After presenting the study's variables using descriptive statistics, inferential statistical comparisons follow.

4.5.3. The Poisson Model

This study utilised the Poisson model to identify the factors affecting multidimensional financial inclusion among smallholder farmers. Given that financial inclusion was assessed as a count variable representing the number of satisfactory accomplishments across the twenty-nine MFI index indicators, the Poisson regression model was suitable for this analysis (Sinyolo et al., 2018). The Poisson model offers a statistical approach for count data, where the occurrence of events corresponds to a Poisson distribution characterised by a single parameter (λ), representing both the mean and variance of the distribution (Olutumise, 2023).

The model was defined in the following manner:

$$\begin{aligned} FI_i | X_i &\sim \text{Poisson}(\lambda_i) \\ E(FI_i | X_i) &= \exp(X_i' \beta) = \lambda_i \end{aligned} \quad (3)$$

where FI_i denotes the level of financial inclusion (count of adequate achievements) for the i^{th} farmer, X_i is a vector of explanatory variables as shown in Table 3 below, β is a vector of parameters to be estimated, and λ_i represents both the mean and variance of the distribution. The explanatory variables comprised age, gender, education, land size, contact with extension services, access to water, marital status, ownership of land, membership in groups, and access to markets, as detailed in Table 3 below.

The model can be expressed as follows:

$$Y_i = \alpha + \beta_1 \widehat{FI}_i + \sum_{k=2}^K \beta_k X_{ik} + \varepsilon_i \quad (4)$$

where:

- Y_i = household welfare outcome for the i^{th} farmer,
- $\widehat{FI}_i$ = predicted financial inclusion score from the Poisson regression,
- X_{ik} = vector of control variables, including age, gender, education, land size, extension contact, water access, marital status, land ownership, group membership, and market access,
- α = intercept term,
- $\beta_1, \beta_2, \dots, \beta_K$ = regression coefficients to be estimated, and
- ε_i = error term capturing unobserved factors affecting welfare.

After running the Poisson regression model to determine the factors that affect the number of financial services utilised by smallholder farmers, maximum likelihood estimation (MLE) was used to derive the parameter estimates (Cameron & Trivedi, 2013). Subsequently, a goodness-of-fit test was conducted to assess the model's ability to accurately represent the observed data (Cameron & Trivedi, 2013). This test involves comparing the actual counts to the counts predicted by the Poisson model (Cameron & Trivedi, 2013). Additionally, the assumption of equidispersion, which states that the mean and variance of the dependent variable are the same, ($E[Y_i] = Var[Y_i]$) was tested. In cases where the variance exceeds the mean, known as overdispersion, the Poisson assumption is violated, and a Negative Binomial model becomes more appropriate for accounting for the extra variability (Cameron & Trivedi, 2013). However, if the mean and variance are approximately equal, the Poisson specification is considered suitable for the analysis (Cameron & Trivedi, 2013).

4.5.4. The Probit Model

In addition to the Poisson model, the study employed a probit regression model to determine the factors affecting the multidimensional financial inclusion index among smallholder farmers in Makhanda, utilising the same variables. Using the Alkire–Foster methodology, a cut-off value of 0.66 was set to distinguish between farmers that are financially included and farmers that are excluded. The study adopted this cut-off point from Adgebite et al (2021). Adgebite et al (2021) state that setting a high threshold would imply that few respondents would be categorised as financially adequate, and a low threshold would imply that it is not challenging for most rural smallholder farmers to achieve financial adequacy; hence, a cut-off point of 0.66 is the best cut-off to use because it ensures that a farmer is classified as financially excluded only when it experiences substantial and overlapping deprivations across most financial inclusion indicators. This binary classification enabled the application of a Probit regression model.

The probit model is a type of probability model that employs a cumulative normal distribution to predict the likelihood of an event happening, with the random variable being expressible as a linear combination of various explanatory variables (Martinez et al., 2013). The selection of this model was based on the dependent variable, the MFI index, which was transformed into a binary outcome variable. A value of 1 signifies that the farmer is financially included, while a value of 0 indicates financial exclusion. This characteristic makes the probit model suitable for

estimating the likelihood of financial inclusion based on various socio-economic and demographic features. Furthermore, the probit model was chosen for its ability to reduce bias in small sample sizes ($n < 300$), making it more suitable than a logit regression, given the sample size of this study ($n = 100$) (Martinez et al., 2013; Asuming et al., 2018).

The Probit model is formally articulated as follows:

$$P(Y_i=1|X_i) = \Phi(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki}) \quad (5)$$

where:

- Y_i indicates the financial inclusion status of farmer i (1 = included, 0 = excluded),
- X_i is a set of explanatory variables encompassing age, gender, education level, land size, support from extension officers, access to water, farming experience, household income, marital status, land ownership, membership in farming groups, and market access as shown in Table 3 below.
- The parameters denoted by β_i can be estimated, and
- $\Phi(\cdot)$ represents the cumulative distribution function (CDF) of the standard normal distribution.

This model operates under the assumption of an unobservable (latent) variable Y_i^* , which signifies the underlying likelihood of a farmer achieving financial inclusion. It can be represented as:

$$Y_i^* = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \dots + \beta_k X_{ki} + \epsilon_i \quad (6)$$

where ϵ_i is an error term that is presumed to follow a standard normal distribution. The visible binary outcome is defined as:

$$Y_i = \begin{cases} 1 & \text{if } Y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \quad (7)$$

The parameters (β) were derived using Maximum Likelihood Estimation (MLE), which assures efficient and reliable coefficient estimates (Martinez et al., 2013; Asuming et al., 2018). After the estimation process, marginal effects were analysed to explain the extent and direction of each explanatory variable's impact on the probability of being financially included (Martinez et al., 2013; Asuming et al., 2018). The marginal effects illustrate how a single-unit change in

an independent variable influences the likelihood of inclusion, *ceteris paribus* (Martinez et al., 2013).

4.5.5. Variables included in the models and the expected relationship based on empirical literature studies

Table 4.2 below presents the explanatory variables included in both the Poisson and probit models (to be discussed below), highlighting the expected relationships with the treatment variable, specifically the connection between the variable and the MFI index. Additionally, the outcome variables used in the propensity score matching analysis (to be discussed below) are also displayed.

Table 4.2: Explanatory variables included in the Poisson, Probit models, and PSM Models.

Variable Code	Variable Description	Expected Sign
Outcome Variables		
HFIAS	Household Food Insecurity Access Scale (24 questions aggregated into a score)	–
HHDS	Household Dietary Diversity Score (number of food groups consumed over 30 days)	+
LIVESTOCK	Number of livestock owned (proxy for wealth)	+
ASSETS	Value of assets owned (ZAR)	+
Depended Variable		
MFII	Multidimensional Financial Inclusion Index (1 = financially included if MFII $\geq$ 0.66; 0 = excluded if MFII < 0.66)	+
Independent Variables		
AGE	Age of respondent (years)	+ / –
GENDER	Sex of respondent (1 = Male; 0 = Female)	+ / –
EDUCATION	Education level (highest grade completed)	+
LAND_SIZE	Total size of land owned/used (m ²)	+
EXT_CONTACT	Had contact with an extension officer (1 = yes; 0 = no)	+
WATER_ACCESS	Number of days with access to water (past 30 days)	+
FARM_EXP	Years of farming experience	+ / –
TOTAL_LU	Total livestock units owned	+
HH_INCOME	Total household income (ZAR)	+
MARRIED	Marital status (1 = married; 0 = otherwise)	+
OWN_LAND	Ownership of farmland (1 = yes; 0 = no)	+
GROUP_MEMBER	Membership of farmer/other group (1 = yes; 0 = no)	+
MARKET_ACCESS	Sold crops (1 = yes; 0 = no)	+

4.5.5.1 Outcome Variables Used In The Propensity Score Matching

A comprehensive framework is necessary to evaluate welfare outcomes for smallholder farmers, particularly in circumstances where formal income is erratic, production is variable, and families rely on multiple livelihood strategies. Consequently, this research employed four outcome indicators: the Household Food Insecurity Access Scale (HFIAS), determined through 24 questions compiled into a single score; the Household Dietary Diversity Score (HDDS), assessed by the variety of food groups consumed over a period of 30 days; Livestock Ownership, indicated by the total number of livestock held as a measure of wealth; and Asset Value, calculated as the cumulative monetary worth of household and agricultural assets in South African Rand (ZAR). Each indicator encompasses a distinct yet complementary aspect of household welfare. These outcome variables encompass food security, nutritional adequacy, economic resilience, and accumulated wealth, making them suitable for examining the pathways through which financial inclusion affects welfare.

4.5.5.2 Dependent Variables Used In The Models

The age of individuals can positively affect access to financial inclusion. Various studies, such as Kiplimo et al. (2015), Chandio et al. (2021), and Mhlanga and Dunga (2020), suggest that the age of smallholder farmers significantly influences the ability to access credit and achieve financial stability. Kiplimo et al. (2015) found that older farmers are more inclined to secure financial assistance, likely due to owning assets that can serve as collateral. Similarly, Chandio et al. (2021) highlighted the role of age and experience in obtaining credit, noting that middle-aged farmers with considerable expertise and education have a higher likelihood of loan approvals. Research conducted by Mhlanga & Dunga (2020), and Abel et al. (2018) reveals a positive correlation between age and financial inclusion, indicating that financial engagement tends to increase with age.

Gender is another factor that may influence financial inclusion. Gender was categorised as 0 = Female, 1 = Male. Tetteh et al. (2015) noted that women were more likely than men to secure loans; however, women typically borrowed smaller amounts due to the requirements set by banks. This may suggest that women face societal and cultural barriers when seeking larger loans, despite generally demonstrating better creditworthiness and repayment capacity (Tetteh et al., 2015). Conversely, men often pursue larger loans for agricultural endeavours, as they

usually possess greater social and political leverage, along with control over household financial resources (Tetteh et al., 2015). Likewise, Ayinde et al. (2023) and Zeka & Alhassan (2023) emphasise the disparities related to gender in terms of financial inclusion and resilience. Ayinde et al. (2023) found that male farmers had significantly higher financial inclusion, as indicated by a multidimensional financial inclusion index (MFII) score of 0.38, whereas female farmers scored 0.31. These findings suggest that men tend to have a higher level of financial inclusion. This gap suggests that female farmers face greater multidimensional financial exclusion, likely stemming from structural, socio-cultural, or economic challenges that hinder access to and effective use of financial products and services (Ayinde et al., 2023).

In terms of education levels, multiple studies have shown that attaining a higher level of education enhances smallholder farmers' ability to access agricultural financing and has a positive impact on farmers' overall financial health. Evidence from nations such as Zimbabwe, Nigeria, and South Africa suggest that education plays a crucial role in promoting financial inclusion. Research conducted by Sebbata et al. (2014), Kiplimo et al. (2015), Wentzel et al. (2016), Mhlanga & Dunga (2020), and Ayinde et al. (2023) found a strong positive correlation between educational achievement and the chances of obtaining loans or credit. Farmers with advanced educational backgrounds have a greater understanding of financial systems and are considerably more capable of securing credit as they better grasp essential financial concepts such as interest rates, assets, and liabilities (Mhlanga & Dunga, 2020).

The total farming area was recorded in square meters (m^2). To facilitate comparison among farmers, the area of a single plot was standardised to 25 m^2 , a size that is typically recognised as the standard plot size (FAO, 2017). Land size is expected to have a positive relationship with access to financial inclusion. According to Kiplimo et al. (2015), the size of farming households in the study area ranged from 0.25 to 96 acres (approximately 1,012 to 388,502 m^2). Households without access to credit generally had smaller landholdings, averaging 2.66 acres (approximately 10,762 m^2), while smallholder farmers with access to credit owned slightly larger farms, averaging 2.84 acres (approximately 11,497 m^2). Similarly, Priyadashini (2020) found a positive correlation between land ownership and financial inclusion, suggesting that farmers owning land are more likely to seek loans and additional financial services. Chissa (2019) also stated that having access to land and owning it has a positive correlation with financial inclusion.

Access to information is also positively linked to whether an individual is financially included or excluded (Yu et al., 2023). In the past year, having access to an extension officer was recorded as 1 (yes) or 0 (no). The assistance offered by extension officers encompassed market insights, input supplies, agricultural training, and financial support. Another factor to consider was the participation of farmers in any groups, such as savings associations, burial funds, or religious organisations. As noted by Yu et al. (2023), belonging to a group or association can help alleviate issues related to information asymmetry and moral hazards; therefore, when smallholder farmers are part of any group, there is a greater likelihood of being financially included. Sebatta et al. (2014) further emphasise that access to information is crucial for obtaining credit services, as it facilitates awareness of the availability of such services or helps establish connections to locations where borrowing conditions are more favourable.

To assess water access, farmers were asked about the number of days they had continuous access to water over the past 30 days. The relationship between access to water and the financial inclusion of smallholder farmers is positively correlated. Touch et al. (2024) highlight that smallholders encounter various obstacles that jeopardise agricultural productivity and livelihoods. Environmental issues, such as soil degradation, loss of biodiversity, and water scarcity, significantly hinder productivity and restrict smallholders' ability to meet the increasing food demand. Having limited water access diminishes agricultural production, which subsequently impacts farmers' capability to market crops. In this research, market access was evaluated based on whether crops were sold, assigned a value of 1 for "yes" and 0 for "no." Earlier research by Wentzel et al. (2016), Priyadarshini (2020), Gichuki and Kamu (2022), Seluhinga (2023), and Ayinde et al. (2023) suggests that generating income through market participation is crucial for enhancing financial inclusion. Income is a crucial factor determining access to financial services and overall financial inclusiveness.

The dummy variable representing the marital status of the household head was assigned a value of 0 for farmers that were single, widowed, or cohabiting, while households led by married heads were designated with a value of 1. In terms of financial inclusion, there is a heightened probability of loan approval associated with marital status. For instance, Mhlanga et al. (2021) discovered a significant positive correlation between marital status and financial inclusion in South Africa. The study revealed that married individuals were 1.916 times more inclined than singles to establish investment accounts, demonstrating a greater demand for financial services

(Mhlanga et al., 2021). Similarly, Kiplimo et al. (2015) found that marital status had a significant influence on access to financing for smallholder farmers in Kenya. Married farmers were more likely to secure loans due to the tendency to make collective decisions and share responsibilities, which renders farmers more reliable borrowers in the eyes of lenders (Kiplimo et al., 2015). This trend may be attributed to enhanced financial stability and collaborative decision-making among married couples (Mhlanga et al., 2021).

4.5.6. Propensity Score Matching

This study used the propensity score matching (PSM) method to investigate the impact of financial inclusion status on the well-being of smallholder farmers, focusing on food security, agricultural productivity, and poverty reduction. PSM is a statistical technique used to estimate the causal effects of a treatment, program, or intervention by addressing selection bias and observable differences between groups individuals that received the treatment and individuals without (Wan, 2025). To evaluate food security, this study utilised the Household Food Insecurity Access Scale and the Household Dietary Diversity Score as indicators. For measuring agricultural productivity, net profit from crop production was adopted as the assessment criterion. The welfare status of poverty farmers was assessed using social grants, the total value of owned assets, and the quantity of livestock owned as measures.

In accordance with Rosenbaum & Rubin (1983), the propensity score represents the conditional probability that a farmer is financially included, given a set of observed characteristics (Austin, 2011). The propensity score is estimated as follows:

$$P(X_i) = Pr(D_i = 1 | Z_i) \quad (1)$$

where:

- D_i is the treatment indicator, which equals 1 if farmer i is financially included and 0 if otherwise.
- Z_i is a vector of observed covariates influencing both financial inclusion and welfare outcomes. These variables include age, gender, education level, household size, farm size, access to credit, access to extension services, and market distance.
- $P(X_i)$ denotes the estimated propensity score for farmer i .

The impact on the welfare of smallholder farmers was assessed by estimating the Average Treatment Effect on the Treated (ATT), which represents the average difference in outcomes attributable to financial inclusion status.

The primary parameter of interest is the Average Treatment Effect on the Treated (ATT), defined as follows:

$$ATT = E[Y_1 - Y_0 \mid D = 1] \quad (2)$$

where:

- Y_1 represents the welfare outcome (such as food security, productivity, or poverty status) if the farmer is financially included, and
- Y_0 represents the welfare outcome if the same farmer were not financially included.

To verify the results, matching techniques such as neighbour, kernel, and radius matching are employed to estimate the Average Treatment Effect on the Treated (ATT) (Jabbar et al., 2025). Nearest-neighbour matching is a widely utilised method for forming matched pairs, where each treated individual is paired with an untreated counterpart that has the closest propensity score (Austin, 2011). In cases of ties, one control subject is randomly selected (Austin, 2011). This procedure can be executed with or without replacement, allowing control subjects to be included in multiple pairs (Lalani et al., 2020). While a threshold can be implemented to evaluate the overall quality of the matches, the traditional nearest-neighbour approach does not impose any limits on the distance between the propensity scores of matched pairs (Lalani et al., 2020).

In contrast, radius matching involves pairing treated and control observations based on propensity scores that lie within a specified range. Treated units are matched to individuals with propensity scores that fall within this defined radius (Caliendo & Kopenig, 2008). Utilising smaller ranges can enhance the quality of the matches by ensuring that matched units are closer in proximity (Caliendo & Kopenig, 2008). However, this method may lead to missed matches if no suitable control units can be found within the established radius (Caliendo & Kopenig, 2008). The kernel matching technique relies on weighted averages derived from all individuals in the comparison group to estimate the counterfactual effect (Christian & Obi, 2018). The weights are determined by the distance between each individual in the comparison group and the treated observation for which the counterfactual is being estimated (Christian &

Obi, 2018). Hence, employing all three methods, nearest-neighbour, radius, and kernel matching, facilitates cross-validation of the results while reducing biases that may arise from relying on a single algorithm (Jabbar et al., 2025). The consistency of findings across these methodologies further solidifies the credibility of the results (Jabbar et al., 2025).

To assess the sensitivity of the estimated treatment effects, a Rosenbaum bounds methodology is utilised since the outcome variables are continuous (Liu et al., 2024). The Rosenbaum bounds technique generally seeks to identify the critical limits for the associations between the unobserved confounder, the exposure, and the outcome, which would result in the study's inference test statistics becoming insignificant (Liu et al., 2014). Consequently, this analysis reveals the extent to which an unobservable variable must impact the selection process in order to compromise or negate the findings derived from the matching of observable characteristics (Phakathi, 2022).

4.6. Summary

This chapter presented the methodological approach used to examine the multidimensional financial inclusion and welfare outcomes among smallholder farmers in Makhanda. The chapter began by outlining the research paradigm and justified the adoption of a post-positivist stance, which allows the use of both quantitative and qualitative evidence to build a more comprehensive understanding of farmers' financial behaviours and constraints. The study area was described to contextualise the sampling process and the socioeconomic environment in which smallholder farmers operate. The chapter then detailed the data collection methods, including the multidimensional financial inclusion questionnaire and focus group discussions, which provided nuanced insights into the lived experiences of farmers. The empirical strategy was also discussed, encompassing the construction of the multidimensional financial inclusion index, the application of descriptive analysis, and the use of Poisson and Probit models to identify the determinants of the multidimensional financial inclusion. Furthermore, the propensity score matching was discussed to evaluate the welfare impact of smallholder farmers. Overall, the methodology outlined in this chapter provides a rigorous and systematic framework for addressing the study's objectives, forming the foundation for the presentation and interpretation of results in the next chapter. The following chapter presents descriptive statistics, providing an overview of the essential features of the sampled smallholder farmers.

CHAPTER 5: DESCRIPTIVE STATISTICS

5.1 Introduction

This chapter presents a descriptive statistical analysis of smallholder farmers in Makhanda, Eastern Cape, aimed at providing an overview of the demographic, socioeconomic, and financial inclusion and resilience levels. Descriptive statistics, including means, visual tools, Likert scales and percentages, are used to describe the respondents' characteristics, such as farming conditions, access to financial services, and indicators of welfare. The analysis focuses on identifying the factors that influence farmers' access to financial services and the level of inclusion, as measured by the multidimensional financial inclusion index. Furthermore, the descriptive findings are presented to show differences in financial inclusion and welfare outcomes among farmers in terms of gender, education, land size, and access to resources. The chapter is structured as follows: Section 5.2 discusses descriptive statistics on the financial inclusion and resilience status of farmers; Section 5.3 examines the socio-demographic characteristics; Section 5.4 elaborates on farming characteristics; and Section 5.5 explores welfare and food security indicators. Images taken during field visits are also included to offer a visual representation of the farming conditions in the study area. Lastly, section 5.6 gives a summary of the descriptive statistics.

5.2 Overview of Smallholder Farmers' Financial Inclusion and Resilience Levels

5.2.1 Access

As stated in Chapter 3, access evaluates how easily individuals can utilise formal financial services, which include having a bank account, acquiring credit, and obtaining savings and insurance products. In this study, access was measured in terms of whether the farmer has a bank account (1 = yes and 0 = no). The second indicator that was included in the access domain is whether a farmer has a credit card.

Table 5.1: The results of the access domain from the MFI index.

Question	Yes	No
Do you have a bank account?	98	2
Do you have a credit card?	1	99

Source: Own survey (2025)

Table 5.1 shows that out of the 100-sample size, 98% farmers had a bank account, and 2% did not have a bank account. The results show that the majority of farmers have a bank account, which aligns with the findings from the Global Findex, which states that as of 2021, approximately 84% of South Africans have a bank account (World Bank, 2024). From the second question, which asked about having access to a credit card, the majority of farmers (99%) said no, and only one farmer said yes. Agriculture, a sector highly vulnerable to climate change, relies heavily on credit to invest in modern technology for efficiency and production (Thlapi, 2023). However, many smallholder farmers in South Africa remain excluded from commercial bank loans, despite making up a significant portion of the farming population (Thlapi, 2023). The reasons for this are due to a lack of collateral, as well as the fact that most farmers are reluctant to take loans due to high transaction costs (Savoy, 2022). Furthermore, high interest rates and rigid repayment terms discourage smallholder farmers from having credit cards (Motete, 2025). This pattern foreshadows later findings in usage and quality that access without depth leaves welfare largely unchanged and exposes households to shocks.

5.2.2 Usage

Usage refers to the frequency and extent of utilisation of financial services, including regular deposit and withdrawal activities, as well as participation in formal savings or credit programs. To construct this domain, the study considered the use of electronic transfers (e.g., EFT) for purchasing farming inputs, credit card usage for both farming inputs and personal expenses, full repayment of credit card balances, and deposits into bank accounts. Additionally, reasons for saving were captured, such as preparation for farm-related risks, purchasing inputs, or covering family expenses. Responses were measured on a four-point Likert scale: 0 = never, 1 = rarely, 2 = sometimes, and 3 = often.

Table 5.2: The Likert scale of the usage domain from the MFI index

Question	Never	Rarely	Sometimes	Often
Used the internet/EFT for farm supplies in the past 12 months?	95	2	2	1
In the past 12 months, have you personally used your credit card to cover farm-related expenses?	100	0	0	0
In the past 12 months, have you, personally, used your credit card to pay for personal items (e.g. groceries)?	99	0	1	0
In the past 12 months, did you pay off ALL your credit card balances in full by their due date?	99	0	0	1

In the past 12 months, has money ever been deposited into your personal account(s)?	39	10	19	32
In the past 12 months, have you personally saved or set aside any money FOR farm damage due to drought/floods (emergencies)?	56	9	24	11
In the past 12 months, have you personally saved or set aside any money for farm inputs?	48	12	29	11
In the past 12 months, have you personally saved or set aside any money for Family expenses?	25	5	20	50

Source: Own survey (2025)

Usage indicators reveal a disconnect between basic access and effective engagement. The non-use of digital payments (95%) and no use of card transactions (100%) indicates that financial behaviour remains cash-centric and episodic, with formal accounts used primarily as pass-throughs for deposits and withdrawals rather than as platforms for planned saving or enterprise transactions. Importantly, saving behaviour is skewed to household needs, with limited, irregular saving for farm emergencies or inputs. This pattern suggests low financial slack and short planning horizons, consistent with income volatility and thin margins; it also explains why shocks transmit quickly into food insecurity and asset sales. In short, usage does not yet support resilience.

5.2.3 Quality

The third domain of the MFI index focuses on quality, evaluating the suitability, reliability, and satisfaction levels of financial services for farmers, as well as the ability to meet these farmers' financial needs. The quality domain covers various factors, including credit card transactions, withdrawals from personal accounts, and savings deposits in bank accounts. In addition, the study also considered sources of financial worry, such as a lack of funds for farming expenses, medical care, groceries, and educational fees, using a three-point Likert scale (1 = very concerned, 2 = somewhat concerned, and 3 = not concerned at all).

Table 5.3: Responses of farmers related to the quality domain of the MFI index

Question	Never	Rarely	Sometimes	Often
In the past 12 months, did you pay off all your credit card balances in full by their due date?	99	0	0	1
In the past 12 months, has money ever been taken out of your personal account(s)?	17	16	21	46
Do you typically keep any money in your bank account	56	14	20	10

Source: Own survey (2025)

Table 5.3 reveals that 99% of farmers did not fully pay off credit card balances by the due dates, suggesting that most farmers have limited or no use of credit cards, as indicated in Table 5.1, where 99% of the farmers reported not having a credit card. In contrast, among the 32% of farmers that deposit money into the banking accounts (as shown in Table 5.1), 46% reported frequently withdrawing funds from personal accounts, indicating a heavy reliance on cash for transactions and daily expenses. Additionally, more than half of the farmers (56%) stated not keeping money in bank accounts, possibly reflecting a preference for cash due to accessibility or a lack of trust in formal financial institutions. According to the World Bank (2024) South African adults still receive or make common payments in cash.

Table 5.4: The levels of financial worry among smallholder farmers

Question	Very worried	Somewhat worried	Not worried at all
Not having enough money for farm-related issues (such as inputs, market crop)	66	18	16
Not being able to pay for medical costs in case of a serious illness or accident	69	13	18
Not having enough money to pay for monthly expenses like groceries	70	16	14
Not being able to pay school fees or fees for education	45	9	46

Source: Own survey (2025)

Table 5.4 presents the levels of financial worry experienced by smallholder farmers. A significant number expressed deep concern about not having sufficient funds to meet the essential needs. Approximately 66% were very concerned about expenses related to farming, 69% about medical expenses, and 70% about affording groceries each month. Interestingly, concerns regarding school fees were more evenly distributed, with 45% expressing high levels of concern and 46% reporting no concerns at all. This may be attributed to the fact that most farmers stated that the children attended no fee-paying government schools, which accounts for the lower levels of concern. The anomaly is that formal accounts are present but do not function as safe stores of value, likely reflecting a combination of low surplus, fee sensitivity, and limited trust.

5.2.4 Financial Literacy

The financial literacy domain assesses farmers' comprehension, awareness, and knowledge of essential financial concepts, including various account types, credit scores, budgeting capabilities, and the operation of interest rates. Smallholder farmers were asked to rank the awareness of financial services and products on a four-point Likert scale.

Table 5.5: Likert scale response of smallholder farmers' financial literacy.

Question	Never	Rarely	Sometimes	Often
Do you create and follow a budget for managing your expenses?	18	12	28	42
Do you know how interest rates on credit cards or loans work?	61	14	11	14
Are you aware of your credit score and how it affects your ability to borrow?	70	13	6	11
Do you know the difference between saving and investing?	34	18	17	31
Are you familiar with different types of bank accounts, like savings, checking, and fixed deposit accounts?	45	18	12	25
Are you confident about your ability to make sound financial decisions?	5	10	16	69

Source: Own survey (2025)

The findings reveal that 42% of farmers frequently create and adhere to a budget, while 18% never engage in such practices, indicating that while some farmers implement budgeting, it is not consistently practised across the board. Farmers, when asked, stated that the challenge of budgeting was due to the limited income, with most relying on social grants for the livelihoods, a topic explored more thoroughly in Chapter 6.

In terms of financial knowledge, about 61% indicated a lack of comprehension of how interest rates on credit work, and 70% were unaware of the credit scores and the implications for obtaining loans. This highlights a significant lack of understanding of formal financial systems. Moreover, 45% were not familiar with various types of bank accounts, indicating a knowledge gap regarding available financial products and the advantages. In contrast, 31% of farmers claimed often recognise the distinction between saving and investing, suggesting a moderate awareness of fundamental financial principles. Approximately 69% expressed confidence in the ability to make informed financial choices, suggesting that despite low levels of financial knowledge, the self-assurance and decision-making capabilities are relatively high.

Table 5.5 suggests that while smallholder farmers in Makhanda demonstrate confidence in managing finances, there are significant shortcomings in essential areas of financial literacy, including an inadequate understanding of credit systems, types of accounts, and interest rates. Many smallholder farmers possess technical skills but lack knowledge of business skills, which would equip farmers businesses to grow, such as a lack of understanding of how financial services and products work, including interest rates on loans and different types of investments (Mtombeni et al., 2019). Consequently, literacy constraints cap the returns to access and contribute to low usage depth.

5.2.5 Financial Resilience

The resilience domain evaluates how financial inclusion enables farmers to manage financial challenges, considering access to emergency funds, climate-related resources, and available insurance options. Farmers were asked how they cope with an emergency such as a sudden farm expense. The farmers were provided with examples of how to generate income within the next 30 days, such as through savings, family support, employment, and borrowing from a bank. The respondents answered on a four-point Likert scale. The last question, on climate resilience, was asked on a five-point Likert scale.

Table 5.6: Likert Scale Responses on Financial Resilience: Sources of Funds for Smallholder Farmers in Hardship

Source of money	Never	Rarely	Sometimes	Often
Savings	38	6	27	29
Family/Relatives / Friends	21	13	35	31
Money from working (including selling crops)	44	2	13	41
Borrowing from a bank	91	1	6	2
Borrowing from an employer	88	3	9	0
Borrowing from a loan shack	79	3	13	5
Selling farm assets (e.g., equipment, livestock)	83	2	6	9
Insurance	84	3	10	3
I could not come up with the money	28	19	25	28
Borrowing from Stokvel	74	1	20	5

Source: Own survey (2025)

Table 5.6 presents the different sources of funding accessed by smallholder farmers in times of crisis. The findings reveal that income from work, particularly through crop sales, is the most prevalent and reliable source of funding for farmers during emergencies. This observation

highlights the crucial role of agricultural and informal employment in sustaining livelihoods, as noted by (Abraham & Pingali; 2020) and the World Bank, 2022). Assistance from family, friends, or relatives also significantly contributes, with 31% of respondents frequently and 35% occasionally receiving financial help through these social networks, highlighting the importance of informal financial support within communities. Savings represent an important funding source for a portion of farmers, with 29% often relying on savings, while 27% do so occasionally. However, a significant 38% never utilise savings due to insufficient funds, as the little income they receive is typically used for purchasing groceries and covering bills.

Formal borrowing methods seem to be the least favoured. A substantial majority of farmers (91%) reported never borrowing from banks, (88%) from employers, or (84%) from insurance providers, reflecting obstacles to accessing formal credit and financial services. Borrowing from loan sharks (79% never) and stokvels (74% never) is similarly limited, although a small number still partake in these options. Notably, 28% of respondents indicated that are unable to secure money when needed, and an additional 25% face this issue occasionally. This finding highlights a major challenge regarding financial resilience, suggesting that many farmers find it difficult to mobilise resources during emergencies or unexpected expenses.

The following section then categorised farmers into two groups based on the level of financial inclusion using the above variables constructed using the Alkire-Foster method to develop a multidimensional financial inclusion index. The results are then analysed using sociodemographic variables such as gender, household income, education, age and marital status.

5.3 Socio-Demographic Characteristics of the Respondents

5.3.1 Gender

Figure 5.1 illustrates the gender distribution of the 100 farmers in this study. About 62% of respondents were female, and 38% were male. The findings on gender in this study are consistent with other studies. For example, the Food and Agriculture Organisation of the United Nations has stated that women make up at least 80% of smallholder farmers in rural regions worldwide (FAO, 2023; ActionAid International, 2011). Furthermore, research in sub-Saharan

Africa has revealed that 66% of women are engaged in agri-food systems, compared to 60% of men, highlighting the crucial contribution of women in this field (FOA, 2023).

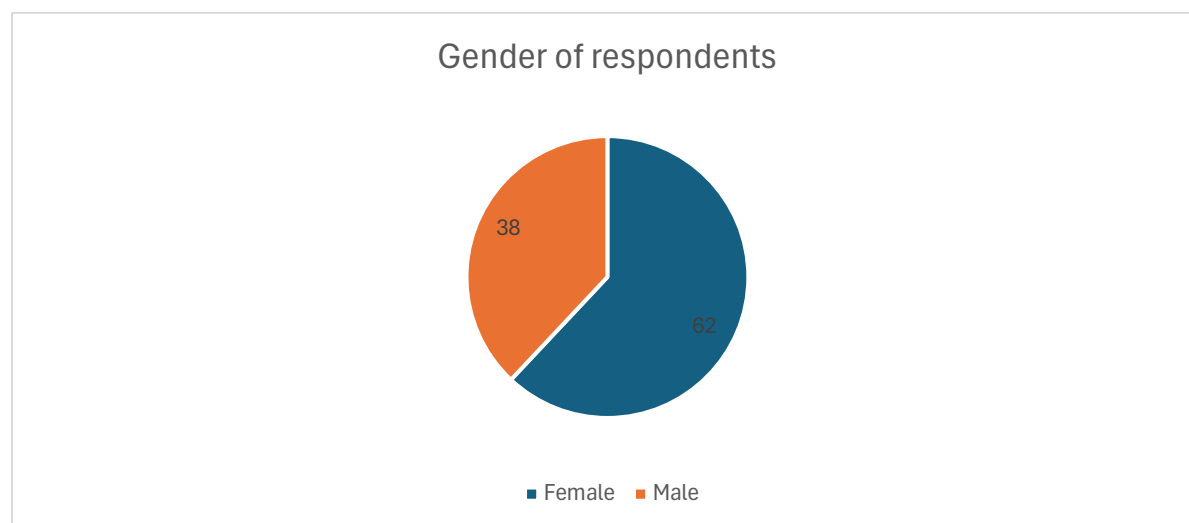


Figure 5.1: Gender of Smallholder Farmers in Makhanda

Source: Own Survey (2025)

In a study conducted in the township of Waterloo, KwaZulu-Natal, only two men participated, while the majority of participants were women from a cooperative (Mbokazi & Maharaj, 2021). Based on the findings of Bruwer's (2022) study in the Eastern Cape province, it was found that females dominated the sample, accounting for 57%, while men constituted 43% of the sample that participated in urban gardening. In contrast, Mhlanga & Dunga's (2020) study on smallholder farmers in Nigeria found that 65% of the participants were male and 35% were female. Thus, the finding of this study aligns with the fact that female farmers dominate the agricultural sector, especially in the smallholder sector.

5.3.2 Age

To assess the difference in age between financially excluded and included smallholder farmers, a two-sample t-test was conducted. Among the 100 respondent farmers, the average age of the household head was 55.23 years. Table 5.7 illustrates that excluded farmers were older ($M = 57.42$ years, $SD = 14.44$) than included farmers ($M = 51.33$ years, $SD = 18.21$), based on the age differences between the finally included and financially excluded smallholder farmers. According to this study, younger farmers are slightly more likely to be financially included ($t(98) = 1.84$, $p = 0.010$).

Table 5.7: Socio-demographic characteristics by average

Factors	Means			T-Test
	Pooled sample (n=100)	Financially included (n = 36)	Financially excluded (n = 64)	
AGE	55.23 (1.61)	51.33 (3.04)	57.42 (1.80)	1.84*
GENDER	0.38 (0.05)	0.44 (0.83)	0.34 (0.06)	0.99
EDUCATION	7.1 (0.41)	8.17 (0.71)	6.5 (0.48)	1.99**
HH_INCOME	3210.15 (208.45)	3452.25 (387.26)	3073.96 (242.91)	0.87
MARRIED	0.31 (0.05)	0.39 (0.08)	0.27 (0.06)	1.28

Significance levels are represented by * = 10%, ** = 5% and *** = 1%

Source: Own Survey (2025)

This outcome may stem from the observation that younger people tend to have greater awareness of financial services and products, resulting in higher financial inclusion compared to older individuals. For example, during fieldwork, it was observed that older farmers had limited knowledge of financial services and had a limited understanding of interest rates, credit scores, and the different types of bank accounts. In contrast, the younger adults exhibited a greater understanding of financial services and products, as illustrated in Figure 5.2.

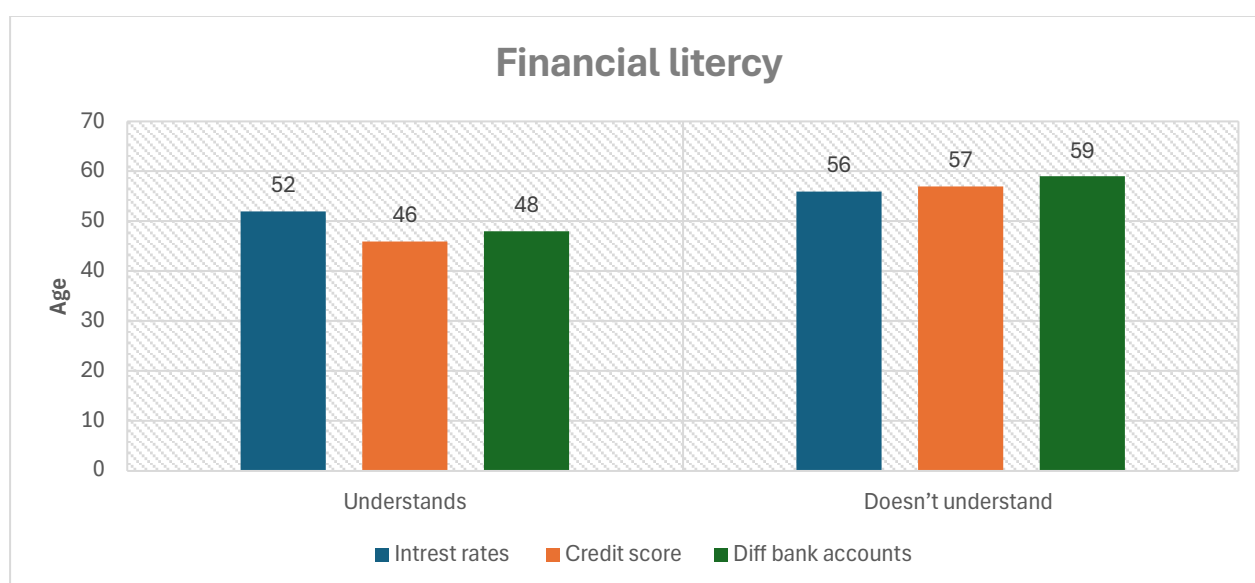


Figure 5.2: Financial Literacy of Smallholder Farmers in Makhanda based on Age
Source: Own Survey (2025)

5.3.3 Education Levels

According to the data presented in Table 5.7, the average education level of farmers within the sample area of Makhanda's townships is 7.1 years, suggesting that the respondents generally reach only the primary level of education. Farmers that are financially included exhibited a notably higher average education level of 8.17 years compared to excluded farmers, that had an average of 6.50 years. The difference is statistically significant at the 5% significance level ($t(98) = 1.993$). These findings suggest that financially included farmers have significantly higher education levels than excluded farmers. According to various studies by Sebbata et al. (2014), Kiplimo et al. (2015), Wentzel et al. (2016), Mhlanga & Dunga (2020), and Ayinde et al. (2023), a positive relationship exists between academic achievement and the likelihood of obtaining credit or loans. Farmers with higher levels of education have a better understanding of financial services and are more likely to secure credit (Mhlanga & Dunga, 2020). This illustrates how education empowers farmers to make informed decisions and seek financing with greater confidence.

5.3.4 Marital Status

Based on marital status, about 31% of smallholder farmers in the sample are married ($SE = 0.05$). This indicates that the majority (69%) of respondents are unmarried, suggesting that most households are headed by single, widowed, or divorced individuals. Based on the sample ($n=100$), about 49% of respondents are single, 10% are widowed, 7% are divorced, and 3% are cohabiting (Figure 5.3). Furthermore, the mean value for financially included respondents is 0.39 ($SE = 0.08$), compared to 0.27 ($SE = 0.06$) for financially excluded respondents. This suggests that married individuals are more likely to achieve financial inclusion compared to single counterparts.

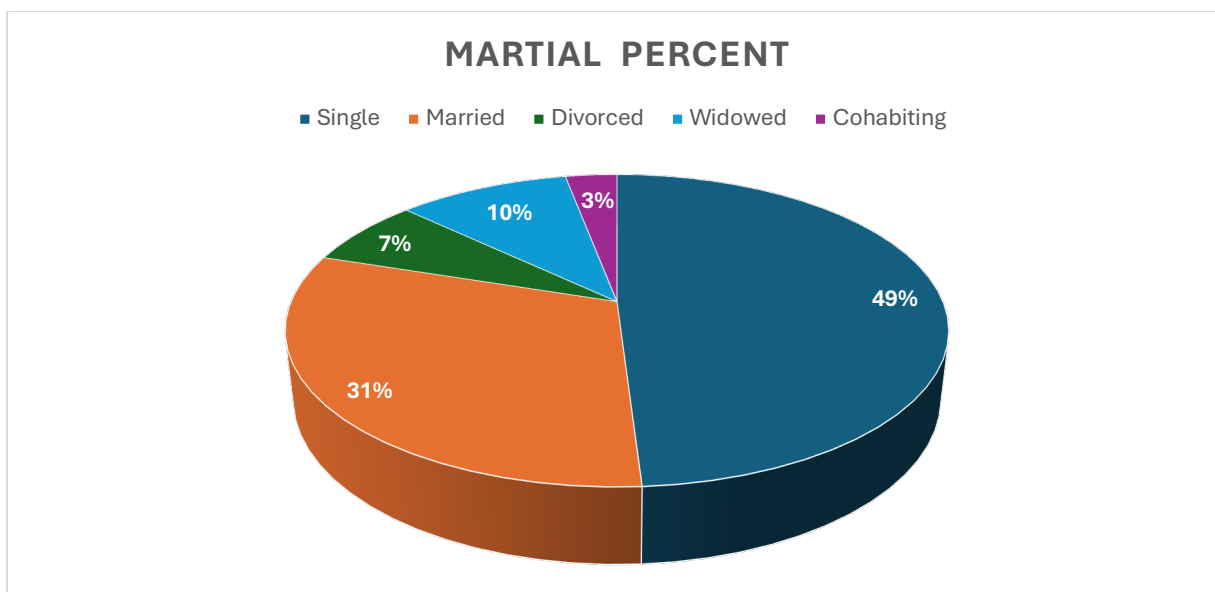


Figure 5.3: Martial Status of Smallholder Farmers in Makhanda
Source: Own Survey (2025)

5.3.5 Household Income

The results in Table 5.7 show that the average monthly household income among smallholder farmers was approximately R3,210.15 (SE = 208.45). Financially included farmers reported a higher mean income of R3,452.25 (SE = 387.26) compared to R3,073.96 (SE = 242.91) among financially excluded farmers. In addition to income derived from farming and other sources, social grants play a vital role in the livelihoods of many rural families.

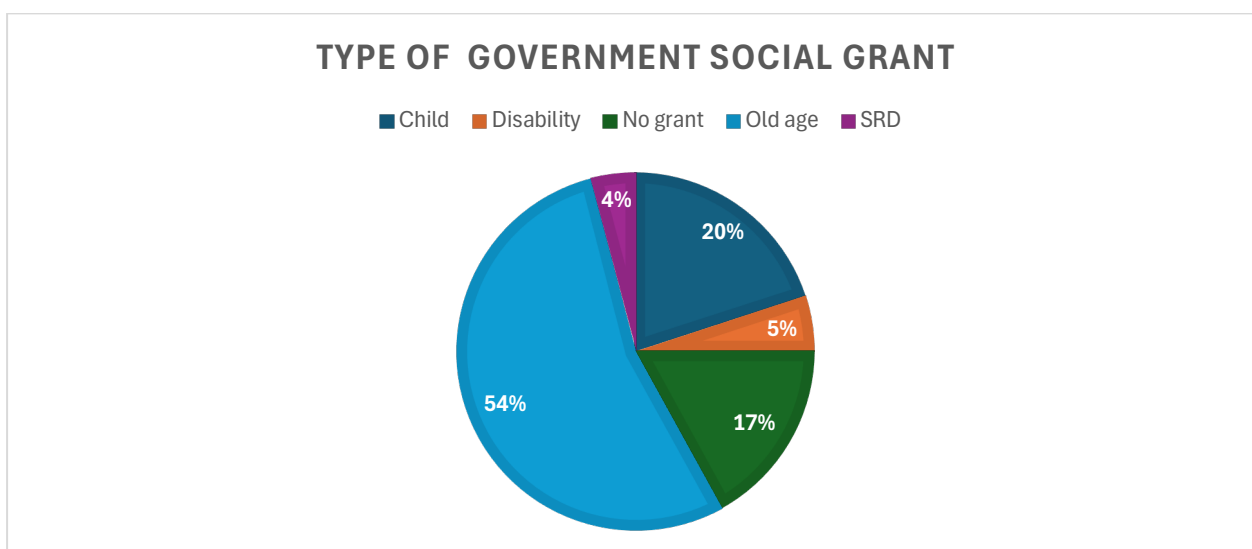


Figure 5.4: Types of social grants smallholder farmers have in Makhanda
Source: Own Survey (2025)

As illustrated in Figure 5.4, about 83% of the surveyed farmers receive at least one type of government social grant, highlighting the significance of state assistance in supporting rural livelihoods. The old age grant emerged as the predominant income source, benefiting 54% of the participants, which reflects the older demographic of the farming population. Furthermore, 20% of households received child grants, 5% obtained disability grants, and 4% accessed the Social Relief of Distress (SRD) grant. Only 17% of households indicated did not receive any form of government support. This trend suggests that a majority of smallholder farmers rely on government assistance to supplement income from both agricultural and non-agricultural sources. During fieldwork, when the smallholder farmers were questioned about the usage of social grants, about 41% of the respondents declared strongly to using the money to buy farm inputs such as seeds, fertilisers, or tools.

5.4 Farming Characteristics

This section offers a summary of the farming traits of smallholder farmers as presented in Table 5.8 below. The section analyses the various farming practices engaged in by the participants, the extent and ownership of land, availability of agricultural extension services and water, and involvement in markets. Furthermore, this section investigates whether farmers are part of organised groups or cooperatives.

Table 5.8: Farming Characteristics of Smallholder Farmers in Makhanda.

Factors	Means			T-Test
	Pooled sample (n=100)	Financially included (n = 36)	Financially excluded (n = 64)	
LAND_SIZE	140 (7.82)	147.94 (16.13)	135.53 (8.23)	0.76
EXT_CONTACT	0.58 (0.05)	0.78 (0.07)	0.47 (0.06)	3.12***
WATER_ACCESS	16.01 (0.94)	16.86 (1.59)	15.53 (1.17)	0.68
OWN_LAND	0.36 (0.05)	0.31 (0.08)	0.39 (0.06)	0.85
GROUP_MEMBER	0.58 (0.05)	0.69 (0.08)	0.52 (0.06)	1.75*
MARKET ACCESS	0.6 (0.05)	0.72 (0.08)	0.53 (0.06)	1.89*

Significance levels are represented by * = 10%, ** = 5% and *** = 1%

Source: Own Survey (2025)

5.4.1 Type of Smallholder Farmer

Among the 100 participants in the study, 52% identified as home gardeners, while 48% were associated with a cooperative, as shown in Figure 5.5.

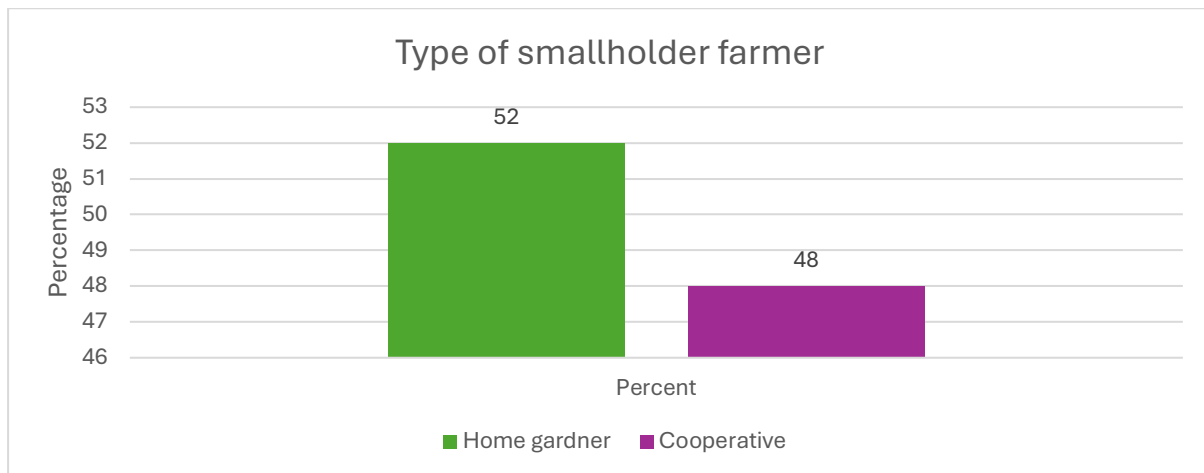


Figure 5.5: Types of smallholder farmers in Makhanda

Source: Own survey (2025)

The majority of smallholder farmers surveyed are home gardeners, which aligns with existing literature indicating that in most rural areas and urban townships, many households engage in home gardening. A notable advantage of home gardens is the ability to provide families with a consistent supply of vegetables, fruits, tubers, and medicinal plants that are rich in essential nutrients, including minerals and proteins (Khan et al., 2021). Additionally, home gardens enhance dietary diversity and play a crucial role in alleviating malnutrition, particularly in communities that primarily rely on cereal-rich diets (Galhena et al., 2013). In South Africa's Eastern Cape province, approximately 74% of households relied mainly on gardens for food needs (Mdiya & Mdoda, 2021). Especially for families facing low incomes and marginalisation, may struggle to afford expensive animal products to meet the nutritional needs (Galhena et al., 2013). Thus, home gardening offers a cost-effective source of healthy foods (Galhena et al., 2013).

5.4.2 Land size and Ownership

In terms of land size, Table 5.8 presents a comparison of the average land size between financially included and excluded farmers. The pool sample indicates an average land size of 140 m², with financially included farmers exhibiting a slightly higher mean land size of 147.94

m², in contrast to 135.53 m² for farmers without financial inclusion. Although the mean land size is marginally greater for financially included farmers, the difference between the two groups is not statistically significant ($t = 0.76$, $p > 0.05$). Furthermore, Figure 5.6 below illustrates a portion of smallholder farming plots within the Makhanda area. These plots are organised into small rectangular sections designated for vegetable cultivation, which highlights the scale and structure of home gardening practices. The plots are defined by footpaths and are surrounded by open land, suggesting a minimal reliance on mechanisation and an emphasis on manual labour. This arrangement is representative of the conventional layout found in urban and peri-urban gardens in Makhanda, where farmers primarily cultivate small parcels for household consumption (Department of Agriculture, Forestry and Fisheries, 2012). As illustrated in Table 5.8, the average land ownership among financially excluded farmers was recorded at 0.39, compared to 0.31 for financially included farmers.



Figure 5.6: Smallholder farming plots in the Umthathi Training Project Trust
Source: Own survey (2025)

5.4.3 Extension Office Support Services

Extension office support plays a crucial role in providing smallholder farmers with access to information. The smallholder farmers in the studied area were asked if they had contact with extension officers in the past 12 months, with responses coded as 1 (yes) and 0 (no). The average extension office supports the farmers got was 58%. In addition, the mean for financially included farmers was 78%, which was significantly higher than the 47% reported

by financially excluded farmers. The t-test result ($t = 3.12$, $p < 0.01$) reveals a statistically significant difference between these two groups at a 1% significance level. Table 5.8 showcases the various types of support that smallholder farmers received from extension officers.

Table 5.9: Extension officer support that smallholder farmers received over the past 12 months

Response	Financially included	Financially excluded
No support	17	46
Market information	33	36
Inputs	52	28
Agricultural training	5	32

Source: Own Survey (2025)

Table 5.9 displays the percentage of various types of support that smallholder farmers receive from extension officers, categorised by the financial inclusion status. On average, financially excluded farmers showed a higher percentage value (46%) for receiving no support, compared to financially included farmers (17%). This suggests that excluded farmers are more likely to lack access to extension services. The average values for market information were relatively similar between the two groups, with financially included farmers at 33% and financially excluded farmers at 36%. This indicates minimal variation in access to market-related information. In terms of input support, financially included farmers had a higher average of 52%, compared to 28% for excluded farmers. Agricultural training followed a similar pattern, with averages of 50% for included farmers and 32% for excluded farmers. Overall, these averages suggest that financially included farmers typically have better access to inputs and training, while financially excluded farmers are more likely to receive little to no support or rely on external funding programs.

5.4.4 Group Membership

In conjunction with the support from the extension office, group membership represents another factor that impacts an individual's access to essential information. Figure 5.7 illustrates the percentage of smallholder farmers affiliated with farmer groups or community-based organisations, including savings groups, church groups, and burial societies.

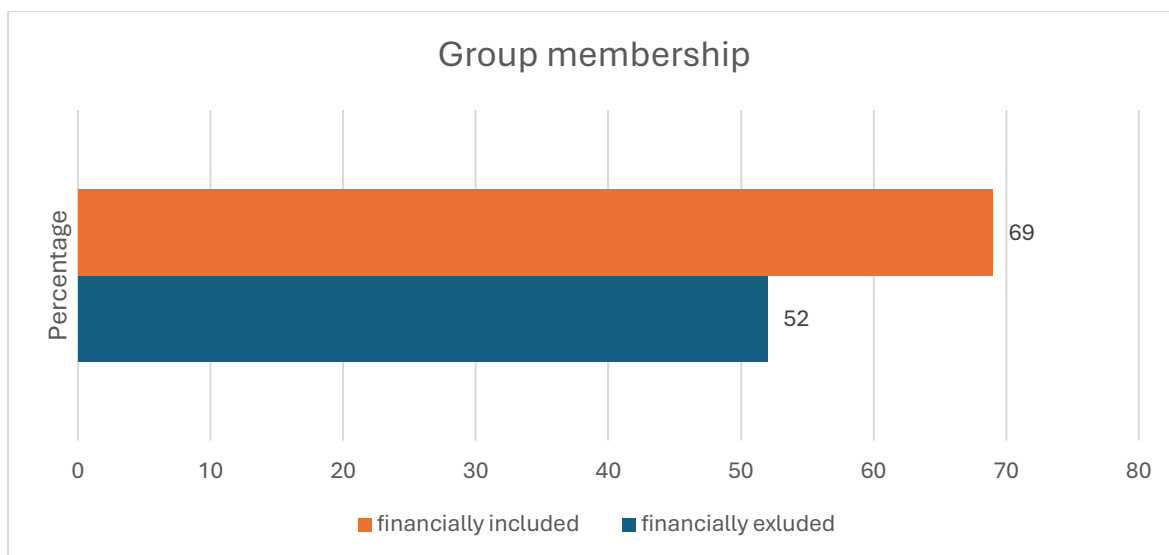


Figure 5.7: The number of financially included and excluded smallholder farmers in a group.

Source: Own survey (2025)

The findings indicate that 69% of financially included farmers participated in a group, in contrast to 52% were financially excluded. This observation demonstrates that being part of a group provides individuals with the necessary information to access financial services through information sharing, trust, and collective bargaining strength among farmers. Furthermore, groups also provide platforms for savings and credit associations, which can bolster members' creditworthiness and offer social support during periods of financial difficulty (Nkambule, 2022). As such, having access to information equips individuals to be financially resilient, enabling farmers to learn about saving and investment strategies (Nkambule, 2022; Mhlanga & Dunga, 2020). With enhanced information exchange and financial literacy, farmers are likely to make better-informed decisions, bridge knowledge gaps, and ultimately enhance financial well-being (Mhlanga & Dunga, 2020).

5.4.4 Water Access

Table 5.8 above showed the findings of a two-sample t-test that compares the number of days farmers had access to water over the last 30 days between smallholder farmers that are financially included and financially excluded. Farmers that are financially included reported an average access to water of 16.86 days per month, whereas financially excluded farmers had access for about 15.53 days. Although the difference of 1.33 days was not statistically

significant ($t = 0.68, p > 0.05$). This suggests that both groups face similar challenges regarding water availability, reflecting the broader infrastructural and environmental issues encountered by smallholders in Makhanda.

Inconsistent and limited access to water can hinder production, reduce crop yields, and ultimately compromise farmers' financial stability and food security. Figure 5.8 visually represents these issues. It is evident that farmers predominantly depend on water tanks for irrigation (Makana municipality, 2025). Makhanda is faced with a significant problem of severe drought that has nearly depleted Settlers' Dam, which supplies around half of the necessary water (Makana municipality, 2025).



Figure 5.8: Water scarcity that smallholder farmers in Makhanda face.
Source: Source: Own survey (2025)
(Picture taken by the author during field work)

Due to the water scarcity that Makhanda faces, farmers use water tanks to irrigate crops. However, these tanks frequently run dry due to water shortages, hindering consistent irrigation. When the tanks are empty, farmers turn to the dam water, which is often contaminated and not suitable for agricultural purposes, potentially endangering crop health. Additionally, as observed in the field, some farmers, especially elderly women, carry heavy water buckets to irrigate fields, which is a physically taxing task. These observations highlight the limitations of insufficient irrigation infrastructure and unreliable water access, which restrict the productivity and resilience of smallholder farmers in Makhanda (Makana municipality, 2025).

5.4.5 Market Access

A binary variable was created to evaluate farmers' ability to sell crops, where a value of 1 indicates 'yes' and 0 indicates 'no'. As shown in Table 3.8, farmers that can sell crops have an average market access of 72%, in contrast to 53% for financially excluded. The t-value of 1.89, which is significant at the 10% level, suggests a marginally significant difference between the two groups.

During fieldwork, when farmers were surveyed about the main crops, the majority indicated that to primarily cultivate spinach (66%), with potatoes and onions each comprising 13% and beetroot (4%). Most home gardeners and smallholder farmers typically grow crops such as spinach, onions, beetroot, cauliflower, pumpkins, potatoes, and cabbage (Mandiriza-Mukwirimba & Kritzinger, 2016). These crops are frequently chosen due to the relatively low production costs, suitability to local climatic conditions, and the ability to serve both household needs and generate income (National Agricultural Marketing Council, 2024). The prominence of these crop varieties also reflects farmers' approaches to enhancing food security while maintaining a certain level of financial stability through the sale of excess produce (Mandiriza-Mukwirimba & Kritzinger, 2016; National Agricultural Marketing Council, 2024).

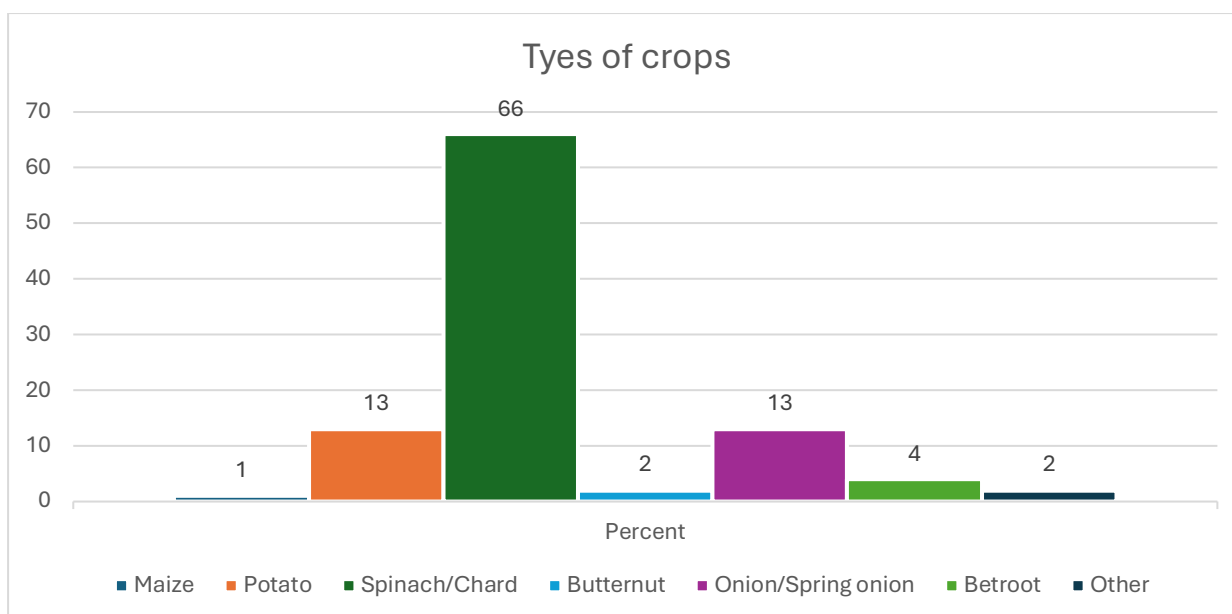


Figure 5.9: Types of crops that Smallholder Farmers in Makhanda Produce
Source: Own survey (2025)

5.5 Welfare and Food Security

This section outlines the welfare and food security aspects of smallholder farmers. The section provides an overview of household food security, dietary diversity, livestock ownership, and asset accumulation among farmers.

Table 5.10: Welfare and food security of smallholder farmers in Makhanda

Factors	Means			T-Test
	Pooled sample (n=100)	Financially included (n = 36)	Financially excluded (n = 64)	
HFIAS	13.01 (0.52)	11.94 (0.79)	13.61 (0.68)	1.54
HDDS	10.49 (0.14)	11.11 (0.20)	10.49 (0.18)	3.50 ***
LIVESTOCK	5.91 (1.86)	13.17 (4.89)	1.83 (0.54)	3.04***
ASSETS	22192.75 (4346.45)	29711.39 (7721.21)	17963.52 (5192.95)	1.30

Significance levels are represented by * = 10%, ** = 5% and *** = 1%

Source: Own survey (2025)

5.5.1 Household Food Insecurity Access and Household Hunger Scale

Table 5.10 presents the findings of a two-sample t-test examining the differences in food insecurity levels between smallholder farmers that are financially included and financially excluded. The Household Food Insecurity Access Scale (HFIAS) was created to assess the food insecurity levels experienced by households of smallholder farmers over the prior 30 days. This scale was designed in accordance with the guidelines established by the Food and Nutrition Technical Assistance (FANTA) project (Ballard et al., 2011). To measure the frequency and severity of food access-related issues, nine occurrence questions were employed, addressing concerns such as anxiety regarding food availability, decreased food quality, and inadequate food consumption. Each answer was assigned a value on a four-point scale: 0 = Never, 1 = Rarely, 2 = Sometimes, and 3 = Often. The responses were then totalled across all nine questions to produce a continuous HFIAS score that ranges from 0 to 24, with higher scores indicating higher levels of food insecurity (Ballard et al., 2011). Households were then categorised based on total scores into four classifications reflecting varying degrees of food insecurity: food secure (0–1), mildly food insecure (2–8), moderately food insecure (9–16), and severely food insecure (17–24) (Ballard et al., 2011).

Table 5.11: Household food insecurity status among the smallholder farmers in Makhandanda.

Household Hunger Categories	Percentage
Food secure	5
Mildly food insecure	26
Moderately food insecure	58
Severely food insecure	11
Total	100

Source: Own Survey (2025)

The data presented in Table 5.11 illustrate the levels of food insecurity among smallholder farmers. The results indicate that merely 5% of households are food secure, while 26% encounter mild food insecurity. The majority of the respondents, 58%, are categorised as moderately food insecure, suggesting that these households often worry about food availability and have to reduce the food intake. Additionally, 11% of smallholder farmers are identified as severely food insecure, indicating that the farmers in Makhandanda frequently experience days and nights without access to food. These findings emphasise that almost 70% of smallholder farmers face moderate to severe food insecurity, highlighting the vulnerability of farming families in Makhandanda.

Table 5.10 presents the average Household Food Insecurity Access Scale (HFIAS) scores for the overall sample as well as categorised by financial inclusion status. The average HFIAS score for the entire sample was 13.01, indicating a moderate level of food insecurity among smallholder farmers in Makhanda. Farmers with financial inclusion exhibited a slightly lower average score of 11.94, whereas financially excluded farmers showed a higher average score of 13.61. This implies that farmers that are financially excluded face higher levels of food insecurity compared to financially included. However, the difference in means ($t = 1.54$) does not reach statistical significance.

5.5.2 Household dietary diversity

Table 5.10 presents the average results of the Household Dietary Diversity Scores (HDDS) for financially included and financially excluded farmers. Financially excluded farmers had a mean HDDS of 10.14 ($SD = 1.40$), while financially included farmers had a mean HDDS of 11.11 ($SD = 1.19$). The mean difference of 0.97 indicates that financially excluded farmers had significantly lower dietary diversity compared to financially included households. The HDDS captures the variety of food groups consumed over the past 30 days, including cereals, vegetables, fruits, legumes, and animal-source foods. These findings suggest that financial inclusion contributes to a more diverse diet, likely due to increased access to resources, higher income, or greater market participation. Overall, the combined mean HDDS across both groups was 10.49 ($SD = 1.40$), indicating moderate dietary diversity among households, with noticeable differences between the financially excluded and included groups.

5.5.3 Livestock Ownership

Livestock is used as a proxy for measuring the welfare of households. Table 5.10 presents the findings of a two-sample t-test that compared livestock ownership between financially included farmers and financially excluded farmers. Farmers that were financially excluded had an average of 1.83 livestock units ($SD = 4.32$), while farmers that were financially included reported an average of 13.17 units ($SD = 29.34$). During fieldwork, smallholder farmers in Makhanda mentioned a variety of livestock, including cattle, chickens, goats, sheep, and pigs, as shown in Figure 5.10.

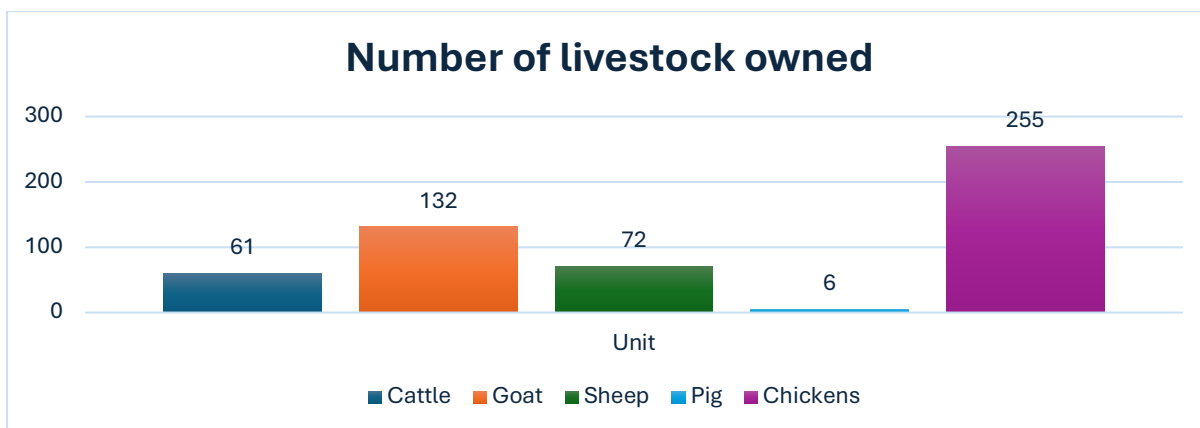


Figure 5.10: Types of Livestock Owned by Smallholder Farmers in Makhanda
Source: Own survey (2025)

Most farmers owned chickens, followed by goats, sheep and cattle, as shown in Figure 5.10. The least owned by farmers are pigs. The high number of units owned shows that livestock farming is crucial as it fulfils multiple roles in enhancing human welfare, ensuring food security, and generating income for households. Globally, this sector supports the livelihoods of nearly one billion people, particularly in marginal and arid regions where crop farming is less feasible (Bahata, 2022).



Figure 5.11: Poor Infrastructure of Chickens
Source: Own survey (2025)
(Picture taken by the author during field work)

Figure 5.11 illustrates the inadequate infrastructure of animal shelters used by smallholder farmers, highlighting the challenges they face in providing proper housing for the livestock. Inadequate shelters can leave animals vulnerable to extreme weather, predators, and illness, potentially diminishing livestock productivity.

5.5.4 Assets Owned

Another proxy for measuring wealth is the number of assets a farmer owns. Figure 5.12, presented below, illustrates the types of assets owned by farmers among the surveyed farmers, including farming equipment, vehicles, electronics, and other household items. Cellphones and televisions are the most widely owned assets. Followed by spades and hand hoes/garden forks, which the majority of farmers received from the Department of Agriculture during visits from extension officers.

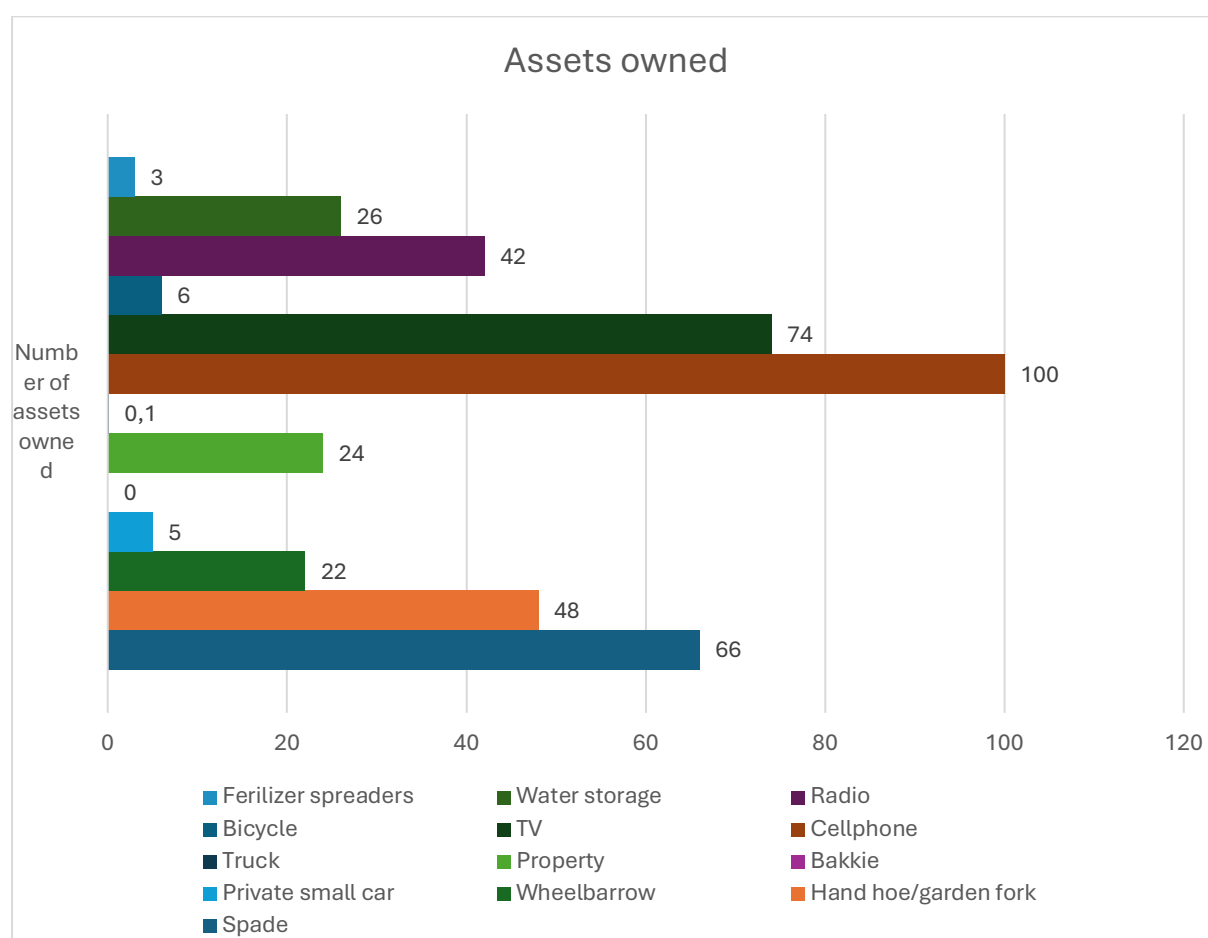


Figure 5.12: Asset ownership among smallholder farmers
Source: Own survey (2025)

Assets that are owned to a moderate extent include radios, property, and wheelbarrows. Ownership of private small cars, trucks, and bakkies is minimal, reflecting a low level of ownership of expensive assets. When asked to estimate the value of assets, the highest figure in total was R204,500, while the lowest value noted by two respondents was R120. Figure 5.12 reveals that most farmers possess basic tools and communication devices, but high-value assets are uncommon, indicating limited financial capacity or investment in larger farming operations (Ayinde et al., 2023; Nkambule, 2022). The differences in asset ownership reveal possible disparities in the productive resources accessible to households, which could influence the productivity, income generation, and financial inclusion. This aligns with the findings of Ayinde et al. (2023), that discovered that financial inclusion enhances the chances of better outcomes for farmers in various aspects, including consumption spending, employment opportunities, access to water, asset growth, and social services.

5.6 Summary of Descriptive Statistics

This chapter provided a descriptive analysis of smallholder farmers in Makhanda through mean values, Likert scale responses, and visual representations like bar and pie charts. The analysis provided insights into the socio-economic characteristics of farmers and the levels of financial inclusion and resilience, as illustrated by various aspects of the Multidimensional Financial Inclusion (MFI) index. The mean analysis highlighted differences between farmers that are financially included and financially excluded are not, particularly in terms of access to credit, savings habits, and income levels. Farmers with financial inclusion generally showed higher average values across various indicators, including household income, access to training, and ownership of assets. The Likert scale findings further indicated that most farmers infrequently participate in formal financial activities, such as using credit cards, holding savings accounts, or using digital payment systems. While some farmers mentioned creating budgets and expressed confidence in the financial decision-making, many lacked a comprehensive understanding of essential financial concepts, such as interest rates, credit ratings, and investment opportunities. Furthermore, a significant number of farmers reported relying on informal financial avenues, primarily family and friends, as well as income from farming, while engagement with formal credit institutions was limited. The results also revealed low involvement in climate change training and workshops, as shown in the bar chart, indicating a lack of awareness and adaptive capacity among farmers.

In summary, the descriptive findings suggest that smallholder farmers in Makhanda encounter several obstacles in attaining financial inclusion and resilience. Restricted access to formal financial services, inadequate financial literacy, and a lack of exposure to capacity-building programs impede farmers' economic empowerment. These trends establish a basis for further inferential analysis in the next chapter, which examines the factors influencing financial inclusion and resilience through econometric techniques such as the probit and Poisson models. The chapter will also discuss the propensity score matching method, illustrating how financial inclusion affects the welfare of farmers.

CHAPTER 6: EMPIRICAL MODELLING RESULTS AND DISCUSSIONS

6.0. Introduction

This chapter presents the empirical findings of the study, based on the objectives outlined in Chapter One. The analysis begins by examining the factors that influence financial inclusion and resilience (MFI index) among smallholder farmers in Makhandanda, utilising both Poisson and Probit regression models. The findings offer insights into how socio-economic and demographic factors influence farmers' engagement with and use of financial services. The chapter then proceeds to discuss the welfare impact of financial inclusion on smallholder farmers by applying the Propensity Score Matching technique. The results of the PSM highlight the relationship between financial inclusion and welfare outcomes, such as income, food security, and productivity. In combination, these analyses present an understanding of how the multidimensional financial inclusion index contributes to the overall well-being of smallholder farmers in Makhandanda.

6.1. Overview of Descriptive Statistics of Factors Influencing Multidimensional Financial Inclusion: Poisson and Probit Model

The descriptive statistics, supported by T-test comparisons, reveal significant differences between financially included and financially excluded smallholder farmers across several socioeconomic and agricultural characteristics, as shown in Table 6.1. Household Dietary Diversity Score (HDDS) shows a statistically significant difference, indicating that households with higher dietary diversity are more likely to be financially included. Livestock ownership is also significantly higher among financially included farmers, showing that asset-rich farmers possess more collateral and income-generating potential, which facilitates access to financial services. Social grant recipients also display meaningful differences, with financially included households being more likely to receive grants, highlighting the role of stable, predictable income in enhancing financial participation. Human capital and institutional factors also show significant variation between the two groups. Age is significantly associated with financial inclusion, with older farmers more likely to be included. Educational attainment is likewise significantly higher among financially included farmers, highlighting the importance of literacy in navigating financial products. Access to extension services emerges as a strong factor, as farmers who receive agricultural advice and training appear better equipped to understand and utilise financial tools. Finally, group membership and market access show

statistically significant differences, confirming that socially networked farmers with reliable market outlets are better positioned to engage with financial institutions. Collectively, these significant variables reinforce the multidimensional nature of financial inclusion, where socioeconomic, institutional, and livelihood factors all play a critical role.

Table 6.1: Descriptive Statistics Results of Smallholder Farmers Based on Financial Inclusion Status.

Factors	Means			T-Test
	Pooled sample (n=100)	Financially included (n = 36)	Financially excluded (n = 64)	
HFIAS	13.01 (0.52)	11.94 (0.79)	13.61 (0.68)	1.54
HDDS	10.49 (0.14)	11.11 (0.20)	10.49 (0.18)	3.50 ***
LIVESTOCK	5.91 (1.86)	13.17 (4.89)	1.83 (0.54)	3.04***
PROFIT_CROPS	507.32 (108.08)	488.31 (151.05)	518.02 (146.78)	0.13
ASSETS	22192.75 (4346.45)	29711.39 (7721.21)	17963.52 (5192.95)	1.30
SOCIAL_GRANTS	1.42 (0.07)	1.74 (0.15)	1.27 (0.06)	3.42***
AGE	55.23 (1.61)	51.33 (3.04)	57.42 (1.80)	1.84*
GENDER	0.38 (0.05)	0.44 (0.83)	0.34 (0.06)	0.99
EDUCATION	7.1 (0.41)	8.17 (0.71)	6.5 (0.48)	1.99**
LAND_SIZE	140 (7.82)	147.94 (16.13)	135.53 (8.23)	0.76
EXT_CONTACT	0.58 (0.05)	0.78 (0.07)	0.47 (0.06)	3.12***
WATER_ACCESS	16.01 (0.94)	16.86 (1.59)	15.53 (1.17)	0.68
FARM_EXP	7.02 (0.67)	7.17 (1.42)	7.17 (0.68)	0.16
HH_INCOME	3210.15 (208.45)	3452.25 (387.26)	3073.96 (242.91)	0.87
MARRIED	0.31 (0.05)	0.39 (0.08)	0.27 (0.06)	1.28
OWN_LAND	0.36 (0.05)	0.31 (0.08)	0.39 (0.06)	0.85
GROUP_MEMBER	0.58 (0.05)	0.69 (0.08)	0.52 (0.06)	1.75*
MARKET ACCESS	0.6 (0.05)	0.72 (0.08)	0.53 (0.06)	1.89*

Significance levels are represented by * = 10%, ** = 5% and *** = 1%; Standard errors are presented in parentheses

Source: Own survey (2025)

6.2 Results on Factors Influencing Multidimensional Financial Inclusion: Poisson and Probit Model

Table 6.2 presents the results of the Poisson and Probit regressions, respectively, detailing the estimated coefficients, marginal effects, and significance levels of the explanatory variables. These models were estimated using the same variables across to check the robustness of the results. The variable that depends on the model in both the Poisson and Probit models is the multidimensional financial inclusion (MFI) status of smallholder farmers. The MFI index was developed using the Alkire-Foster framework across five areas: access, usage, quality, financial literacy, and resilience. A threshold of 0.66 was used to categorise farmers as either financially included or excluded, in accordance with the approach detailed in Chapter 3. For both models, the sample size ($n = 100$) is sufficient to ensure proper representation and reliable estimation (Martinez et al., 2013), as indicated by the R-squared values, which show that the models account for a considerable portion of the variance in the dependent variables (Woolridge, 2015). The goodness-of-fit statistics support the notion that both the Poisson and Probit models effectively represent the data. In the Poisson regression, the goodness-of-fit chi-square value of 99.164 indicates that the model fits the observed count data well, suggesting minimal differences between the predicted and observed frequencies (Woolridge, 2015). Likewise, the Probit model's Hosmer–Lemeshow chi-square statistic of 6.17 is low and statistically non-significant, indicating that the predicted probabilities align closely with the actual outcomes (Woolridge, 2015). These findings, coupled with low variance inflation factor (VIF) values beneath the usual cutoff of 10, imply that multicollinearity is not an issue and that the models are properly configured to identify the main determinants of financial inclusion and financial resilience among smallholder farmers in Makhanda (Woolridge, 2015).

These diagnostic results confirm that both the Poisson and Probit models are statistically robust and suitable for identifying the main factors influencing financial inclusion and financial resilience.

Table 6.2: Poisson Model and Probit Model

Variables	Poisson Model	Probit Model	
	Coefficient	Coefficient	Marginal effect
AGE	0.005* (0.003)	0.024 (0.016)	0.006 (0.004)
GENDER	0.003 (0.070)	0.689 (0.371)	0.176 ** (0.089)
EDUCATION	0.018 * (0.010)	0.082 (0.050)	0.021 * (0.012)
LAND_SIZE	0.001 * (0.000)	0.002 (0.002)	0.000 (0.001)
EXT_CONTACT	0.175 *** (0.068)	0.898 ** (0.365)	0.229 *** (0.083)
WATER_ACCESS	0.001 (0.003)	0.002 (0.018)	0.000 (0.005)
FARM_EXP	0.012 ** (0.005)	0.054 * (0.028)	0.014 ** (0.007)
TOTAL_LU	0.003 (0.002)	0.030 * (0.017)	0.007 * (0.004)
HH_INCOME	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
TOTAL_ASSETS	0.000 (0.000)	0.000 * (0.000)	0.000* (0.000)
MARRIED	0.002 (0.077)	0.124 (0.407)	0.032 (0.104)
OWN_LAND	0.053 (0.070)	0.166 (0.375)	0.042 (0.095)
GROUP_MEMBER	0.118 * (0.073)	0.761 * (0.421)	0.194 * (0.095)
MARKET ACCESS	0.192 *** (0.071)	1.098 ** (0.438)	0.280 *** (0.010)
Constant	2.188 (0.237)	2.568** (1.232)	
Number of obvs	100	Number of obvs	100
Prob > chi2	0.000	Prob > chi2	0.000
R-squared	0.081	R-squared	0.30
Goodness-of-fit chi2	99.164	Goodness-of-fit	6.17
VIF	1.26	VIF	1.26

Significance levels are represented by * = 10%, ** = 5% and *** = 1%; Standard errors are presented in parentheses

Source: Own survey (2025)

The results from both models indicate that several socio-economic factors have a significant influence on the multidimensional financial inclusion index among smallholder farmers. Based on the Poisson model, the age of smallholder farmers is found to be positively correlated with the likelihood of being financially included. Significant at the 10% level, the probability of financial inclusion increases by 6 % points with an increase in age. The results are consistent with several studies by Kiplimo et al. (2015), Mhlanga & Dunga (2020), and Chandio et al. (2021), which suggest that the age of smallholder farmers significantly influences farmers' ability to access credit and achieve financial stability. This is primarily because older farmers are more inclined to possess assets that can be used as collateral (Kiplimo et al., 2015). In addition, as farmers age increases, farmers tend to become more adept at navigating financial services, diversifying income streams, and effectively managing savings and investments, which further enhances farmers' financial inclusion and resilience levels (Mhlanga & Dunga, 2020; Chandio et al., 2021).

Furthermore, education is also significant at the 10% level in the Poisson model. The positive coefficient indicates that a one-unit increase in education level is associated with an estimated 0.18 percentage-point increase in the anticipated count of the financial inclusion index. This result highlights the role of education in improving farmers' financial literacy and the ability to comprehend and utilise financial products effectively. As noted by Sebbata et al. (2014), Kiplimo et al. (2015), Wentzel et al. (2016), Mhlanga & Dunga (2020), and Ayinde et al. (2023), a significant positive correlation exists between academic success and the probability of obtaining credit or loans. Farmers possessing higher education levels tend to have a better understanding of financial services and are significantly more successful in gaining access to credit, as farmers comprehend the financial concepts related to interest rates, assets, and liabilities (Mhlanga & Dunga, 2020). This demonstrates how education equips farmers to make well-informed decisions and pursue financing with increased confidence (Sebbata et al., 2014; Kiplimo et al., 2015; Ayinde et al., 2023).

The size of land and the total livestock owned by smallholder farmers are significant at the 10% significance level. The combination of larger land areas and high livestock numbers that farmers own enhances income opportunities, offers collateral, and reduces risk, allowing smallholder farmers to engage more actively in formal financial systems and withstand economic disruptions, thereby increasing both financial inclusion and resilience. According to

the Probit marginal effects, a one-unit increase in cultivated land area increases the probability of financial inclusion by approximately 42 percentage points. These results are consistent with previous research by Kiplimo et al. (2015), Chissa (2019), and Priyadashini (2020), which indicates that larger land holdings enhance the chances of financial inclusion for smallholder farmers, as farmers with more extensive land are better positioned to produce surplus crops, earn higher incomes, and meet the collateral or credit requirements needed to access formal financial services. For example, Kiplimo et al. (2015) observed that smallholder farmers lacking access to credit typically had smaller land areas, averaging 2.66 acres (approximately 10,762 m²), whereas farmers with credit availability owned slightly larger plots, with an average size of 2.84 acres (roughly 11,497 m²). Livestock, on the other hand, is also used as collateral and a reliable source of income (Bahata, 2022). Based on the results above in the Probit model, an increase in livestock units is likely to increase a farmer's asset base and financial inclusion by 0.7 % points. In accordance with the findings presented in this paper, Idike and Nwibo (2024) emphasise that livestock serves a dual purpose in boosting financial inclusion and resilience for smallholder farmers. Firstly, livestock generates a consistent income through the sale of animals and related products such as eggs and milk (Bahata, 2022). Secondly, livestock serves as a form of collateral, enabling farmers to secure credit even without formal land titles (Idike & Nwibo, 2024). These elements work together to enhance financial inclusion and increase farmers' capacity to manage financial shocks, thereby reinforcing farmers' resilience.

In both the Poisson and Probit models, the support from extension officers, the level of farming experience, group membership, and access to markets are all highly significant and positively associated with financial inclusion. Based on the probit model, smallholder farmers that interact with extension officers have a 0.22 percentage point higher likelihood of being financially included, a finding that is statistically significant at the 1% level. Additionally, smallholder farmers involved in community-based organisations, such as savings groups, religious groups, and burial societies, are 0.19 % points more likely to be financially included, with this result being significant at the 10% level. These findings align with the anticipated positive relationship between support from extension officers and group membership, as well as financial inclusion, as measured by the MFI index. The rationale behind this is that when smallholder farmers engage in groups and receive assistance from extension officers, farmers gain crucial insights about financial services and products through information sharing and the

trust built among farmers (Nkambule, 2022). Moreover, these groups also serve as platforms for savings and credit associations, which can increase members' creditworthiness and provide social support during challenging financial times (Nkambule, 2022). Furthermore, having access to such information empowers farmers to be financially resilient, allowing farmers to learn about various saving and investment techniques (Mhlanga & Dunga, 2020; Nkambule, 2022). With improved information exchange and enhanced financial literacy, farmers are more likely to make informed choices, close knowledge gaps, and ultimately improve financial welfare (Mhlanga & Dunga, 2020). With the assistance provided by extension officers, through resources such as market insights, funding, training, and agricultural inputs, smallholder farmers can utilise these resources and tools to boost the productivity levels, elevate crop yields, and implement superior agricultural practices (Mbatha, 2024). This, in turn, increases farmers' chances of engaging with formal financial systems, accessing credit, and achieving financial inclusion (Mbatha, 2024). In addition to information, the farming experience of smallholder farmers influences the ability to withstand shocks and utilise financial services.

The findings presented above in the probit model indicate that farmers with greater farming experience are more likely to be financially included, at a significance level of 5%. For every additional year of farming experience, the expected probability of financial inclusion increases by about 0.14 percentage points. These results are consistent with existing literature indicating that smallholder farmers that have access to credit and more farming experience tend to possess a better understanding of agricultural operations, risk cycles (such as seasonal changes and input/output pricing), and financial management practices such as saving, borrowing, and investing (Saqib et al., 2018; Amare et al., 2021; Ayinde et al., 2023). This accumulated knowledge enables farmers to effectively sell the products and generate income. Hence, access to markets is a significant factor in determining whether a farmer achieves financial inclusion at a 1% significance level in the probit model. This indicates that farmers that have market access are 0.28 percentage points more likely to be financially included. In agreement with the findings of this study, Wentzel et al. (2016), Priyadarshini (2020), Gichuki and Kamu (2022), Seluhinga (2023), and Ayinde et al. (2023) argue that generating income through market engagement is essential for enhancing financial inclusion. Given that income is a vital determinant of access to financial services and overall financial inclusiveness (Ayinde et al., 2023).

6.3 PSM: Matching Quality and Sensitivity Testing.

Table 6.3: Matching Test Quality for Covariates

Variable	Means		%Bias	P-value of equality means
	Financially included	Financially excluded		
AGE	51.33	49.14	13.4	0.58
GENDER	0.44	0.61	33.9	0.16
EDUCATION	8.17	7.87	4.8	0.83
LAND SIZE	147.94	129.17	22.7	0.31
EXT CONTACT	0.78	0.72	12.0	0.59
WATER ACCESS	16.86	19.33	26.2	0.23
MARRIED	0.39	0.33	11.8	0.63
OWN LAND	0.31	0.31	0.0	1.00
GROUP MEMBER	0.69	0.50	40.0	0.10
MARKET ACCESS	0.72	0.78	11.6	0.59

Significance levels are represented by * = 10%, ** = 5% and *** = 1%. Bootstrapped Standard error values are given in brackets.

Source: Own survey (2025)

Table 6.3 presents the quality of matching between financially included and financially excluded smallholder farmers. The “pctest” command was utilised to compute results, with an additional option included to show both matched and unmatched samples. The results indicate that following the matching process, which used the Nearest Neighbour option from the “Psmatch2” command, there are no statistically significant differences in the average values of all covariates between the two groups (financially included and financially excluded) ($p > 0.05$). This implies that the matching process was effective in achieving a satisfactory balance. The percentage bias for most covariates, such as age (13.4%), education (4.8%), and extension contact (12.0%), remains below the commonly accepted threshold of 20%, signifying effective covariate balance following the matching process (Phakathi, 2022). When the percentage bias of a covariate exceeds this threshold, it indicates that the matching process has not eliminated pre-existing differences between the treated and control groups (Baek et al., 2015). In this instance, gender (33.9%) and group membership (40%) exhibit notably high levels of bias, suggesting that these variables remain imbalanced even after matching. This highlights that farmers in the financially included group differ from financially excluded group in terms of gender and group membership, and that propensity score matching did not entirely address these differences. Nonetheless, the matching process significantly decreased the overall bias for most covariates, increasing comparability between the groups and facilitating a more accurate assessment of the effects of financial inclusion (MFI index) on welfare outcomes.

Table 6.4: PSM Results on Welfare Impact Based on the Differences in Mean Values (n=100)

Outcome variables	Nearest neighbour	Kernel matching	Radius matching	Stratification
HFIAS	1.665* (0.877)	1.665 * (1.011)	1.665 (1.026)	2.605** (1.279)
HDDS	0.970*** (0.240)	0.970*** (0.280)	0.970 *** (0.285)	1.233*** (0.321)
LIVESTOCK (ZAR)	11.339** (4.385)	11.339 ** (4.472)	11.339 ** (4.931)	10.331** (4.799)
ASSETS (ZAR)	11747.873 (9159.873)	11747.873 (8870.907)	11747.873 (8945.693)	17892.820** (7764.204)

*Significance levels are represented by * = 10%, ** = 5% and *** = 1%. Bootstrapped Standard error values are given in brackets.*

Source: Own survey (2025)

Table 6.4 presents the Propensity Score Matching (PSM) estimates regarding the welfare disparities between smallholder farmers that are financially included and financially excluded farmers, employing four different matching algorithms: nearest neighbour, kernel, radius, and stratification. The results across all methods are coherent and statistically significant for the majority of welfare indicators, indicating that financial inclusion has a positive influence on farmers' welfare. The results suggest that financial inclusion significantly increases household dietary diversity (HDDS), livestock ownership, and access to social grants. However, social grants were omitted from the table because not every participant in the sample received social grants. Hence, the number of farmers was insufficient for inclusion in the model.

The Household Dietary Diversity Score (HDDS) consistently demonstrates a positive and highly significant effect at the 1% significance level across all matching techniques. Farmers that are financially included have a dietary diversity score that is between 0.970 (nearest neighbour) and 1.233 (stratification) points higher than financially excluded farmers. This is likely attributed to financial inclusion facilitating access to a wider variety of food options, a result of improved resource availability, increased income, or greater market involvement. Under nearest neighbour, kernel, and radius matching, the livestock ownership of financially included farmers indicated values that are approximately R11,339 higher, while stratification revealed a difference of around R10,331, all of which are significant at the 5% level. This

suggests that financially included farmers tend to invest more in productive assets, such as livestock, which can serve as savings, collateral, and a source of income, thereby enhancing farmers' financial resilience (Bahata, 2022). Likewise, financial inclusion has a positive impact on total household assets. Although the estimates derived from nearest neighbour, kernel, and radius matching are not statistically significant, the stratification method indicates a significant difference of R17,892 at a 5% significance level.

6.3.2 Rosenbaum Bounds Test for Sensitivity

The Rosenbaum bounds test was performed to assess the sensitivity of the results presented in Table 6.4 above to the effects of confounding unobservable variables (Liu et al., 2014). The Rosenbaum sensitivity test was conducted after radius matching to determine how strongly an unmeasured confounding variable(s) would need to affect the selection into treatment to alter the results, which show a positive effect as presented in Table 6.4. Table 6.5 below presents the Rosenbaum bounds test results, which are used to examine the robustness of the propensity score matching (PSM) estimates to potential hidden bias.

Table 6.5: Rosenbaum Bounds Test for Sensitivity Analysis

Gamma	HFIAS	HDDS	LIVESTOCK(ZAR)	ASSETS (ZAR)
r	Upper bound	Upper bound	Upper bound	Upper bound
1	0	0	3.1e-07	0
6	0.00	0.00	0.02	0.00
11	0.00	0.00	0.07	0.00
16	0.01	0.01	0.11	0.02
21	0.03	0.03	0.14	0.03
26	0.04	0.04	0.16	0.04
31	0.06	0.06	0.19	0.06
36	0.07	0.07	0.20	0.07
41	0.09	0.09	0.22	0.09
46	0.10	0.10	0.23	0.10

Source: Own survey (2025)

The findings indicate that for HFIAS, HDDS, and assets, the p-values consistently stay below the 5% significance level even at high levels of hidden bias (Γ values between 30 and 40), suggesting that these outcomes are highly resistant to unobserved confounding variables (Liu et al., 2014). This implies that the positive impacts of financial inclusion on food security, dietary diversity, and asset building are valid and not influenced by omitted factors. In

summary, the Rosenbaum bounds analysis confirms that the estimated effects of financial inclusion on welfare indicators are robust, thereby enhancing the reliability of the PSM results. Therefore, financial inclusion has a significant contribution to the improvement of welfare among smallholder farmers, particularly in terms of food security, dietary quality, and asset ownership.

6.4 Summary of Results

The findings from the Poisson and Probit regression analyses, along with the Propensity Score Matching assessment, offer in-depth insights into the factors affecting multidimensional financial inclusion and the welfare outcomes of smallholder farmers in Makhandha. The Poisson model identified significant socio-economic and demographic variables influencing financial inclusion, including age, education level, farming experience, ownership of livestock, total assets, and receipt of social grants. The positive and significant coefficients for land size, livestock, and assets suggest that possessing these resources increases the likelihood of achieving financial inclusion, as the tools can serve as collateral or protection against financial setbacks. Likewise, the results from the Probit model indicate that farmers with higher education, more extensive farming experience, and varied income sources are more likely to be financially resilient. This implies a strong connection between financial inclusion, resilience, and the availability of resources, as well as access to productive assets and social networks.

The PSM findings further illustrate that farmers that are financially included exhibit better welfare outcomes compared to financially excluded farmers. In particular, financial inclusion significantly increases dietary diversity (represented by higher HDDS scores), as well as asset accumulation and income derived from agricultural activities. These results suggest that financial inclusion has a favourable impact on farmers' livelihoods. The robustness of these results was validated through the Rosenbaum bounds sensitivity analysis, demonstrating that the estimated treatment effects remain relatively stable even with significant hidden bias. Overall, the combined results from the Poisson, Probit, and PSM analyses effectively illustrate that financial inclusion plays a crucial role in enhancing welfare among smallholder farmers in Makhandha. Therefore, improving farmers' access to financial services, productive resources, and institutional support can significantly enhance farmers' resilience, diminish vulnerability, and enhance inclusive rural development.

CHAPTER 7: CONCLUSION AND RECOMMENDATIONS

7.1 Recapping the Research Objectives and Methods

The agricultural sector plays a crucial role in reducing food insecurity and poverty. Globally, the agricultural sector accounts for approximately 4% of the total gross domestic product, and in developing countries, it accounts for over 25% of GDP (Abraham & Pingali, 2020; World Bank, 2022). In Sub-Saharan Africa, agriculture serves as a vital economic engine and a livelihood for many individuals, with smallholder farmers playing a pivotal role in the region's food security and rural economies. However, smallholder farmers in Africa continue to face numerous challenges in accessing financial services. For instance, over 140 million adults across the continent continue to receive cash payments for the sale of agricultural products and livestock (World Bank, 2024).

Financial inclusion is widely recognised as a crucial factor in alleviating poverty and promoting economic growth (Ozili, 2020). Over the last decade, the global percentage of adults with bank accounts has increased from 51% in 2011 to 76% in 2021 (Demirgüç-Kunt et al., 2022). However, despite this advancement, over 1.4 billion people worldwide still lack access to banking services (Shipalana, 2019). These gaps are particularly noticeable among low-income populations and rural areas, highlighting the persistent challenge of achieving fair financial access (Shipalana, 2019). Ozili (2020) notes that the vulnerable group theory of financial inclusion stipulates that a nation's financial inclusion strategies ought to focus on the most disadvantaged sectors of society, including the elderly, women, and marginalised groups, that are disproportionately affected by economic hardships and crises. The theory emphasises that integrating these vulnerable individuals into the formal financial system is vital, as the marginalised often bear the brunt of financial disruptions and economic downturns, especially smallholder farmers (Ozili, 2020).

Thus, both financial inclusion and resilience are essential for smallholder farmers. However, given the inherent risks associated with agricultural production and the escalating impacts of climate change, merely having access to financial services is not enough. That's why capturing financial inclusion is a complex concept that goes beyond just having bank accounts (Cáamara & Tuesta, 2014). It also includes the usage, quality, affordability, and ability to utilise financial services that improve one's quality of life (Cáamara & Tuesta, 2014). Traditional metrics tend

to focus on ownership of financial products, often overlooking more substantial indicators of true financial engagement. Hence, there are only a few studies that have assessed financial inclusion through a multidimensional index.

The objective of this study was to quantify the level of financial inclusion among smallholder farmers in South Africa using a Multidimensional Financial Inclusion Index (MFII) and to analyse whether financial inclusion influences household welfare outcomes. To achieve this aim, a mixed-methods approach was implemented, incorporating both quantitative and qualitative data collection and analysis techniques. Quantitative data were gathered through structured questionnaires distributed to smallholder farmers from various farming groups in Makhandla. A sample of 100 smallholder farmers was selected from Makhandla, specifically from Extensions 7 and 9, as well as Fort Beaufort. The questionnaire collected data on demographic characteristics, financial behaviours, accessibility of financial services, and indicators of financial resilience. In addition to the questionnaires, focus group discussions were conducted with randomly selected members from smallholder farming groups, providing qualitative insights into the experiences, challenges, and perceptions of farmers regarding financial inclusion. These discussions provided a deeper understanding of the social, institutional, and cultural factors that affect financial inclusion, which could not be fully captured by quantitative methods alone.

The analysis employed descriptive statistics to summarise demographic and financial inclusion characteristics, while inferential statistics, such as regression models including Poisson and Probit, were utilised to identify the main determinants of financial inclusion. To evaluate its impact on farmers' welfare, the propensity score matching method was applied. This combination of methods ensured a thorough understanding of the factors influencing financial inclusion and its subsequent effects on the livelihoods of smallholder farmers in Makhandla.

7.2 Conclusion

The results provided sufficient evidence that the MFI index is a useful tool for measuring financial inclusion among marginalised individuals. The results indicated that the financial exclusion rate for smallholder farmers in Makhandla is 64% and that the findings revealed that financial inclusion is shaped by a combination of socio-economic, infrastructural, and

institutional factors, and that being financially included leads to significant welfare improvements for farmers.

Regarding Objective 1, the findings detailed in Chapter 6 indicated that the age of smallholder farmers has a positive correlation with the probability of achieving financial inclusion, suggesting that the age of smallholder farmers significantly impacts the ability of farmers to obtain credit and achieve financial stability. Furthermore, as farmers age increase, farmers become more skilled at navigating financial services, diversifying sources of income, and managing savings and investments effectively, which further enhances the farmers' levels of financial inclusion and resilience.

Secondly, the study revealed that education plays a crucial role in financial inclusion. As shown in Chapter 5, farmers in Makhandha's township sample have an average education level of 7.1 years, suggesting that most respondents have only attained primary education. Financially included farmers demonstrated a significantly higher average education level of 8.17 years compared to excluded farmers, with an average of 6.50 years. Furthermore, the findings in Chapter 6 indicated that education is linked with an estimated 18% rise in the predicted score of the financial inclusion index. The results emphasise the importance of education in enhancing farmers' financial literacy and the farmers' ability to understand and utilise financial products efficiently. Farmers with higher levels of education tend to grasp financial concepts related to interest rates, assets, and liabilities quickly than uneducated farmers. This illustrates how education empowers farmers to make informed choices and pursue financing with greater assurance. Furthermore, farmers with access to extension office support and group membership are more likely to be financially included. The rationale behind this is that when smallholder farmers engage in groups and receive assistance from extension officers, farmers gain crucial insights about financial services and products through information sharing and the trust built among farmers. Essentially, group membership serves as a platform for savings and credit associations, which can increase members' creditworthiness and provide social support during challenging financial times.

Additionally, the study revealed that farmers with more extensive farming experience are more likely to be financially included. For each extra year of farming experience, the expected probability of financial inclusion increases by approximately 14 percentage points. The

findings are consistent with previous research, which indicates that smallholder farmers with access to credit and more farming experience often possess a superior understanding of agricultural practices, risk management strategies, and financial management techniques, such as saving, borrowing, and investing. This accumulated experience enables farmers to sell more products effectively and generate a higher income.

Furthermore, the analysis indicated that an increase in livestock units is likely to enhance a farmer's asset base and financial inclusion. This is because livestock serves two roles in improving financial inclusion and resilience for smallholder farmers. Firstly, livestock provides a steady income through the sale of animals and associated products, such as eggs and milk. Secondly, livestock can act as a form of collateral, allowing farmers to secure credit even in the absence of formal land titles. Collectively, these factors contribute to enhancing financial inclusion and bolstering farmers' capacity to manage financial shocks, thereby strengthening farmers' resilience.

For objective 2, the study found that financial inclusion significantly increases household dietary diversity (HDDS) and livestock ownership. Chapter 6 showed that farmers that are financially included have a dietary diversity score that is between 0.970 and 1.233 points higher than financially excluded farmers. This is likely attributed to financial inclusion facilitating access to a wider variety of food options, a result of improved resource availability, increased income, or greater market involvement. Furthermore, the livestock ownership of financially included farmers indicated values that are approximately R11,339 higher. This suggests that financially included farmers tend to invest more in productive assets, such as livestock, which can serve as savings, collateral, and a source of income, thereby enhancing farmers' financial resilience.

In conclusion, the study found that 36% of smallholder farmers in Makhanda have access to financial services; however, significant obstacles remain to achieving full financial inclusion. The favourable welfare results, such as enhanced food security, indicate that improving financial inclusion could significantly enhance the well-being and resilience of smallholder farmers.

7.3 Recommendations

Based on the findings of this study, where only 36% of farmers were financially included and 64% remained excluded, targeted interventions are required to improve financial access and overall welfare. In the short term (3–12 months), the Department of Agriculture, in collaboration with the Umthathi Training Project, should introduce community-based financial literacy workshops delivered in isiXhosa, focusing on budgeting, understanding interest rates, savings, credit use, and digital financial services. Short-term action should also include training by extension officers on basic climate-shock preparedness, since most farmers reported limited knowledge on how to respond to droughts, crop losses, or extreme weather events.

In the medium term (1–3 years), extension services should be strengthened to incorporate structured financial inclusion modules and to support farmers participating in savings groups, stokvels, and cooperatives, as group membership has been shown to improve financial inclusion. Additionally, the Department of Agriculture can assist farmers in gaining better access to markets by facilitating opportunities to sell produce to a wider client base, including schools, local retailers, and municipal programmes.

Finally, in the long term (3–10 years), more substantial structural interventions are required, such as investing in improved water infrastructure including boreholes, irrigation systems, and reliable municipal water supply given the severe water shortages affecting Makhanda. Other long-term actions include, promoting access to micro-insurance and tailored agricultural credit, and advocating for policy reforms that reduce collateral requirements and improve financial products designed for smallholder farmers. These coordinated short, medium and long-term actions can significantly enhance smallholder farmers' financial inclusion, resilience, and overall welfare.

7.4 Limitations of the study

This study has some limitations that should be considered when interpreting the results. Firstly, due to limited data funding and the high costs of data collection, the small sample size of 100 farmers may impact the statistical power of the econometric models and limit the ability to generalise the findings to the wider population of smallholder farmers in Makhanda or similar environments. Although the research offers valuable insights into financial inclusion and resilience, a larger sample size would have facilitated a more thorough subgroup analysis and

enhanced the accuracy of models, particularly regarding the multidimensional financial inclusion index and causal estimates derived from Propensity Score Matching. However, at a master's level, the results offer some insights into financial inclusion in smallholder farmers in Makhanda.

Secondly, measuring productivity as a welfare outcome presents another limitation. The initial aim was to examine how financial inclusion and resilience affect farmers' productivity; however, this proved challenging as most smallholder farmers in the study area primarily farm for personal consumption, and the majority do not sell agricultural produce. Lastly, the farmers that do sell often encounter significant barriers to accessing markets. Therefore, reliable productivity indicators such as sales volumes, market prices, or crop production income were either unavailable or inconsistent. This limitation hampered the study's ability to assess productivity as a welfare aspect and restricted the analysis to alternative welfare indicators, such as food security.

7.5 Area of Future Research

Given the limitations identified in this study, several avenues for future research emerge. First, future studies should consider expanding the sample size to improve the robustness and generalisability of findings across diverse groups of smallholder farmers. A larger sample would also enable deeper subgroup analyses. For example, examining differences by gender, age group, cooperative membership, and farming type to better understand the heterogeneity of multidimensional financial inclusion outcomes. In addition, future research should investigate the structural constraints that limit market access for smallholder farmers, including transport challenges, price volatility, and weak bargaining power, and assess how improved market linkages, value-chain participation, or digital marketplaces may influence both productivity and financial inclusion. Further studies could also explore how innovations in agricultural extension, such as digital advisory tools, financial-education modules, or climate-smart extension services, enhance farmers' financial capability and resilience. Finally, research could incorporate longitudinal or panel data to track changes in financial inclusion and welfare over time, providing deeper insights into the long-term impacts of financial inclusion on food security, asset accumulation, and resilience to climate-related shocks.

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Appendix.

Appendix A: Questionnaire used for data collection.

Questionnaire used for data collection.

Rhodes University

Department of Economics and Economic History

Note: The information captured in this questionnaire is strictly confidential and can be used for further research and academic publication. Participation in the survey is voluntary, and no financial or non-financial benefits are paid during or after participation. The respondent should be the (actual) household head or anyone well-informed about the household. Participants can withdraw from the survey anytime they feel like doing so. However, your cooperation is highly appreciated.

Signature of interviewee:.....

Questionnaire for smallholder farmers.

Identification.

Name of farmer	
Category: 1= Home gardener; 2=Cooperative 3=Livestock farmer	
Cell number of the farmer	
Location and Group	
Name of Enumerator	
Date of interview	

Section 1: Demographics

1. A Household Head and other household members	1. B Age	1. C Gender	1.D Education level	1. E Marital Status	1. F Primary employment
1=Yes 0=No	Years	1=Male 0=Female	Number of educational years	1=Single 2=Married	1=Full time farmer 2=Stable Waged employment

			(grades) completed	3=Divorced 4=Widowed 5=Cohabiting	3=Retired 4=Part-time work 5=Unemployed 6=Self-employed 7=Other (specify)
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1. If the participant is not the Household head, fill in the household head's information as well.

1.G What is the total number of your household members? (someone who stays in the same house for 12 months)	
1.H How many of the household members are adults (15 years old or more)?	
1.I How many of the household members are children (less than 15 years old)?	

Section 2: Smallholder farmer

2. A How many years of farming experience do you have?	
2. B.What is the total size of land the household has access to?	
2. C Do you have your own farming land? 1=Yes 0=No	
2. D Have you had contact with an extension officer in the past 12 months =? 1=Yes 0=(No skip to 2.E)	
2.E What form did the support come in? 1=Market information 2=Inputs 3=Agricultural training 4=Funding	
2.F Is water security a problem for the farm? 1=No; 2=Only during the dry months; 3=Yes, it is a constant problem	
2.G In the last 30 days, how many days did you have access to water your farm?	
2.H What is the main source of water for use in the farm? 1=Water tank 2=Public tap 3=Household tap 4=Spring 5=River	
Rank the following reasons for engaging in farming on a scale of 1-5, where: 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree	
2.I The farm is for growing food for household consumption	
2.J The farm is for improving household nutrition	
2.K The farm produce is sold for income	
2.L It is enjoyable to work on the farm	

Section 3: Household income/expenditure

Source of income	3. A Amount per given time	3.B How often? (e.g., monthly)	3.C Total Amount	
3.A Permanent employment				
3. B Temporary employment				
3. C Crop production				
3. D livestock				
3. E Remittances				
3. F Other (Specify)				
3. G Does a member/member of your household receive a government social Please specify which grant(s) are received and how many?			A. Grant type	B.Number of grants
3. H Do you ever spend your grant money on agricultural inputs? 1 = Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree				
3. I Are you a member of any other associations/groups? 1=No 2=Savings Group 3=Religious/Church Group 4=Burial Scheme/Society 5=Other (specify.....) List all possible groups				

Section 4: Livestock

Please indicate your livestock production and marketing activities by completing the table below

Livestock type	Goat	Cattle	Sheep	Chicken	Ducks	Donkey	Pigs
4. A Number owned today							
4. B Money spent on feeds, chemicals, vet services, etc., in the last 12 months							
4. C Number sold in the last 12 months							
4. D Main market livestock sold*							
4. E Number slaughtered for family purposes							
4. F Number given to others as gifts or fines							

*Main market codes: 1=Local butchery 2=Supermarket 3=Neighbours 4=Hawkers
5=Other (specify

Section 5: Physical Capital Endowment

Which of the following production assets does your household have access to?	A.Number of Assets held if owned	B.Total current value owned?
5.A Spades		
5. B Hand hoe/garden fork		
5. C Wheelbarrow		
5. D Private small car		
5. E Bakkie		
5. F Total land holdings (Property owned)		
5. G Truck		
5. H Cell phone		
5. I TV		
5. J Bicycle		
5. K Radio		
5. L Water storage tank		
5. M Fertilizer spreaders		
5. N Others (specify.....)		

Section 6: Crop Production and Market Activity

Complete the table below regarding farming activities. Use the following codes given in Table 6 for reference:							
6. A Crop [CODE 1]	6. B Area Planted (m2)	6. C Quantity Harvested	6.D Quantity Sold	6. E Market buyer [CODE 2]	6. F Price per KG/unit sold	6. G Quantity consumed at home	6. H Inputs (Cost Seed, Fertiliser and Pesticide)

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Code 1: 1=Maize 2=Potato 3=Tomato 4=Spinach/Chard 5=Beans 6=Groundnuts 7=Sweet Potato 8=Butternut 9=Pumpkin 10=Pepper 11=Cabbage 12=Chilli 13=Herbs 14=Onion/Spring Onion 15=Beetroot 16=other

Code 2: 1=Co-op contract Contribution 2=Local shop 3=Shop in town 4=Friend/Neighbour 5=Individually sales 6=Stall sales 7=Hawkers 8=other (specify.....)

Section 7: Market access

7. A Rate your normal level of market access 1=very poor 2=poor 3=average 4=good 5=very good	
To what extent do you agree with the following statements about market access: 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree	
7. B I receive low prices	
7. C I struggle to access vital market information	
7. D I market my produce with trusted/established market connections, which I have made	
7. E I struggle to make individual sales of my crops	

Section 8: Household Food Insecurity Access Scale and Household Hunger Scale

1 = Rarely (once or twice in the past month) 2 = Sometimes (three to ten times in the past month) 3 = Often (more than ten times in the past month)

For all primary questions (A): In the past 30 days, how often did this happen... Code 0=Never 1= Rarely 2=Sometimes 3=Often	a.During Covid	b.After Covid
8.A Did you worry that your household would not have enough food?		
8.B Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?		
8.C Did you or any household member have to eat a limited variety of foods due to a lack of resources?		
8.D Did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?		
8.E Did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?		

8.F Did you or any household member have to eat fewer meals in a day because there was not enough food?		
8.G Was there ever no food to eat of any kind in your household because of a lack of resources to get food?		
8.H Did you or any household member go to sleep at night hungry because there was not enough food?		
8.I Did you or any household member go a whole day and night without eating anything because there was not enough food?		

Section 9: Household Dietary Diversity

C1: How many days over the last 30 days did most members of your household (50% +) eat the following food items? (Use codes below, write 0 if not consumed in the last 30 days). Better to ask what foods they ate, before reading them this list. Note: Determine whether to exclude from count if consumption of fish or milk was only in small quantities.

FOOD GROUP	a.During Covid	b.After Covid
9.A Cereals [e.g. mielie pap, bread, rice, biscuits, millet, sorghum, pasta]		
9.B Roots and Tubers [potatoes, sweet potatoes, mdumbi]		
9.C Vegetables		
9.D Fruits		
9.E Meat, poultry, offal [beef, chicken meat, liver, kidney or giblets, pork, lamb, goat, venison]		
9.F Eggs		
9.G Fish and seafood [fresh and dried fish or shellfish]		
9.H Pulses, legumes, nuts [beans, peas, lentils]		
9.I Milk and milk products [amasi, yogurt, cheese]		
9.J Oils, fats [any oils, natural or animal fat, butter]		
9.K Sugar, honey		
9.L Miscellaneous [other foods not mentioned - condiments like tea, coffee, spices, herbs]		

Financial inclusion

Section 10: Banks, co-operatives, and other formal financial institutions

Finance: From question 10.3 coded responses are (0= Never; 1 = Rarely (once or twice in the past month), 2 = Sometimes (three to ten times in the past month), 3 = Often (more than ten times in the past month))	
10.A Do you, either by yourself or together with someone else, currently have an account at a bank, agricultural co-operative, or another type of formal financial institution? 1= Alone 2= Joint 3= None IF NO SKIP TO SECTION 11	
10.B Do you, personally, have a credit card? 1= Yes 0=No	
10.C Thinking about your account at a bank or financial institution, in the PAST 12 MONTHS, did you ever use the internet/eft to buy agricultural supplies, or to send/receive money related to your farm using this account? If so, how frequent?	
10.D In the PAST 12 MONTHS, have you personally used your credit card to cover farm-related expenses? If so, how frequent?	
10. E In the PAST 12 MONTHS, have you, personally, used your credit card to pay for personal items (e.g. groceries)? If so, how frequently?	
10.F In the PAST 12 MONTHS, did you pay off ALL your credit card balances in full by their due date?	
10.G IN THE PAST 12 MONTHS, has money ever been DEPOSITED into your personal account(s)? This includes cash or electronic deposits, or any time money is put into your account(s) by yourself, from selling farm produce, by an employer, or by another person or institution. If so, how frequent ?	
10.H In the PAST 12 MONTHS, has money ever been TAKEN OUT of your personal account(s)? This includes cash withdrawals you make in person, using your bank card (similar to an ATM/debit card). If so, how frequently?	
10.I Do you typically keep any money in your bank account (e.g., for savings, farm investments, or emergencies)?	
10.J Do you typically rely on your credit card balance for purposes like savings, farm investments, or emergencies?	

10.2 Thinking about the FIRST account you opened, did you open it for any of the following reasons?

Reasons 1=Strongly Disagree, 2=Disagree, 3 = Neutral, 4 = Agree, 5 =Strongly Agree	
10.K To receive a wage payment for farming work or government subsidies	
10. L To receive social grants	
10. M To receive remittances	

Section 11: Unbanked

Please tell me whether each of the following is A REASON why you, personally, DO NOT have an account at a bank, agricultural co-operative, or another type of formal financial institution.

Reason	1=Strongly Disagree, 2=Disagree, 3 = Neutral, 4 = Agree, 5 =Strongly Agree	
11.A Financial institutions are too far away (e.g., hard to access from your farm).		
11. B Financial services are too expensive (e.g., high fees for farmers)		
11.C Don't trust financial institutions		
11.D Someone else in the family already has an account (e.g., spouse or family member)		
11.E No need for financial services at a formal institution (e.g., prefer informal methods for farm transactions)		

Section 12: Savings

Savings: Reasons (0= Never; 1 = Rarely (once or twice in the past month) 2 = Sometimes (three to ten times in the past month) 3 = Often (more than ten times in the past month)	
12. A In the PAST 12 MONTHS, have you personally saved or set aside any money FOR farm damage due to drought/floods (emergencies)? If so, how frequently?	
12.B In the PAST 12 MONTHS, have you personally saved or set aside any money for farm inputs? If so, how frequent?	
12.C In the PAST 12 MONTHS, have you personally saved or set aside any money for Family expenses? If so, how frequent?	

Section 13: Financial literacy

Responses (0= Never; 1 = Rarely (once or twice in the past month) 2 = Sometimes (three to ten times in the past month) 3 = Often (more than ten times in the past month)

13.A Do you create and follow a budget for managing your expenses? If so, how frequent?	
13.B Do you know how interest rates on credit cards or loans work?	
13.C Are you aware of your credit score and how it affects your ability to borrow?	
13.D Do you know the difference between saving and investing?	
13.E Are you familiar with different types of bank accounts, like savings, checking, and fixed deposit accounts?	
13.F Are you confident about your ability to make sound financial decisions?	

Financial resilience

Section 14: Financial Resilience

Now, imagine that you have an emergency, such as a sudden farm expense (e.g., livestock illness, crop failure), and you need to pay. What would be the MAIN source of money that you would use to come up with within the NEXT 30 days? (Read Items)

Item	0=Never	1=Rarely	2=Sometimes	3=Often
14.A Savings				
14.B Family/Relatives / Friends				
14.C Money from working (including selling crops)				
14.D Borrowing from a bank				
14.E Borrowing from an employer				
14. F Borrowing from a loan shack				
14.G Selling farm assets (e.g., equipment, livestock)				
14. H Insurance				
14.I I could not come up with the money				
14.J Borrowing from Stokvel				

Section 15: Financial Worry

How worried are you right now about each of the following? Are you very worried, somewhat worried, or not worried at all at the present time? (Read Items).

Response	1=Very worried	2= Somewhat worried	3=Not worried at all
15.A Not having enough money for farm-related issues (such as inputs, market crop)			
15.B Not being able to pay for medical costs in case of a serious illness or accident			
15.C Not having enough money to pay for monthly expenses like groceries			
15.D Not being able to pay school fees or fees for education			

Section 16: Climate resilience.

Question Response (1 = Strongly Disagree , 2 = Disagree , 3 = Neutral , 4 = Agree , 5 = Strongly Agree)	Response
16.A In the last 3 years, has your household or farm system been affected by any unexpected climate shock (extreme event)?	
16.B Are you able to change farming practices in response to changing weather patterns	
16. C Do you have access to reliable information about future climate conditions and how to respond to them?	
16. D Can you recover quickly after experiencing climate-related shocks such as droughts or floods?	
16. E Have you participated in training or workshops on climate change adaptation?	
16. F Are you a member of a farmer group, cooperative, or association that helps address climate-related challenges?	

Focus group discussion

1. How do you usually manage your household finances and farming-related expenses?
2. Are there barriers that make it difficult for you to access financial services (distance, documentation, cost, etc.)?
3. How often do you use formal financial services, and for what purposes (savings, credit, investments)?
4. How do you perceive the role of financial services in improving your farming business?
5. Do you feel that financial institutions (banks, cooperatives) understand the specific needs of smallholder farmers?
6. In the past, have you experienced disruptions to your farming activities due to external factors such as climate change, market fluctuations, or economic shocks?
7. How did you manage financially during those times? Did you rely on savings, credit, or other resources?
8. Have you ever had to take loans to cope with financial difficulties? How easy or difficult was it to access credit when you needed it?
9. If you had the opportunity to provide feedback to a financial institution, what would you want them to understand about the needs of smallholder farmers?