LAND AND MARKET ACCESS AMONG URBAN FARMERS IN SOBANTU AND MPOPHOMENI: IMPLICATIONS ON HOUSEHOLD FOOD SECURITY

by

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ABSTRACT

Land access is a crucial requirement for crop production among smallholder farmers, as limited access is a challenge that often prevents them from producing sufficient yields to participate in lucrative markets. For emerging smallholder farmers, there is limited space when it comes to accessing agricultural opportunities in South Africa. This means that when it comes to supporting structures, fewer systems support these farmers, causing them to be unable to take advantage of various opportunities that the South African government has been instituting. The first objective examined the factors influencing farmers' access to land and the associated challenges. The study's second objective looked at the impact of land and market access on the household food security of urban farmers in Sobantu and Mpophomeni.

The study employed a mixed-methods approach, utilizing purposive sampling to select urban farmers in Sobantu and Mpophomeni. Questionnaires, focus group discussions and photography were used for data collection. Descriptive analysis and binary logistic regression model were used to analyse the first objective. Binary logistic regression helps identify factors affecting land access and the associated challenges. The second objective employed descriptive analysis, PESTEL analysis for focus group discussions and Tobit regression analysis in conjunction with the Household Food Insecurity Access Scale (HFIAS) to evaluate urban farmers' food security in Sobantu and Mpophomeni. The study revealed that limited access to land and markets significantly impacts urban farmers' food security, as insufficient land results in inadequate crop yields needed for a consistent supply to lucrative markets. Additionally, factors such as education, total household income, household size, and marital and land access significantly influence food security status. Urban farmers experience challenges due to limited funding opportunities, preventing them from producing high value crops necessary for accessing formal markets. The study suggests that the key stakeholders, such as policy makers and private sectors such as NGOs, need to invest in platforms and programmes that will provide education to the farmers through workshops, training and seminars so that farmers are aware of alternative and additional planting methods, market information and gain knowledge on the impact of farmers group on their livelihoods. The alternative methods that the study recommends are rooftop farming, container gardening, vertical farming, and hydroponics farming.

Keywords: Food security, land access, market access, regression models

PREFACE

This research was conducted at the School of Agricultural, Earth, and Environmental Sciences, College of Agriculture, Engineering and Science, University of KwaZulu-Natal, Pietermaritzburg Campus, under the supervision of Prof J. Chitja.

This work has not been submitted to any other University except where explicitly acknowledged; the results reported stem from my original investigation under the guidance of my supervisor.

Signature……  ……. **Date** 19 December 2024

Name of student: Sinethemba Gwala

As the candidate's supervisor, I agree to submit this dissertation.

Signature…… **Date**……..

Prof. Joyce Chitja (Supervisor)

DECLARATION- PLAGIARISM

I, **Sinethemba Gwala,** declare that:

1. The research reported in this dissertation, except where otherwise indicated, is my original research.

2. This dissertation has not been submitted for any degree or examination at any other university.

3. This dissertation does not include others' data, pictures, graphs, or information unless explicitly acknowledged.

4. This dissertation does not contain other persons' writing unless acknowledged explicitly as a source from other researchers. Where other written sources have been quoted then:

    a. Their words have been rewritten, but the general information attributed to them is referenced.

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Name of student: Sinethemba Gwala

As the research supervisor(s), I agree to the submission of this dissertation for examination:

Signature:……. **Date:……..**

Prof. Joyce Thamaga-Chitja (Supervisor)

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LIST OF ABBREVIATIONS

COVID-19	Coronavirus Disease
DALRRD	Department of Agriculture Land Reform and Rural development
DDS	Dietary Diversity Score
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussions
GDP	Gross Domestic Product
HDDS	Household Dietary Diversity Score
HFIAS	Household Food Insecurity Access Scale
IFAD	International Fund for Agricultural Development
NGO	Non-governmental Organisations
PESTEL	Political, Economic, Social, Technological, Environmental, Legal
SA	South Africa
SDGs	Sustainable Development Goals
SPSS	Statistical Package for Social
STATA	Statistics and data
STATSA	Software for Statistics and Data Science
UA	Urban agriculture
UNECA	United Nations Economic Commission for Africa
UN	United Nations

CHAPTER 1: INTRODUCTION

1. BACKGROUND

Urbanisation continues to grow as individuals move from rural to urban areas in search of better livelihood opportunities. (Bisaga *et al*., 2019). Agriculture serves as the backbone of developing countries, providing food nutrition and a primary source of income for many families. With agriculture, people can sustain their livelihoods to be food secure. Urban agriculture is a method contributing to the four dimensions of food security (Kennard *et al*., 2019). According to the FAO (2007), urban agriculture can be explained as the cultivation of plants and the raising of animals for the production of food and other purposes within the urban and peri-urban areas, as well as related activities such as producing and delivering inputs, processing and marketing products.

Urban farming is essential mainly since many urban residents in developing countries rely on it (Ayambire *et al*., 2019). For Ferreira *et al*. (2019), urban agriculture contributes to increased food independence levels and can be classified as a "leitmotif" for introducing new strategies for education, participation and civic engagement. Urban farmers remain victims of poverty and face challenges, such as a lack of comprehensive land policy. An example would be that farmers, especially female farmers, have no rights to land access for cultivation (FAO, 2012), limiting their access to markets. City-based agriculture is a known approach that is interrelated to food justice (Reynolds, 2015). According to Dewey (2021), urban agriculture plays the role of providing healthy, locally grown produce and offers increased access to healthy produce that is grown locally by the farmers.

Land access is a challenge in the expansion of agriculture as there are many urban farmers who have limited access to land (Houessou *et al*., 2020). Municipalities also contribute to the limited access to land for urban farmers as most land is used for other developmental projects (Houessou *et al*., 2020). Smallholder farmers in most communities lack market information (Stambuli, 2022). Farmers having limited access to market information results in them selling their produce to nearby households within their communities, which limits their chances of accessing more significant markets (Kangethe and Serima 2014). According to Louw and Fordaan (2016), urban smallholder farmers' access to markets is limited as most fail to meet retail quality and quantity standards. Urban farmers experience challenges as they are located in areas where it is challenging to access markets, technical assistance, or support from the government (Vignola *et al*., 2015).

Farmers having access to markets positively influences household dietary diversity, consumption and food security in various ways (Usaman and Halie, 2022). Smallholder farmers who have access to markets have an advantage when it comes to improved diet quality, decreased transaction costs and reduced poverty and household food insecurity. Smallholder farmers' access to markets is essential as farmers are able to participate in the markets and, therefore, contribute towards economic growth (Cele, 2020).

The study intended to investigate the impact of land and market access on urban farmers in Sobantu and Mpophomeni and its implications for household food security. It examined how the household food security of urban farmers in Sobantu Township and Mpophomeni was affected by their access to land and markets. Additionally, the study explored the relationship between land and market access, considering how these factors were directly linked or interdependent.

2. Problem statement

Limited land and market access significantly affect urban farmers in many communities. Land access is crucial for agricultural production and food security in Sub-Saharan Africa (Akinyemi *et al*., 2019). Limited land access is a challenge in most communities, as most of it is privately owned (Houessou *et al*., 2020). The food security of urban farmers is affected negatively by agricultural production (Akinyemi *et al*., 2019). Policies are put into place advocating for the rights of urban farmers, but it seems they are only good on paper and not in implementation. Restricted market accessibility further threatens the food security of urban farmers (Houessou *et al*., 2020); the reason for this is the poor infrastructure, lack of market information, long distance to get to market, less support from the government (Vignola *et al*., 2015); all of this is common because it leads to high transaction costs.

Nevertheless, the farmers would be advantaged if challenges such as market information and tenure security were solved. Simelane (2011) states that cop-operatives aid smallholder farmers in agricultural production and marketing activities. According to Nangobi and Mugonola (2018), market failure means that farmers are experiencing challenges when it comes to selling their products, which affects their profits. Smallholder farmers require more access to secure urban land and markets for significant improvement and to sustain their livelihoods through a good diet. Information on market access needs to be presented to farmers to enhance their adoption of urban farming and improve their household food security. Therefore, this study will

provide insight into urban farmers' challenges when acquiring land, accessing markets and promoting food security within their households and communities.

2.1. Knowledge gap

Houessou et al. (2020) highlight that limited access poses a significant challenge to urban farmers, threatening agricultural expansion. Furthermore, a study by Vignola *et al*. (2015) suggested that market access for urban farmers is a challenge, especially since there is no government support and they are far from the markets. Policies are put into place advocating for the rights of urban farmers, but they are only good on paper and not in implementation. The knowledge gap is that it is known that urban farmers experience challenges when it comes to land tenure and market integration. Still, less literature explains the relationship between land and market access as they link to each other. It is important to find out how the household food security of urban farmers is affected by the restricted resource accessibility. There is also a need to answer the question because since land ownership is a crisis in South Africa, we need to know how it links to market access. There is also a need to show how the land policies developed by the South African government are helping disadvantaged urban farmers by assisting them in sustaining their livelihoods.

3. Research aim

The study aimed to investigate how land and market access of urban farmers at Sobantu and Mpophomeni is affected and the implications on household food security.

3.1. Research Objectives

(a) Identifying the factors and challenges affecting urban farmers' access to land
(b) Land and Market Access: Effects on Urban Farmers' Food Security in Sobantu and Mpophomeni.

3.2. Research Questions

(a) What are the main factors influencing land access for urban farmers in municipalities uMsunduzi and uMngeni?
(b) What are the key indicators of household food security among urban farmers concerning their access to land and markets?
(c) How do urban farmers perceive their level of market access and the challenges they face in accessing markets for their produce?

3.3. Hypothesis

(a) Small urban farmers have limited land size and weak tenure security.

(b) Urban farmers' access to markets and land positively impacts their household food security.

4. Importance of the study

Food insecurity threatens most rural and peri-urban communities to at least a third of the population, particularly in urban city metros with rapid migration Statistics South Africa (2019). The study was motivated by the challenges faced by urban farmers regarding land and market access. A significant issue encountered by these farmers was market access, which, for some, was constrained by the size of their land and the security of their tenure. Existing research on the correlation between land and market access is scarce, making it difficult to ascertain how these factors influence household food security among urban farmers. Consequently, this study was essential in providing empirical data on the implications of land and market access for the household food security of urban farmers.

5. Study Assumptions

The study presumed that all participants responded truthfully to the questions and did not engage in deception. It was assumed that the allocated time frame was sufficient to gather the necessary data for the study's completion. The participants responded to the best of their abilities as the study was using pseudonyms to protect their identity.

6. Study Limitations

The study consisted of 172 urban farmers from Sobantu and Mpophomeni. The sample size allows for a deeper understanding of the local farming conditions and practices, contributing to a significant understanding of the farming patterns. Therefore, this sample does not represent all South African urban farmers, and the findings cannot be generalized. Future research could explore a larger and more diverse sample by expanding to other urban communities with different socio-economic issues.

7. Definition of terms

Food security: This concept is directly related to the physical, economic and social access to adequate, nutritious and safe food at all times by all people in order to meet their end needs and food requirements for maintaining a healthy and active life (FAO, 2013).

Urban agriculture: Urban agriculture entails various activities that produce food in and around cities. Urban agriculture has become a central aspect of local government and civil society responses to food insecurity and poverty within many communities (FAO, 2013).

Smallholder farmers: Farmers who are involved in crop production and livestock on small plots of land (Mugabe et al., 2019). For this study, smallholder farmers are those whose primary focus is on producing crops on small plots of land for agricultural purposes. It, therefore, excludes the smallholder farmers whose focus is on livestock farming.

Land access: access to land is governed through land tenure systems. It is the ability to use land and other natural resources to control the resources and to transfer land rights to the land to take advantage of other opportunities (FAO, 2006). Land access is a major constraining factor linked to urban farming (Olumba *et al*., 2019), as many factors affect the farmer's access to land.

Market access: market access is the ability to acquire farm inputs and farm services and deliver agricultural products to buyers (IFAD, 2010). Different kinds of markets are found in urban areas, such as retail markets, weekly markets, shopping malls and complexes, neighbourhood shops and others. For this study, the main markets that will be used will be retail markets and weekly markets.

8. Organisation of the Dissertation

The dissertation comprised six Chapters. Chapter one introduces the study's problem and context. Chapter two presented the literature review, while Chapter three detailed the methodology used for data collection and analysis. This Chapter also included a description of the study area and sample of urban farmers, the research design, sampling technique, sample size and data analysis. Chapters four and five presented the research results and Chapter six concluded the dissertation with conclusions and recommendations.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

Agriculture is the backbone of developing countries, as it provides food and nutrition and is a way for many households to sustain their livelihoods. With agriculture, people can sustain their livelihoods to be food secure. This study specifically examined how urban farmers' food security was impacted by land access and market access. The research aimed to highlight how land and market access of urban farmers at the uMsunduzi and UMngeni municipalities are affected by the implications on household food security. Agriculture in the African continent accounts for 70% of labour and over 25% of the GDP (UNECA, 2009). Research shows that urban agriculture is a source of employment opportunities with communities and increases the levels of food security (Lynch and Olofin, 2001). The agricultural sector and urban farmers' livelihoods are threatened, as tenure insecurity and land development are challenges (Lynch and Olofin, 2001). Urban farmers remain victims of poverty and face challenges such as a lack of comprehensive land policy; an example would be that farmers, especially female farmers, have no rights to land access for cultivation, limiting their access to markets (FAO, 2012).

Land access poses a significant challenge to the expansion of agriculture, as urban farmers often face limited access to land (Houessou *et al*., 2020). Town planning and development through Municipalities further contribute to this limitation, as much of the available land is allocated to other developmental projects (Houessou *et al*., 2020. Urban farmers experience challenges as they are located in areas where it is challenging to access markets, technical assistance, or support from the government (Vignola *et al*., 2015). The study further investigates the relationship between land and market access and how they are directly linked or dependent on each other. Limited access to land is a challenge in most communities, as most of it is privately owned (Houessou *et al*., 2020). The food security of urban farmers is affected as agricultural production is affected (Akinyemi *et al*., 2019). Policies advocating for the rights of urban farmers are often established, but they tend to be effective only on paper, with limited implementation in practice. The policies include promoting and strengthening sustainable food production systems that will benefit urban and peri-urban communities. (Wiskerke, 2020). Another challenge affecting urban farmers' food security is restricted market accessibility (Houessou *et al*., 2020); the reason for this is the poor infrastructure and less support from the government (Vignola *et al*., 2015).

2.2. Food security concept and the Pillars

The concept of food security came about in the 1970s (Pahl-Wostl, 2019). Food security is a broad and evolving concept, lacking a universally agreed-upon definition. Food security is when people have physical, social and economic access to safe, sufficient and nutritious food that meets their dietary needs to sustain a healthy life (Peng and Berry, 2018). The four pillars of food security- availability, accessibility, utilization and stability-must all be intact to achieve complete food security (Peng and Berry, 2018). Food access plays a role in ensuring that all households and individuals within those households have adequate resources to obtain appropriate foods through production, purchase, or donation to have a nutritious diet (Gross *et al*., 2000). According to Gross *et al*. (2000), "Adequate utilization refers to the ability of the human body to ingest and mobilize food". The last dimension is stability, which is the other pillar's anchor. For a household or individual to be food secure, all three pillars must be achieved for stability. According to (Gross *et al*., 2000), "stability refers to the temporal determinant of FNS and affects all three physical elements".

According to Peng and Berry (2018), "Food security is best considered as a casual, linked pathway from production to consumption, through distribution to processing, recognized in several domains rather than as four pillars". Food systems encompass the whole spectrum of actors and the interconnection of the activities that have an impact on the production, distribution, collection, processing, consumption and disposal of food products. These products come from agriculture, forestry, and fisheries and are controlled by economic, social, and environmental factors (FAO, 2018).

2.3. Emergence of urban farming

The 21st century is often referred to as the first urban century (Mason and Knowd, 2010). there is an increase in rural-urban migration, which has led to urban growth, whereas in the 1900s, approximately 13% of the population occupied urban areas (Mason and Knowd, 2010). The UN-Habitat estimates that by 2030, the number of people moving to urban areas will increase by 60%. Moreover, all states show that the cities in low will absorb population growth over the next few decades- in middle-income countries and this will impact the resources as they will become limited (Korth *et al*., 2014).

The main goal of urban agriculture is to achieve food security. According to the Sustainable Development Goals, goal 2 indicates that "there should be zero hunger". Therefore, the development of city-based agriculture is needed to achieve the goal. Urban populations mostly rely on the consistent, secure supply and affordability of food products (Korth *et al*., 2014:2).

For Orsini *et al*. (2013), urban farming practices utilise city resources such as land, labour, organic wastes and water to nourish urban dwellers. It is significantly shaped by elements such as policies, land availability, competition, market presence, pricing trends, and quality standards, and it also plays an essential role in socio-economic landscapes (Orsini *et al*., 2017).

2.3.1. Defining urban agriculture

Urban agriculture is a mechanism contributing to the four pillars of food security. According to the FAO (2007), urban agriculture is the "growing of plants and raising animals for food and other uses within and around cities and towns and related activities such as the production and delivery inputs, processing and marketing of products. According to Ferreira *et al*. (2019), urban agriculture contributes to higher food sovereignty levels and can be used as a "leitmotif" to implement new education, participatory and citizenship strategies. For Orsini *et al*. (2013), urban agriculture has positive outcomes when it comes to ecological landscapes as it helps with the reduction of city waste, improving the urban biodiversity and also ensuring that the environmental element is not affected in terms of transport and storage. City-based farming is also defined as production in the home plots in urban or peri-urban areas. It uses city water and recycles organic discards, which is beneficial as it manages natural resources for a sustainable environment (FAO, 2010; Orsini *et al*., 2013). According to Dubbeling *et al*. (2010), urban agriculture is understood as a means to tackle issues ranging from food security to social inclusion. Urban agriculture is a method that contributes to food security in each of the four dimensions of food security (Kennard, 2019). In South Africa, urban farming is growing because of rural-urban migration. Studies done in Johannesburg on urban agriculture help us understand that urban farmers experience issues such as low productivity because of limited access to land and conflict over land ownership (CDS, 2009:23-24).

2.3.2. Urban farming in South Africa

Urbanization is increasing in a digitizing and globalizing world, with many people settling in cities for work and establishing permanent residence (Mlambo, 2018). The study by Mlambo (2018) states that South Africa is one of the countries with alarming population increase rates. Therefore, it was projected that by 2050, the increase in urban areas would significantly improve rural development (Mlambo, 2018). The rise in the population in urban centres is that urban areas are perceived as places with more opportunities, which results in a struggle with commercial farming, land scarcity, and issues of climate change. Mlambo (2018) highlights that there has been a rise in the unplanned informal settlements developed as cities experience challenges when it comes to fast-paced urbanisation. According to Pietersen (2018), urban

farming is practised globally due to increasing urbanization, with more people becoming involved in urban agriculture. However, this trend has not yet taken root in South Africa. This is because of historical injustices that affected many communities. However, a transformation is occurring towards urban farming as more people are shifting to it. In South Africa, there is a noticeable shift towards transforming urban spaces to foster more significant interaction and participation, with various organizations exploring the relationship between land use, citizenship, and entitlement (Mlambo, 2018). The South African agricultural economy, when it comes to emerging farmers it offers limited opportunities (Khapayi and Celliers, 2016). Therefore, it means that when it comes to supporting structures, fewer systems support these farmers, causing farmers to be unable to benefit from the opportunities that the South African government has been introducing (Chikazunga and Paradza, 2012:3). Furthermore, according to Khapayi and Celliers, (2016: 26), the "South African agricultural economy proliferated under the previous South African government owing to strong state subsidies and support programs to support commercial farmers". South Africa's agricultural sector mostly depends on international markets when it comes to agricultural products being marketed (Chikazunga *et al*., 2012:3-4). Hence, according to Khapayi and Celliers (2016), removing the marketing boards' state subsidies and deregulating the agricultural sector after the democratic transition in 1994 caused severe problems for commercial farmers, particularly for previously disadvantaged farmers.

Implementing urban farming in various South African communities has had a significant impact, as demonstrated by a case study in the Cape Town Metropole (Swanepoel *et al*., 2017). This study compared households within informal settlements that engaged in urban farming with those that did not. The findings revealed that households involved in urban agriculture were more likely to maintain food security statuses (Swanepoel *et al*., 2017). This indicates that as urban agriculture expands among households in South Africa, it is likely to reduce high poverty levels. A case study was done in KwaZulu-Natal, Durban, "The challenges and opportunities for sustainable urban farming in SA's low-income settlements" by Bisaga *et al*. (2019). The study shows that if more people move to urban areas, there will be pressure on cities as there will be limited resources, such as land, water and infrastructure (Bisaga, 2019). This then makes it a challenge for urban farming.

2.4. Push and Pull factors to urban farming in South African communities

According to Brand South Africa (2014), cities and towns produced over 80 percent of the Gross Domestic Product and metropolitan doubled the rate when compared to other cities. Kok

(2006:8-12) attributes significant urban migration to the discovery of gold in Johannesburg. However, rural-urban migration is not limited to unskilled individuals; skilled professionals from rural areas also increasingly move to urban centres due to better working and living conditions. This trend has raised concerns among authorities about its impact on the effective delivery of government services (Shezi, 2013: 110-112). The response to migration within the country is because of the lack of stability in the economy. The primary driver of migration to urban areas is pursuing economic growth and development by searching for opportunities. However, the specific reasons for migration can differ significantly between countries and regions.

2.4.1. Employment opportunities

According to the Organisation for Economic Co-operation and Development (2011), more people are moving to rapidly developing provinces like Gauteng and Western Cape in search of employment opportunities. In South Africa, rural-urban migration is driven by economic factors; when it comes to rural areas, they fail to offer adequate employment, leading to individuals moving to cities in search of employment opportunities (Mlambo, 2018:66)

2.4.2. Educational and health services

In the South African rural areas, providing educational and healthcare institutions is insufficient (Mlambo, 2018). Page (2013) states that the services offered in rural areas are in turmoil, marked by corruption, nepotism and poor accountability alongside service delivery, such as problems that entice people to seek places that are characterized by better services while they might not move to the urban communities. The reason for migrating is because cities offer well-improved and developed services, making it more accessible to get to places and improving their lives.

2.4.3. Wage difference

When looking at wage differences, one can see that wages vary between rural and urban areas. Working in an urban area increases the likelihood of earning more than working in a rural area. Therefore, this motivates one to migrate to an urban area (Mlambo, 2018).

2.4.4. Infrastructure development and transportation

Infrastructure, health, education and transportation push rural to urban migration. People, especially farmers, leave rural communities for urban communities because of the better infrastructure that allows them to reach the markets easily. For example, farmers experience

transportation costs when they are far from the markets; therefore, migrating to urban areas is beneficial as they can easily access the markets.

2.5. Relationship between urban farming and food security

According to Stats SA (2021), in the year 2021, it was reported that households participating in agricultural activities were 3,1 million (17,3%). The proportion of households that engage in agricultural food production is low in the country (StatsSA, 2021). Malnutrition is a significant component of food security that is expressed not only through undernutrition and hunger but also overnutrition and obesity, which are rapidly growing global epidemics closely linked to poverty (Darmon *et al*., 2005; Tanumihardjo *et al*., 2007). This is because of the high prices of nutrient-dense foods like fruits and vegetables (Stewart *et al*., 2013). Lower-income households often prioritize affordability over nutritional value when purchasing food (Stewart *et al*., 2013).

City-based farming is a revolution that is stirring our food system (Dieleman, 2017). Armar-Klemesu (2000) estimated that 200 million households participating in urban agriculture produced food for the urban market, providing 15-20% of the world's supply, mainly in developing countries. Ferreira *et al*. (2013) state that "urban agriculture bears the promise of food security and food sovereignty and is expected to increase in the future, contributing to a low carbon economy due to shorter supply chains and the number of fossils used in transportation". Urban farming practices are essential in poverty alleviation because of their survival strategies (Stewart, 2018). However, controversy arises when considering its real economic impact (Hampwaye, 2013); it has an essential food supply function (Aubry *et al*., 2012) more significantly in developing countries.

Urban agriculture contributes to availability and accessibility, particularly on more perishable foods such as vegetables and milk (Zezza and Tasciotti, 2010). Urban agriculture positively impacts food sovereignty, especially among the most deprived fringes of our societies (Ferreira *et al*., 2013) and contributes to reducing the cash purchases of food (Badami and Ramankutty, 2015). Therefore, it improves the farmers' economic and nutritional status (Grewal and Grewal, 2012). The most beneficial benefit of urban agriculture is that crime is reduced once it is practised within communities. According to Mougeot (2000), Producing food within urban areas improves nutritional status and the environment as it provides an excellent opportunity to enhance cities' present-day and future sustainability.

Urban agriculture significantly enhances food security by providing access to food for low-income urban communities (Orsini *et al*., 2013). Studies using descriptive statistics and multivariate analysis have shown that participation in urban farming improves dietary adequacy and allows urban households to consume more nutritious diets (Zezza and Tasciotti, 2010; Orsini *et al*., 2013). Food security can also depend on urban agriculture, as if households implement more food gardens, they can then sell their products to generate income and maintain their livelihoods. Urban farming contributes towards food security, as agriculture in urban areas such as cities provides the less fortunate with sufficient access to food. According to a study by Zeza and Tasciotti (2010), results show that if urban households participate in farming, they have a higher chance of consuming better, more nutritious diets.

2.6. The contribution of urban agriculture to local food systems.

Urban agriculture has emerged as a critical component of local food systems worldwide, offering a multifaceted approach to enhance food security, increase economic opportunities, and promote environmental sustainability. This significance is evident across various geographical contexts, including global observations, African dynamics, and specific South African applications.

At a global level, urban farming plays a pivotal role in addressing the mounting food demands of burgeoning urban populations. As noted in a comprehensive study, urban and peri-urban agriculture is fundamental in cities, especially mega-cities where rapid population growth and migration exert intense pressure on existing food systems (Anwar et al., 2023). Effective city-based farming can mitigate food insecurity by harnessing local resources to produce food, thus reducing reliance on external supplies and enhancing resilience against global market fluctuations (Anwar et al., 2023; Mwaura et al., 2021). Urban agriculture is not just about food production but also serves critical functions, including energy conservation, organic waste management, and social interaction, highlighting its multifunctional nature (Yusuf et al., 2021; Menyuka et al., 2020).

In the context of Africa, urban agriculture is especially vital due to the continent's unique socio-economic challenges and urbanization trends. With increasing urbanization, food insecurity has become a significant concern—urban agriculture offers an effective strategy for ensuring that cities can meet the nutritional needs of their inhabitants (Jagganath, 2021; Gonfa, 2019). For instance, in Sub-Saharan Africa, urban farming practices have the potential to significantly reduce food waste occurring during the post-harvest phase, which has been shown to account

for over half of all food lost within the region (Cilliers et al., 2020). By improving local food production and decreasing dependency on long-distance transportation of food, urban agricultural practices can directly enhance food security and economic stability among urban populations (Cilliers et al., 2020; Mwaura et al., 2021).

South Africa's urban agriculture scene is particularly noteworthy due to its historical and socio-political context. During the apartheid era, urban agriculture was often criminalized and failed to receive recognition in urban planning (Kanosvamhira, 2023). However, as the post-apartheid landscape evolved, urban agriculture gained recognition as an essential livelihood strategy for millions (Kanosvamhira, 2023; Gonfa, 2019). Urban farms contribute significantly to economic resilience, job creation, and the greening of cities, thereby fostering social equity and environmental conservation (Cilliers et al., 2020; Yusuf et al., 2021; Gonfa, 2019). Despite challenges, such as inadequate policy support for smallholder farmers and limited access to land and resources, urban agriculture's role in improving socioeconomic conditions remains critical (Menyuka et al., 2020; Ngundu & Ngalawa, 2023).

Sociocultural factors also play a significant role in shaping the success and acceptance of urban agriculture initiatives. Community involvement and the integration of indigenous knowledge systems can enhance participation in urban farming practices, leading to more sustainable practices that reflect local needs and values (Torres et al., 2022; Okem & Odindo, 2020). Diverse farming practices implemented by urban farmers often incorporate innovations tailored to their specific environments, which can result in varied outcomes in food security and social cohesion (Jagganath, 2021; Torres et al., 2022). Moreover, educational programs focused on urban agriculture can increase awareness, enhance nutritional knowledge, and promote dietary diversity among urban populations (Torres et al., 2022; Mbogori et al., 2020).

Urban agriculture functions simultaneously as a strategy to alleviate poverty and promote livelihoods. The economic benefits can be substantial, with reports suggesting that urban agriculture in African contexts can cut food expenditure significantly, thereby freeing up resources for other vital needs (Mwaura et al., 2021; Gonfa, 2019). Likewise, the practice can facilitate the establishment of local markets which bolster small businesses, providing food and services accessible to urban dwellers (Ruwanza et al., 2022; Gottero et al., 2021).

Despite its clear contributions, urban agriculture is not without its limitations and challenges. Issues such as inadequate access to essential resources (land, water, capital) often hinder small-scale farmers from realizing the full potential of agricultural practices within urban environments (Menyuka et al., 2020; Mwaura et al., 2021; Jackson et al., 2020). Supportive

policies are necessary to create an inclusive framework that empowers urban farmers while ensuring food security and economic development (Kanosvamhira, 2023; Gonfa, 2019). Furthermore, climate change poses additional risks to the sustainability of urban agriculture as erratic weather patterns jeopardize traditional farming practices (Gonfa, 2019; Lottering et al., 2020).

Urban farming emerges as a vital element in local food systems at multiple levels, offering concrete solutions to global challenges of food insecurity, economic instability, and environmental degradation. The success of these agricultural practices largely hinges on effective policies, community engagement, access to resources, and adaptive strategies that can address both current and future challenges.

2.7. Accessibility of land for agricultural activities by urban farmers

Land availability is part of the many challenges recorded in urban agriculture, and this has been proven by many previous studies (Wekerle and Classen, 2015). According to Angotti (2015), land security can incentivize rent-seeking behaviour, which will affect urban agriculture in that urban agriculture is at risk of the highest and best use of developments. The land accessibility by urban farmers for urban farming in this paper refers to land ownership. Accessibility relates to the opportunity of land for urban agriculture among farmers (Namwata *et al*., 2015). Accessibility can be explained in this context as the opportunity presented to the farmers regarding the actual land utilisation by the needy households. However, land challenges or conflicts limit urban farmers' chances of acquiring land (Namwata *et al*., 2015). The term land accessibility in this paper also refers to the availability of land and the power of urban farmers to use it. According to Namwata *et al*. (2015), land ownership and tenure patterns are unknown because of a lack of records or frequent change of hands. Further, land may also be far from where farmers live, public transportation and roads could be inadequate or unavailable, and available land may be too costly for farmers to rent (Flynn-Dapaah, 2002; Namwata, 2013).

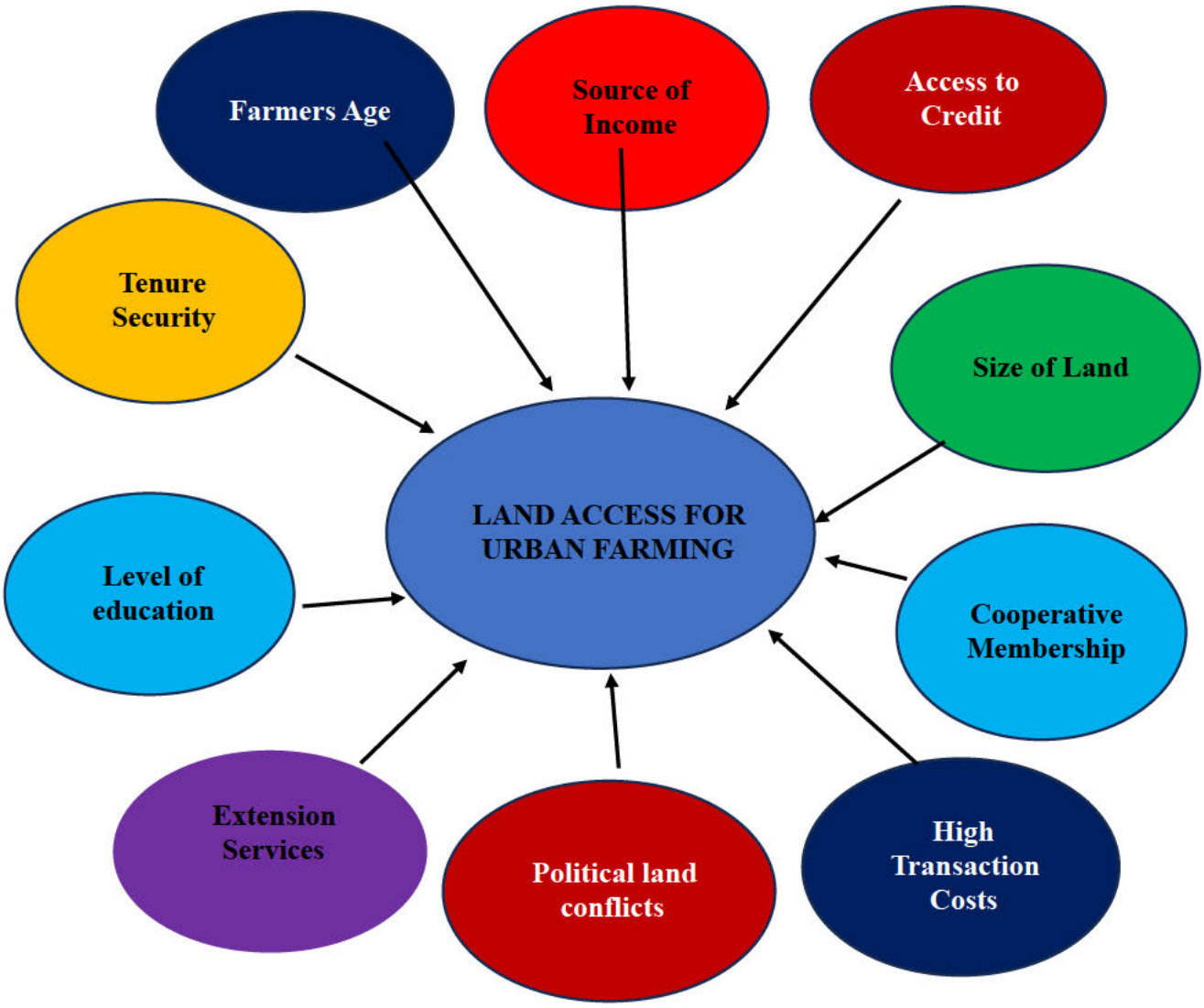

Figure 1: Framework on factors urban farmers experience when accessing land for urban farming

2.8. Urban Farmers and Land Access: Key Influencing Factors

2.8.1. Gender

Farmers experience challenges when it comes to accessing land for agricultural purposes. Access to land is a significant challenge for urban farming systems. Gender is a factor that affects the farmers' access to land; for example, female farmers are less likely to access large amounts of land and even access the land (Olumba *et al*., 2019). According to Mthembu *et al*. (2014), land is generally allocated to men, while for women, it is mainly through inheritance and less likely through allocation. Land access is a gendered issue that, in most communities, when a woman becomes a widower, they lose the land that belonged to her husband and passes on to another male figure within the family (Mthembu *et al*. 2014). Gender inequality still exists

in farmers accessing land for agricultural practices, as men are favoured as they are given first preference compared to women (Olumba *et al*., 2019).

2.8.2. Age

Age affects farmers' access to land because, as they age, they form networks within the agricultural communities. Within the social networks created by the farmers, they gather more information and resources, which could result in a positive impact when accessing land (Mdoda *et al*., 2023). An increase in the age of the farmers increases the chances of owning the land and ultimately using the land for agriculture (Akinyemi and Mushunje, 2019).

2.8.3. Access to credit

Access to credit positively impacts accessing land for urban agriculture (Olumba *et al*., 2019). Access to credit improves the chances of land access for agricultural activities as farmers will have the ability to produce more yields and enhance the farm's performance (Haryanto *et al*., 2023)

2.8.4. Income

Income significantly affects access to land for agricultural purposes. According to Oladehinde *et al*. (2017), high-income earners within a farming household have a higher chance of owning land because they have all the financial resources required to access land.

2.8.5. Cooperative membership

Farmers can easily access land, join forces, and purchase land through cooperative memberships rather than individually. According to Mdoda *et al*. (2023), farmers who become part of cooperatives have a greater chance of owning land, which also gives farmers access to inputs and welfare development of their members (Onumadu, 2014; Daudu *et al*., 2022 Mdoda *et al*., 2023).

2.9 Conflicts that arise in accessing land for urban agricultural activities

Research conducted by Smit *et al*. (2001) indicates that urban farmers encountered several challenges when accessing land. These challenges included a lack of money to buy land, high prices and a shortage of land for some communities. According to Smit *et al*. (2001), in cities around the world, a vast amount of land is farmed that is neither officially allocated for that purpose nor reported. The informal or illegal transactions for acquiring land consist of usufruct agreements between landowners and farmers (de Jong *et al*., 2021). This means when a person or party confers the temporary right to benefit from someone’s property to generate income, in this case, it would be the farmers making agreements to use certain land for agricultural

activities. However, private landowners often will not lease their land for farming because of the adequate laws governing tenancy and lease agreements (Smit *et al*., 2001). It is not only private landowners who might be hesitant to lease out land, as public landowners may also hesitate to make land available for farming (de Jong *et al*., 2021).

2.10. Level of security on land for urban agricultural activities

The study presented by Steward (2013) revealed that the greatest challenge to urban agriculture in terms of development and growth is the limited access to land and the lack of tenure security. It shows that many urban agricultural activities were done in open spaces, plots that were not surveyed, and underdeveloped surveyed plots without the direct permission or agreement of the landowner (Stewart, 2013).

2.11. Land access for urban farmers

Land access is an essential factor for urban agriculture. Access to land is a challenge for urban agriculture, undermining the potential of urban agriculture to contribute to individuals' food security and livelihood (Olumba *et al*., 2019). Land access for most communities is a challenge because of the complexity of tenure rules that have been put in place (Horst *et al*., 2017). The social, economic and institutional environment where urban farmers work influences their access to land, which then affects the practice and sustainability of urban agriculture (Famakinwa *et al*., 2017; Hussein, 2017). Land access is essential for farming and market access because, without land, the farmers will not have anything to send to markets. Land access is the primary factor for agricultural production, but it is a challenge for emerging farmers, especially young people (Mwangi *et al*., 2015). Farmers experience challenges when it comes to affording land for agricultural purposes because of the high prices set and the fact that most of the farmers depend on social welfare, therefore making it challenging to afford expensive land. (Leslie, 2019).

In urban areas, land use competition for housing, industry and other developments is highly competitive. This makes it challenging for urban farmers as the financial endowment is the deciding factor, whereby those with high income quickly access land and most urban farmers lack financial resources, undermining their access to land (Olumba *et al*., 2019). Institutional factors that determine the land accessibility of urban farmers include tenure security, land use conflict, high costs of land and bureaucracy in land acquisition (Namwata *et al*., 2015; Odudu, 2015a; Oladehinde *et al*., 2017). Land access is a major constraining factor linked to urban farming (Olumba *et al*., 2019), as many factors affect the farmer's access to land.

Land injustices are a worldwide issue but commonly pronounced in developing nations, especially Africa, where the legacy of colonial hangover and neoliberal economic policies have been significant factors in the struggles of the urban poor, including farmers (Namwata *et al*., 2015). Land access is a significant issue for farmers (Nuhu, 2019). In most cases, urban farmers have limited land access because the local and central governments have not set enough land for farming (Namwata *et al*., 2015). a study conducted by Namwata *et al*. (2015) indicated that in most areas' farmers have access to land through renting, grabbing, using their friend's land and some through inheritance (Jacobi, 2000; Dongus, 2000).

Farmers who access land through inheritance regard their land as more secure than land grabbers; they normally sub-divide their land and rent a section to other farmers monthly (Namwata *et al*., 2015). The land size is determined by the relationship between the farmer and the landowner, which also determines the rent amount. Land grabbing occurs when a farmer intentionally encroaches or invades the land set aside for utilities, right of way, buffer zone, or an undeveloped parcel of land allocated to individuals or institutional developers (Jacobi, 2000; Mireri *et al*., 2006).

According to Kidunga and Shomari (2017), competing land uses impact the farmers' activities. Land competition is common in most communities as land is used for various activities such as property development and sand mining (Namwata *et al*., 2015). The study presented by Namwata *et al*. (2015) indicates that sand mining is a significant cause of soil degradation, reducing soil fertility and affecting urban farmers. The soil loses fertility because the sand miners remove the upper fertile agricultural land to reach the appropriate engineering soil (Namwata *et al*., 2015).

2.11.1. How limited access to land affects the household food security of urban farmers

Urban farmers experience challenges in terms of their access to land and household food security. Studies show that less fortunate people lack adequate access to quality land and have limited rights to it when they do have access (Roth, 2013). For example, farmers might use the land for cultivation but cannot use it as collateral, rent it, sell it, or hold it for long enough to recoup labour and capital investments (Roth, 2013). This threatens their household food security as income generated is less, making them unable to afford nutritious foods, leading to nutrition deficits. Farmers are affected in a bad way when it comes to land access because of issues such as inequalities. Due to disparities, some have access to small land portions that are not much used for agricultural production (Nara *et al*., 2020). This then affects their food security as they cannot fully sustain their household's food security.

2.12.2. Lack of access to financing is a factor contributing towards farmers accessing land

Emerging urban farmers experience challenges when it comes to accessing financing. According to Cabannes (2012), "most urban producers lack access to credit and investment schemes and develop their activities with limited resources". The emerging farmers are limited from contributing to their food security because most credit institutions are reluctant to give loans to urban farmers. According to a study by Cabannes (2012), credit institutions are unwilling to provide financial assistance because some tend to target only large-scale commercial enterprises, mainly those in the processing sector. It is also because of the lack of awareness of urban agriculture, a perception that financing agriculture, especially small scale, is risky and the concern about the farmers' behaviour regarding repayments. The main reason financial institutions restrict their access to financing for urban farmers is that most do not own land (land title), making it a challenge (Cabannes, 2012).

2.13.3. Lack of funding from the government

According to a study by Mnyeni *et al*. (2019: 6-7), the unclear land use policies resulted in minimal or the absence of investments as farmers were reluctant to take the risk of losing their modest income if authorities seized the land and destroyed their crops. The limited governmental support received has made urban farming nearly impossible, especially when land is now mostly designed for industrial and infrastructural purposes.

2.12. Various ways of farming in Urban areas

2.12.1. Vertical farming

Urban agriculture is important in Sub-Saharan African countries as many households depend on farming to maintain their livelihoods by growing crops for consumption and profit. Vertical farming is a modern agricultural practice of growing crops stacked vertically in a protected indoor environment that mainly utilises hydroponic or aeroponic cultivation systems (Lu and Oh, 2023). Urban smallholder farmers who participate in vertical farming have an advantage because of the more efficient space uses; the crops are protected from pesticides, and if there are extreme weather conditions, the crops are sheltered (Lu and Oh, 2023).

2.12.2. Rooftop farming

According to Appolloni et al. (2021), rooftop farming can be explained as a form of urban agriculture that happens on building rooftops and incorporating both protected methods like greenhouses and unprotected approaches such as open-air gardens and farms. The high land

costs have strained urban agriculture; therefore, planting crops on rooftops has been recognised as a functional way to better ecological services, food availability and climate change (Appolloni *et al*. 2021). According to Appolloni *et al*. (2021), households that implement rooftop farming can use their obtainable spaces to generate income by selling the crops produced to maintain their livelihoods and for consumption and food security.

2.12.3. Container gardening

Container gardening is the system of growing plants in pots, bags, buckets or bottles (Van Cotthem, 2007). Container gardening is mainly done by urban people interested in growing crops but face the challenges of land limitations (Van Cotthem, 2007). The advantage of farmers using containers to grow crops is that they are easy to move with, allowing seasonal transport of plants indoors and avoiding the dry winter seasons (Nangase and Lundholm, 2021). According to Nangase and Lundholm (2021), container-based systems are also in dense cities where soils are primarily covered with hard surfaces, resulting in intense competition for space.

2.12.4. Hydroponic farming

Hydroponics is "the science of growing plants without soil, in which the nutrients required by the plants are supplied in a water-based solution" (Agronomy Journal, 2020). Crops that are leafy green, tomatoes and peppers are crops mostly grown using hydroponic systems (Ghimire *et al*. 2023). Hydroponics is a land-efficient agriculture technique that can produce more food per unit of land than traditional soil-based agriculture (FAO, 2019). According to Niederwieser *et al*. (2020), hydroponic systems are implemented in urban areas. One advantage is the reduction of transportation costs and carbon emissions associated with food production and distribution. Hydroponics enable the recycling of nutrients and water, reducing water and increasing resource efficiency (Ghimire *et al*. 2023).

2.13. Market Access for Urban Farmers

Market access is the ability to acquire farm inputs and farm services and deliver agricultural products to buyers (IFAD, 2010). Different kinds of markets are found in urban areas, such as retail markets, weekly markets, shopping malls and complexes, neighbourhood shops and others. For this study, the main markets that will be used will be retail markets and weekly markets. Weekly markets operate on certain days when sellers from different places gather and sell various goods. According to the World Bank (2008; 2017), poor access to markets due to poor transportation and infrastructure makes it harder to access productivity-enhancing inputs like fertilizer and obtain high prices for harvest output. A study by Aggarwal *et al*. (2018)

indicates that reduced market access will affect farmers' choices and decisions. Market access is a challenge, especially for urban farmers in African countries. Market failures are usually driven by fundamental policy and institutional shortcomings that lead to information being accessed unevenly, high transportation costs and limited access to property rights (de Janvry *et al*. 1991; Barrett 2008; Shiferaw *et al*. 2009). The barriers to farmers accessing markets, information and technologies explain that smallholders' ability to seize and tap emerging income opportunities will be hindered despite their possessions.

Market access is a challenge for farmers, especially emerging urban farmers. According to Machete (2004), one of the critical factors necessary to farming is when smallholder farmers enter profitable markets, which necessitates, for example, market information and strong farmers' associations that are responsive to their needs (Jari and Fraser, 2012). In most developing countries, emerging smallholder farmers struggle to participate in markets because of the constraints and barriers there (Siegner *et al*., 2018). Market access in the context of farming is explained as the ability of the farmers to partake in the market opportunities (Siegner *et al*., 2018).

Smallholder farmers, especially those recently joining the farming sector, lack market access because of the following challenges. Such as poor infrastructure (this includes roads, communication and storage infrastructure), long-distance to output and input markets, high transportation costs, lack of information (such as information relating to markets, production, finance and environmental issues), lack of technical support (e.g. training on aspects of production and marketing and regular sources of information in the form of active involvement of extension officers), low involvement in agricultural cooperatives and no record-keeping practices among others (Jari and Fraser, 2012).

2.13.1. Significance of Adequate Market Access for Farmers

Adequate market information is essential for farmers to access markets, as it is lucrative for them to be profitable and productive. According to Tsakok *et al*. (2011), One of the common cases of successful agricultural transformation would be when most farmers operate in expanding markets with paying customers. According to Tsakok *et al*. (2011), farmers' access to markets is important, but rising competition makes it challenging for emerging new farmers. "The challenge is particularly tough for smallholders whose operations are not integrated into a value chain, national, regional or global, primarily because they have no policy and investment support (Tsakok, 2018).

2.13.2. Impact of Limited Market Access on Agricultural Activities

Farmers experience many challenges in farming or agricultural activities as most live below the poverty line, making it difficult to access commercial agriculture (Khapayi and Celliers, 2016). Lack of market participation mainly affects urban farmers; the lack of market access is that most places are privatized (Khapayi and Celliers, 2016). The socioeconomic characteristics that limit urban farmers from accessing markets include low education levels amongst the farmers, lack of credit access, absence of innovative production implements needed to increase the yield of the commodity produced and poor entrepreneurial skills. The farmer's ability to have access to markets has a positive impact on their income (Aku *et al*., 2018). The IFAD (2020) indicates that reliable market access boosts productivity, increases income and strengthens food security. If urban farmers have access to markets, their household food security will not be negatively affected. Factors that affect urban farmers accessing markets include high transportation costs from where one is to the market and the fact that they have to deliver limited knowledge, meaning that some urban farmers have insufficient information on the markets, affecting their access (IFAD, 2020).

2.13.3. Market Access: Its Impact on the Food Security of Urban Farmers

Urban farmers experience challenges when it comes to restricted market access; this then threatens their food security. Expensive transport and limited access to distribution markets and retail outlets (such as supermarkets) result in the urban poor relying on often expensive and nutritionally inadequate local food sources (Roth, 2013). Urban farmers' restricted or limited access to markets affects their food security; if they do not have access to markets, they have nothing to feed on.

2.13.4. Poor access to market information

Poor access to market information is a factor limiting emerging urban farmers from contributing to their food security. A study by Khapayi and Celliers (2016) indicated that 55% of the sampled urban farmers did not have access to market information. Therefore, such farmers are limited to participating in the market because they are not informed about their operations, such as market prices, products in supply, or products in demand.

2.12.5. Transportation costs

Amongst the challenges faced by emerging urban farmers are the high transportation costs. With high transportation costs, it becomes a challenge for the farmers to reach the markets to sell their produce. According to Khapayi and Celliers (2016:34), "The availability of one's market transport influences the delivery time of production to the markets, unlike the case of farmers

who depend on hired transport or public transport to transport their produce". An example is that for most emerging farmers, and transportation fare is a problem as they are still trying to sell their products, so now, if the prices or costs increase, they end up working for transportation fares as they will not have something for their households. It is further explained that unreliable transport will negatively impact the quality of the produce, especially for urban farmers with no proper storage facilities (Khapayi and Celliers, 2016).

2.13.6. Distance from food retailers

The distance from the food retailers is a challenge for the emerging urban farmers as if the food retailers are far away and, transportation costs will be high. This is a negative impact because if the farmers travel long distances to get to the food retailers, it will be the same as working for transport and not for profit, as their earnings will be used for transportation costs.

2.14. Urban Planning and Ecosystem Services

The integration of equitable urban planning practices has been highlighted as a potential solution to mitigate disparities in land access. Effective urban planning can ensure broader community access to essential ecosystem services, including community gardens and green infrastructure that support food production (Sangha, 2024). Ensuring all residents have access to parks, recreational spaces, and urban agriculture can foster community resilience and support public health initiatives by promoting local food systems. This aspect is particularly critical in historically marginalized neighbourhoods where low-income populations face increased health hazards and limited access to nutritious food.

2.15. Climate Change and Agricultural Viability

In sub-Saharan Africa, climate change significantly threatens agricultural viability, exacerbating food security challenges. Fluctuations in climate patterns have been linked to reduced agricultural output, which is devastating for smallholder farmers who largely rely on consistent weather patterns for their livelihoods (Tantoh, 2023). In regions like South Africa, compounded factors, including land access, ownership issues, and changing climate conditions, can create a perfect storm, limiting the productive capacity of urban agriculture and heightening food insecurity. It is paramount that interventions consider both the effects of climate variability and the existing socio-economic frameworks to improve resilience among vulnerable populations.

2.16. Theoretical Review

The FAO (2002) defines food security as “when all people have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for a healthy and active life. Food security comprises four interrelated pillars: availability, accessibility, utilisation and stability. Theoretically, this study hypothesises that urban farmer's access to land and markets improves their household food security. Farmer’s food security is positively affected by participation in the market chain (Montalbano *et al*., 2018). Theoretically, farmers' successful access to the market is associated with increased household income, sustaining their livelihoods. According to a study by Kirk *et al*. (2018), an increase in revenue does not imply that households are food and nutrition-secure because many households can purchase less nutritious foods due to the high inflation rates that affect food prices.

2.14. Conceptual Framework

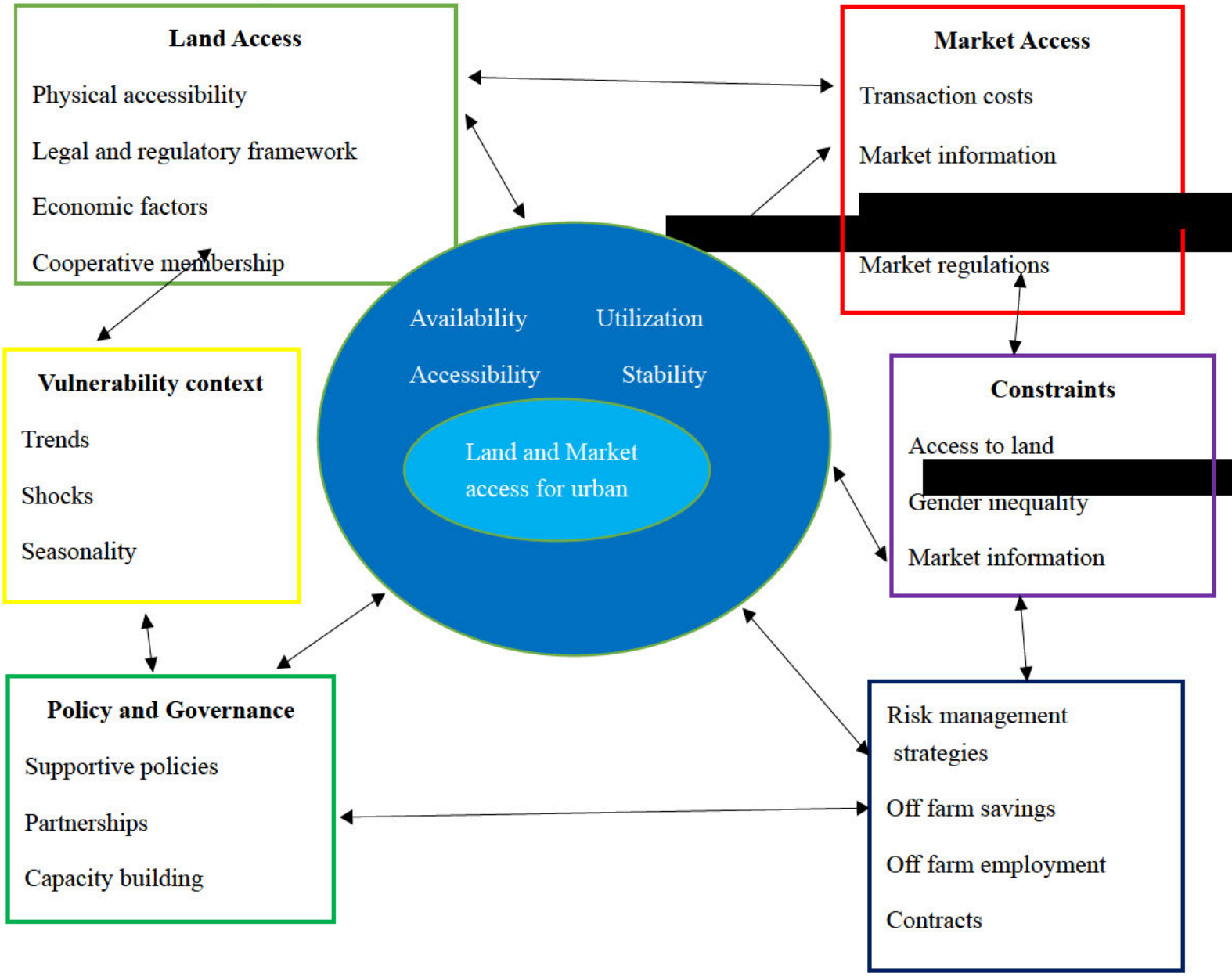

Figure 2: Conceptual Framework

2.17. SUMMARY

This study reviewed the literature on the impact of land and market access on urban farmer's household food security. This study investigates whether farmers' land and market access improve their household food security. It is hypothesized that the farmer's access to land and markets improves their source of income and, therefore, can sustain their livelihoods. Urban farmers' access to land and markets is significant as their household food security is improved, resulting in their ability to maintain their livelihoods.

CHAPTER 3: RESEARCH METHODOLOGY

3.1. INTRODUCTION

This study covers the methodology used to conduct the study and analyse data. It outlines the study areas, the sampled farmers and the issues and challenges they encounter within their households. The chapter outlines the research design, sampling method, data collection tools and data analysis. This study aimed to investigate how land and market access of urban farmers is affected and the implications on their household food security. The communities of Sobantu and Mpophomeni were chosen because they are urban and semi-urban areas with smallholder farmers who grow agricultural produce and interact with markets. The study explored the following research objectives:

1. Identifying the factors and challenges affecting urban farmers' access to land
2. Land and Market Access: Effects on Urban Farmers' Food Security in Sobantu and Mpophomeni.

3.2. DESCRIPTION OF STUDY AREAS

The study was conducted in Pietermaritzburg in the KwaZulu-Natal province. The study was conducted in two regions: Sobantu, which falls under the uMsunduzi municipality and Mpophomeni, which falls under the uMngeni municipality. Both these regions are under the uMgungundlovu district. The district is located in the midlands between Pietermaritzburg and the Drakensberg, where agriculture is common. The province has one of the best rainfall patterns and has a large area of agricultural land.

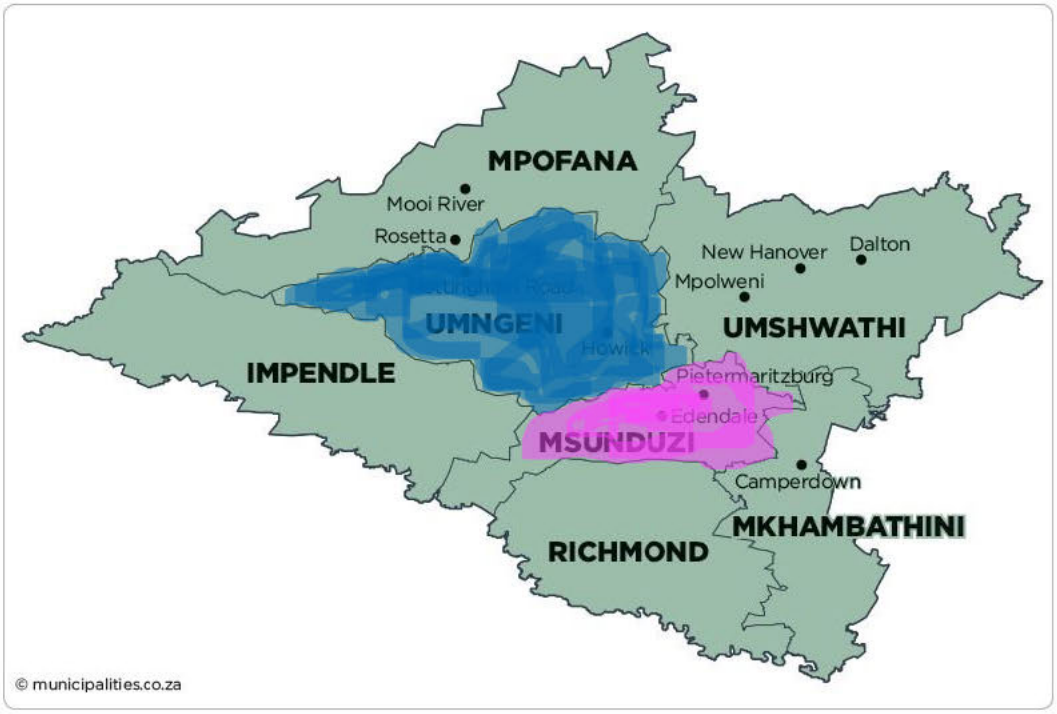

Figure 3.1: Map showing uMgungundlovu district with highlighted study areas: uMsunduzi and uMngeni municipalities where Sobantu and Mpophomeni are located

3.2.1. Sobantu township

Sobantu is a historically black township located about 5 kilometres east of the Pietermaritzburg city centre (Napier, amp &Mthimkhulu, 1989). Sobantu is surrounded by the residential areas of Northdale, Raisethorpe, Eastwood and Woodlands (Kirkpatrick, 1994). The township of Sobantu covers an area of 1.16 km2 with a population size of 7448 (Census, 2011). In terms of employment opportunities, most people work at the nearby factories and some are unemployed. The township consists of two main rivers and also several floodplains. For agricultural purposes, farmers use rivers as a source of irrigation. Housing development is limited in the township of Sobantu because of the numerous floodplains (Partridge & Maud, 2000). According to Cebekhulu (2016), the community practices agricultural farming to sustain their livelihoods, as several small home gardens exist. The area can be described as a community bounded by strong relationships and common interests.

3.2.2. Mpophomeni township

Mpophomeni township the second study site, a Peri-urban township located in KwaZulu-Natal Province. Mpophomeni, meaning "home of falls", is located 15 km outside Howick, overlooking Midmar Dam. The township is 28.3 km from Pietermaritzburg central town. The township is known for its rich Zulu culture and traditional history. The population was estimated

at 33 101 (Statistics SA, 2023). Numerous households in the area have subsistence farmers; a small portion are smallholder farmers (Baiyegunhi and Makwanguduze, 2013). Like most communities, the township also faces challenges in terms of social and economic issues, such as unemployment and environmental issues, which lead to soil degradation and water quality issues (van Deventer, 2012). Those working in formal employment work around Hilton, Howick and Mpophomeni shopping centre and a small portion at Pietermaritzburg central.

3.3. Research Design and Methodology

The study adopted mixed methods research to collect data. Mixed-methods research involves collecting, analysing and integrating qualitative and quantitative data to provide a comprehensive understanding of the research problem (Creswell, 2017). Using a mixed methods approach when collecting data has an advantage in that it allows the utilization of both methods, providing a better understanding of the research problem than either method alone. It is advantageous because using different methods for the same phenomenon or problem allows the researcher to view the problem from various perspectives. The study used key informant interviews and focus group discussions to assess the challenges farmers face regarding land and market access. Quantitative data consists of experiments and surveys, whereas qualitative data consists of focus groups and interviews. The research approach to be implemented is the community-led approach. Community-led research is a collaborative research approach that equitably involves community members, researchers and other stakeholders such as local governments, NGOs and agricultural extension services in the research process and it recognizes the unique strengths that each brings (Collins *et al*., 2018).

3.4. Sampling technique and Sample size

The study used a mixed methods approach consisting of quantitative and qualitative data collection techniques. The reason for using the mixed methods approach is that it is advantageous as it allows the utilization of both methods for more reliable results. The data was collected in September 2023 and also November 2023. The urban farmers were purposively selected as they had the characteristics required in the study. The targeted participants in this study were urban farmers. The study used structured questionnaires as well as focused group discussions. Focus group discussions are frequently used as a qualitative approach to gain an in-depth understanding of social issues. The study aimed to obtain data from a purposely selected group of individuals.

3.4.1. Sampling Procedure

The study employed purposive sampling, also known as selective sampling. This type of sampling is used in qualitative research and is a non-probabilistic technique. According to Creswell and Clark (2011), purposive sampling involves identifying and selecting individuals or groups who are well-informed and experienced in a specific area. For this study, the targeted population were household members engaged in urban farming within the two municipalities. The study made use of the multistage sampling technique. The multistage technique is explained as sampling that divides the population into clusters and then selects some clusters at the first stage. It is based on a hierarchical structure of natural clusters within the population (Sedgwick, 2015). The first stage of the technique was the purposive selection of the study areas, Pietermaritzburg and Howick. The second stage involved randomly selecting the urban farmers within these municipalities.

The sample size was limited by factors such as the number of individuals engaged in urban farming. The study had a sample size of 172 urban farmers, where Sobantu had (65) participants and Mpophomeni (107). The farmers' diversity was one factor considered during the selection process. For both municipalities, the farmers are surrounded by schools, factories, and industries, forming a market for the farmers. Farmers without access to markets sold their produce to the community and local Spaza shops for income generation. The structured survey questionnaire was pre-tested on ten households in Sobantu; the pretesting was conducted to ensure that the farmers understood the questionnaire. Pretesting was used to improve the reliability and validity of the questionnaire.

3.5. Data collection tools

3.5.1. Structured questionnaires

A structured interview is one in which each subject or respondent is asked a series of questions according to a prepared and fixed interview schedule questionnaire (Brace, 2018:2). The quantitative data was collected using structured interviews with the farmers. The interviews were conducted in both English and isiZulu, especially in isiZulu, as it is the local language. The purpose of a structured questionnaire was to ask respondents the same questions simultaneously and get different answers, as people have different beliefs, thoughts and perceptions regarding farming. The food security conditions of the household were measured before the intervention using the Household Food Insecurity Access Scale (HFIAS) and the Diet Diversity Score (DDS).

3.5.2. Focus group discussions.

The study employed the focus group discussions (FGD). Focus group discussions are frequently used as a qualitative approach to gain an in-depth understanding of social issues. The method aimed to obtain data from a purposely selected group of individuals rather than from a statistically representative sample of a broader population (Nyumba *et al*., 2018:1). The advantages of using focus group discussions were that they allow respondents to talk and interact with each other. A focus group discussion consisting of groups of farmers, both female and male, was conducted in the Sobantu and Mpophomeni communities, where the researcher organised farmers who were part of cooperative organisations and farmers groups to participate. These focus groups aimed to establish external environmental factors such *as political, economic, social, technological, environmental, and legal factors that challenged* farmers when accessing land and markets.

Table 3.1: Themes used to guide focus group discussions with the farmers

Themes	**Concepts**
Political	Political issues, policies and assistance received from governmental structures.
Economic	Finances such as own finance and microfinance institutions to generate farm profit.
Social	Unemployment, poverty, aging, health care, crime and violence.
Technological	Access to innovative technology such as agriculture, radio, TV, the internet and cell phones.
Environmental	Environmental challenges, climate change, soil contamination.
Legal	Factors affecting the acquisition of adaptation strategies.

Figures 3.2 &3.3 : The researcher conducting focus group discussions with farmers who are part of cooperative membership groups in Sobantu

Figure 3.4: focus group discussion with farmers at Mpophomeni

3.5.3. Photography

The photography method of data collection consists of capturing pictures of the study sites and then utilising the pictures as actual data (Glaw *et al*., 2017). For the study, a cellphone camera was used to take photographs of the farming land and agricultural produce during observations. By capturing these photographs, the evidence helped the researcher enhance the richness of the

collected data by discovering additional layers of meaning, adding validity and depth, thus creating knowledge (Glaw *et al*., 2017).

3.6. Data analysis

3.6.1. Descriptive analysis

Descriptive analysis was used to determine the averages, mean difference tests and percentages to compare the urban farmers' socio-economic characteristics for both study areas. The descriptive analysis examines the variables' mean, frequencies and standard deviation. Some of the variables in the descriptive data were later used in the logistic regression model as explanatory variables.

3.6.2. Pestel analysis

The PESTEL Analysis is a framework or tool used to monitor the macro-environmental factors that may impact the organization. The framework is an acronym for Political, Economic, Sociological, Technological, Legal and Environmental factors (Alanzi, 2018). For this study, the PESTEL analysis tool provided a question guide for further analysis of the focus group discussions. The farmers' responses are in table form with the frame factors—furthermore, this tool analyses how external factors impact the household food security of urban farmers.

3.6.3. Logistic regression model

Binary regression model

This study used the binary logistic model to analyse the factors affecting urban farmers from accessing land. This model uses the same principles as the linear regression. According to Hastie *et al*. (2009) and Karsmakers *et al*. (2007), some of the main advantages of the logistic regression model are that it can naturally provide probabilities and extend to multi-class classification problems. Another advantage of this model is that it is easier to use for interpretation when compared to the other models. The study assumes two possible outcomes: "Farmers having access to land improves their participation in urban agriculture, or farmers not having access to land decreases their participation in urban agriculture".

The Equation represents the form of the logistic model:

Log (P_i) = ln ($PP_i/1 - PP_i$) = $\alpha\alpha + \beta\beta_{kk}XX_{ii}$+……. u

Where: Log (P_i) = ($PP_i/1 - PP_i$) = logistic of Urban farmers having access to land for urban agriculture P_i = Probability of urban farmers accessing land for farming ($YY = 1$), $1-PP_i$ = Probability of urban farmers who do not have access to land for urban farming ($YY = 0$), α = intercept term,
$\beta\beta_{kk}$ = model parameters, $XXii$ = independent variables and u = error term.

3.6.3.1. Variables used in the Logistic model that influence urban farmers from accessing land for urban agriculture

The variables were used to determine the factors preventing farmers from accessing land for urban agriculture. The following independent variables were used, and their expected outcomes are presented in Table 3.2 below:

Table 3.2.: Description of the dependent and independent variables affecting land access

Variables	**Variables explanation**	**Variable type**
Dependent variable: Land access	If the head of household has access to agricultural land	Dummy (0=No, 1=Yes)
Gender	Whether the household head is male or female	Dummy (0=Male, 1=Female)
Marital status	The marital status of the household head	Categorical (1=Single, 2=Married, 3=Divorced, 4=Widowed)
Education level	The level of education of the household head	Categorical (1=No education, 2=Primary, 3=Secondary/High school, 4=University/College)
Household size	The total number of permanent members of a household	Continuous (number)
Credit access	If the household head has access to credit	Dummy (0=No, 1=Yes)
Total household income	Money (Rand)- household earnings per month (off-farm)	Continuous (rands)
Cooperative membership	Whether the household head belongs to a farmers' association or not	Dummy (0=No, 1=Yes)

Below is an explanation and description of the variables affecting urban farmers' access to land in both study areas (Sobantu and Mpophomeni).

a). Gender of household head

Gender is classified as a dummy variable. This variable is divided into whether the head of the household is classified as male or female. This variable also influences the farmers when it comes to accessing land. The variable is expected to have either a negative or a positive impact on the farmers' access to land for agricultural production. Land access is essential for all households in communities and should be distributed evenly, where women are also given access (Tempra *et al*., 2018, p1).

b). Marital status of household head

The marital status of the head of household is expected to have a positive impact on land access. A study by Mothae (2017) indicates that marital status is an essential factor in the relationship of households to their land issues. A study by Thamaga-Chitja *et al*. (2010) showed that in most communities, marriage was important in determining access to land, especially for women.

c). Education level of household head

The education level of the household head is expected to have a positive impact on accessing land. This is because the higher the farmer's education level, the more influential they are expected to be when negotiating (Mthembu, 2014).

d). Household size

The household size is expected to have a positive impact on land access. This means that if the household size increases by 1 unit, more land is required as there is also human labour to assist with agricultural activities.

e). Credit Access

Farmers having access to credit for land access is expected to have a positive impact. A study by Mthembu (2014) indicates that farmers having more access to credit would give them the power to buy land or even rent from other people.

f). Total household income

The total household income results could either have a positive or negative impact. This is because a household might have a sufficient income, but it does not mean that members might purchase the land for agricultural use. Having income within a household does not mean that the land purchased will be put to productive use (Akinyemi and Mushanga, 2019).

g). Cooperative membership

Farmers being part of cooperatives are expected to impact land access positively. The farmers can qualify for credit as a group, especially smallholder farmers. Cooperative memberships allow farmers to get bigger plots of land than individual farmers.

3.6.4. Tobit regression model

The Tobit regression model is identified as an econometric model used to describe the relationships between a dependent variable that is non-negative YY_{ii} and one or multi-independent variables $XX_{ii.}$ The dependent variable is censored in this model because the negative values are not observed. It assumes that there is a latent non-observable variable Y* and this variable depends linearly on the independent variables XX_{ii} through a vector of coefficients $\beta\beta_{\mathrm{i}}$ determining their relationships. The Tobit regression model is used specifically when the outcomes of the dependent variables are not continuous (Anderson, 2017). It allows the researcher to determine the threshold (lower or upper) to censor the regression while keeping the linear assumptions required for the model. The equation for the model:

$$\boldsymbol{YY_{ii}} = \{\boldsymbol{YY^{*}}\ ii\text{f}\ \boldsymbol{YY^{*}} > \mathbf{00},\ \mathbf{00}\ ii\text{f}\ \boldsymbol{YY^{*}} <= \mathbf{00}\},\ \text{With}\ \boldsymbol{YY^{*}} = \boldsymbol{XX_{ii}}\boldsymbol{\beta\beta}+\boldsymbol{UU_{ii}}$$

Where: YY_{ii} = HFIAS score dependent variable that will vary between '0' and '27',

UU_{ii} = error term,

i = number of observations,

$\beta\beta_{kk}$ = a vector of unknown coefficient and XX_{ii} = a vector of independent variables.

This, therefore, means that since the Household Food Insecurity Access Scale is the dependent variable (proxy of food security) and is a continuous variable with ranges between '0 and 27'; the Tobit regression model was suitable for this analysis as it was able to identify the impact land and market access have on the household food security of urban farmers within the study areas.

Table 3.3: Description and explanatory variables used in the Tobit regression model

Variable name	Definition and measurement	Expected sign
Dependent variable: Food security	Food security score (Minimum=0, Maximum=27)	N/A
Independent variables Gender of household head	If the head of household is male or female (0=Male, 1=Female)	+/-
Marital status	If head of household is (1=single, 2married, 3-divorced, 4-widowed)	+/-
Education	Level of education for head of household (1=No education, 2=Primary, 3=Secondary, 4=University/College)	-
Household size	Number of household members (continuous)	+
Land size	Surface of farm in hectares: 1=0-1, 2=1,001-2, 3=2,001-3, 4=3,001-4, 5=4,001-5, 6=>5)	+
Land access	If the household has access to land (0=No, 1=Yes)	-
Cooperative membership	If the household head is a member of cooperative groups (0=No, 1=Yes)	+
Market access	If the household head has access to lucrative markets (0=No, 1=Yes)	-
Total household income	Money (Rand)- household earnings per month (off-farm): 1=R0-5000, 2=R5001-10000, 3=R10001-15000, 4=15001-20000, 5=>R20000)	-
Credit access	If the household head has access to credit (0=No, 1=Yes)	+/-

a). Gender

Gender is classified as either female or male within a household. This variable was expected to positively and negatively impact the farmer's household food insecurity. Female-headed households have a higher dependency. The study by Etwire *et al*. (2013) revealed that when it comes to agricultural activities, it is mostly men who participate compared to females.

However, a study by Mothae *et al*. (2017) found that compared to males, females participate more in agricultural practices.

b). Marital status

The expected outcome for this variable could be positive or negative, being that households with married spouses are likely to be food secure. The married couple assist each other with household income, as the female may participate in agricultural activities while the male may be more involved in industrial income-generating activities (Maziya *et al*. 2017). However, some households are headed by females who can sustain their food security status (Mthembu, 2014).

c). Education

The level of education is expected to have a negative impact. Education is defined as the number of schooling years the head of household has spent in school. In this study, this variable is continuous.

d). Household size

Household size is the number of members living in the same household. The higher the number of members in the household, the more likely the household will be food insecure compared to households of smaller sizes (Eneyew and Bekele, 2012). This variable is continuous and is expected to positively influence the household food insecurity status.

e). Land size

This study's land size is expected to positively affect household food security status. If the household has more land for agricultural practices, they can produce more for consumption and selling. Food production can be increased extensively by expanding areas under cultivation (Najafi, 2003). Therefore, there could be a significant improvement in household food security status.

f). Land access

Land access is expected to affect a household's food security status negatively; if the household has access to land for agricultural practices, they can grow more crop yield and sustain their livelihoods (Mthembu, 2014).

g). Cooperative membership

Farmers' groups improve their members' food consumption and household income (Nugusse *et al*. 2013). This variable is expected to negatively affect the food security status as if farmers are part of cooperative groups; they can produce more and sell in lucrative markets.

h). Market Access

Market access is a variable that can be explained as the ability of household heads to sell in lucrative markets to maintain the food security status. A study by Cele (2020) found that when household heads participate in lucrative markets, they can sustain their livelihoods and support their household food security.

i). Total household income

The total income is defined as the monthly income that is earned from non-agricultural activities. This variable is expected to affect the household's food security status negatively. A study by Bahir *et al*. (2012) found that families with income significantly improved their food security status compared to households without an income.

j). Access to credit

Access to credit is the variable that shows whether the household head can access credit from government or private services. Access to credit can be explained as the ability of the household to obtain money which could be used for either consumption or agricultural production (Kuwornu *et al*., 2018). Access to credit is considered a source of income that could improve the household's livelihood by improving their agricultural productivity and food security status (Nokuphiwa *et al*., 2014). Therefore, the expected sign of this variable will be either positive or negative.

3.6.5. Household Dietary Diversity Score

The household Dietary Diversity Score (HDDS) is an indicator used to determine the different types of food consumed by a household. It indicates whether the household maintains a good

healthy diet. The HDDS indicators show the household's ability to access food and the socioeconomic status based on the previous 24 hours (Kennedy *et al*., 2011). According to Azadbakht *et al*. (2005), determining household food security status requires a deeper analysis of the dietary diversity of the household because most food-insecure households rely mainly on starchy staples at the expense of proteins and other dietary nutrients. For Swindale and Bilinsky (2006), the household dietary diversity score is a population-level indicator used to measure household food access. In this study, 12 food groups were used to determine household food security, as indicated below. According to Swindale and Bilinsky (2006), the Household Dietary Diversity Score ranges between 0 as the lowest and 12 as the highest score. Therefore, the indicator includes 12 questions and part of those questions are the types of food used in this study: Cereals, Root and tuber, Vegetables, Fruits, Meat and poultry, Eggs, Fish and seafood, Pulses/legumes/nuts, Milk and milk products, Oil/fats and offal, Sugar/honey and Miscellaneous (Swindale *et al*., 2006).

HDDS indicator tabulation: HDDS (0-12) =Sum (A+B+C+D+E+F+G+H+I+J+K+L)

Objectives	Variables collected	Method of analyses
Factors and Challenges affecting urban farmers' access to land.	Age of respondent, Source of Income, Marital status, Access to credit, cooperative membership, Size of land, the condition of the land acquired, condition of water access, political conflicts and transaction costs.	Descriptive data analysis, Binary regression model, PESTEL analysis
Land and Market access: Effects on urban farmers' household food security in Sobantu and Mpophomeni	-How long have urban farmers farmed in the community? -Are there challenges experienced when accessing land and markets? -Process of acquiring land? -What are the factors that limit urban farming? -What are the usual enablers?	Descriptive data analysis, Tobit regression model, PESTEL analysis, HFIAS and HDDS

3.7. SUMMARY

This chapter discussed the study's methodology by stating and explaining the methods used. The data was collected from 172 farmers in Sobantu and Mpophomeni. Purposive sampling was used to select the participants, and data was collected using structured questionnaires, focus group discussions, and photography.

CHAPTER 4: FACTORS AND CHALLENGES AFFECTING URBAN FARMERS' ACCESS TO LAND

ABSTRACT

Land access is a fundamental element of sustainable urban development and related issues for food security and the community's well-being. Land access for urban farming means the availability and use of land in urban communities for agricultural practices. Urban agriculture is a suitable solution for increasing local food production and building strong communities. However, land access results in a significant challenge for urban farmers within communities. The challenges associated with land access include farmers' age, gender, education, cooperative membership, access to credit, high transaction costs and political issues related to land. Therefore, the study aims to discover the factors and challenges affecting urban farmer's land access. Data was collected from a sample of 172 households in Sobantu and Mpophomeni, and a mixed methods approach was adopted. A statistical software package (SPSS version 29) was used to analyse data, and a logistic regression analysis was performed to analyse the quantitative data further. Results from the model indicated that farmers' access to credit, total household income, and household size positively impact their access to land. The study concludes that within urban communities, there is a shortage of land access and that only a limited number of people qualify for credit access to purchase land. To safeguard farmers access to agricultural land for farming activities, the study recommends land trusts be set for agricultural use within the communities and for farmers to shift to alternative farming methods such as rooftop farming, vertical farming, container gardening and hydroponic farming.

Key words: land access, urban farming, gender, logistic binary regression

4.1 INTRODUCTION AND CONTEXTUALIZATION

Land is an essential means of survival and income for most of the African population (Fobih, 2004). According to Owoicho *et al*. (2023), farmers having access to land is key essential when it comes to farming. Factors such as tenure security, bureaucracy in land acquisition, land use conflict and high land cost compromise the urban farmer's access to land (Namwata *et al*., 2015; Odudu, 2015a; Oladehinde *et al*., 2017). Urban farming requires land as an essential resource; however, land access is considered a major challenging factor for urban farming systems (Oluma *et al*., 2019). Land is a competing demand in urban communities as it is mostly used for housing and industrial purposes, limiting urban farmers from acquiring large plots of land.

The social, economic and institutional factors that dominate the environment in which urban farmers work have influence on their access to resources and opportunities, resulting in a sustainability challenge for urban agriculture (Famakinwa *et al*., 2017; Hussein, 2017). Access to financing is considered a factor affecting the urban farmer's access to land. According to Cabannes (2012), most financial institutions are reluctant when it comes to helping emerging farmers as they give much preference to large-scale commercial enterprises. Transport is also a challenge that affects the farmer's access to land. Agricultural land may be far from where the farmer lives, public transportation is expensive to travel daily and the poor road infrastructure and land may be expensive for the farmers to rent monthly (Namwata, 2013; Flynn-Dapaah, 2002).

Gender is a challenge that affects most urban farmers because they are unlikely to own and rent land, and those with access to land are of lower quality and small sizes (FAO, 2014). Age is another factor affecting the urban farmers' access to land, as an increase in the farmer's age increases the chances of owning the land and, therefore, using it for agricultural purposes (Akinyemi and Mushunje, 2019). Other factors affecting urban farmers' access to land include education, extension services, farmer's membership organization and geographical location. The study by Mothae and Chitja (2017) focuses on land as a crucial aspect of agriculture and farmer's access to markets. However, the study's primary focus is on smallholder farmers and not on urban farmers and it also focuses more on the land rights of urban farmers. Therefore, this study focuses on land access as a crucial element for urban farmers and their challenges.

This study aims to contribute to the literature on factors affecting urban farmers' access to land and the challenges they encounter in Sobantu and Mpophomeni. The study is divided into sections. Section one covers the analytical framework; section two discusses the methodology section, which describes the urban areas studied with the prevailing underlying issues. Data collection tools, sampling procedure and size, dependent and independent variables and the model were used.

4.2. MATERIALS AND METHODS

4.2.1. Study areas and description of sampled farmers

The study consists of 172 urban farmers from the study areas in and around Pietermaritzburg. The study sites are part of the uMgungundlovu District but are not from the same municipalities. Mpophomeni falls under uMngeni, and Sobantu falls under uMsunduzi municipality. Sobantu township consists of two main rivers and also several floodplains. For agricultural purposes, the farmers use rivers and tap water as a source of irrigation. The area can be described as a community bound together by strong relationships and everyday interests, with close facilities such as schools, clinics, community halls, shopping centres and factories. Like most communities, the Mpophomeni township faces challenges of high unemployment rates and water quality issues, which affect soil and water quality issues and irrigation activities (van Deventer, 2012). Those working in formal employment work around Hilton, Howick and Mpophomeni shopping Centre and a small portion at Pietermaritzburg central. The study uses purposive sampling, as the farmers were selected based on their farming type.

4.2.2. Research design

The study adopted mixed methods research to collect data. The mixed methods can be explained as a research methodology that involves collecting and analysing data using both qualitative and quantitative research (Creswell,2017). Using a mixed methods approach when collecting data has an advantage in that it allows the utilization of both methods, which then provides a better knowledge of the research problem than either alone. It is advantageous because using different methods for the same phenomenon or problem allows the researcher to view the problem from various perspectives. Purposive sampling was used to select 172 urban farmers within the municipalities with access to land and markets. A survey questionnaire was used to collect data from the farmers. Supplementary information was obtained using focus group

discussions with the urban farmers who were part of cooperatives as they had greater market access.

4.2.3. Data collection tools

4.2.3.1. Structured questionnaires

A structured interview is known to be where each respondent is asked a series of questions based on the prepared fixed interview schedule (Brace, 2018:2). Face-to-face interviews were done as part of quantitative data, where structured questionnaires were provided to the farmers. The interviews were conducted in English and isiZulu, especially in isiZulu, which is the local language. The structured questionnaire was designed to capture data on the demographics of farmers, their access to land and markets and household food security. The aim of a structured questionnaire was to collect information from farmers individually to avoid bias and answer, as people have different beliefs, thoughts and perceptions regarding farming. The Household Food Insecurity Access Scale (HFIAS) and the Diet Diversity Score (DDS) were used to measure the food security of households within the communities. The reason for selecting these tools is their rapid and cost-effectiveness in data collection and their ability to manage both the experience of food availability and nutrition security.

4.2.3.2. Focus group question guide

The study employed the focus group discussions (FGD) tool. Focus group discussions are commonly used as a qualitative approach to gain an in-depth understanding of social issues. For this study, the method aimed to obtain data from a purposely selected group of individuals rather than from a statistically representative sample of a broader population (Nyumba *et al*., 2018:1). Therefore, allowing the participants to engage with each other on different aspects shared during the discussion. A focus group discussion consisting of female and male farmers was conducted in the Sobantu and Mpophomeni communities. These focus groups aimed to show external environmental factors such *as political, economic, social, technological, environmental, and legal factors* which affect farmers when accessing land and markets. Table 4.1 below provides a demonstration of the concepts and themes guide used during focus group discussions with the farmers.

Table 4.1.: Themes of PESTEL analysis

Themes	**Concepts**
Political	Political disputes, constraints by existing policies, and institutional support.
Economic	Financial resources such as microfinance institutions generate farm profit.
Social	Unemployment, poverty, aging, health care, crime and violence.
Technological	Access to innovative technology such as agricultural technology, radio, TV, the internet and cellphones.
Environmental	Environmental challenges, climate change, soil contamination.
Legal	Factors affecting the acquisition of adaptation strategies. Discrimination law, consumer law, employment law, health and safety law.

4.2.3.3. Photography

The photography method of data collection consists of capturing pictures of the study sites and then utilising the pictures as actual data (Glaw *et al*., 2017). For the study, a cellphone camera was used to take photographs of the farming land and agricultural produce during observations. By capturing these photographs, the evidence helped the researcher enhance the richness of the collected data by discovering additional layers of meaning, adding validity and depth, thus creating knowledge (Glaw *et al*., 2017).

4.3. Data analysis

The data collected was coded into Microsoft excel and then transferred to Statistical Software Package for Social Sciences (SPSS Version 29) for analysis. A descriptive statistical analysis was employed to understand the demographic characteristics of urban farmers and the challenges faced by the farmers when it comes to accessing land. It also presented the frequencies. The qualitative data was analysed using thematic analysis, which is mostly applied to this dataset. For further analysis of the quantitative data, a Logistic regression analysis was performed. The Equation represents the form of the logistic model:

$$\text{Log } (P_i) = \ln (PP_i/1 - PP_i) = \alpha\alpha + \beta\beta_{kk}XX_{ii} + \ldots\ldots\ldots\ldots u$$

Where: Log $(P_i) = (PP_i/1 - PP_i)$ = logistic of Urban farmers having access to land for urban agriculture P_i = Probability of urban farmers accessing land for farming ($YY = 1$), $1-PP_i$ = Probability of urban farmers who do not have access to land for urban farming ($YY = 0$), α = intercept term,
$\beta\beta_{kk}$ = model parameters,
XX_{ii} = independent variables and u = error term.

4.4. RESULTS AND DISCUSSION

Table 4.2: Farmers' Demographic Profile

Socio economic variable	Category	Frequency	Percentage
Age	1-40	23	13,4
	41-60	66	38,4
	61-80	76	44,2
	>80	7	4,1
	Total	172	100
Gender	0-Male	71	41,3
	1-Female	101	58,7
	Total	172	100
Marital status	Single	82	47,7
	Married	51	29,7
	Divorced	7	4,1
	Widowed	32	18,6
	Total	172	100
Land access	0-No	0	0
	1-Yes	172	100
Type of land	Rental	13	7.6
	Ownership	142	82.6
	Municipal	17	9.9
	Total	172	100

Level of Education	No formal education	6	3,5
	Primary	37	21,5
	High School	108	62,8
	University/College	21	12,2
	Total	172	100
Household size	1-5 members	17	9,9
	6-10 members	138	80,2
	11-16 members	11	6,4
	<16 members Total	6	3,5
		172	100
Extension services	0-No	108	62,8
	1-Yes	64	37,2
	Total	172	100
Access to credit	0-No	163	94,8
	1-Yes	9	5,2
	Total	172	100
Farming years	1-10 years	83	48,3
	11-20 years	44	25,6
	21-30 years	37	21,5
	31-40 years	7	4,1
	41-50 years	1	0,6
	Total	172	100
Source of Income	Permanent	15	8,7
	Self-employed	20	11,6
	Temporary work	28	16,3

	Welfare grant/pension	109	63,4
	Total	172	100

a). Age

Table 4.2. above presents a summary of the demographic profile of 172 urban farmers who participated. The respondents were black Africans for both study areas, and the language used for interaction was isiZulu as their first language. The results indicated that most of these urban farmers aged 61-80 with a percentage of 44,2%. While other farmers interviewed ranged between the ages 20-40, presenting a percentage of 13,4% and 38,4 % for middle-aged farmers. The results showed that the youth does not significantly engage in urban agriculture. This is alarming when comparing the level of unemployment in the country, with a rate of 32.1% as of 2024; out of that, 59,40% is unemployed youth (StatsSA, 2024). These statistical results should trigger the youth to invest more of their time by starting businesses based on urban farming. As part of the results from the Focus group discussions (Table 4.5) of the study area, farmers mentioned that most of the youth do not show interest in urban agriculture, resulting in them being unable to pass on the knowledge to future generations who will continue with urban farming.

b). Gender

The results presented in Table 4.1 show that 58,7% of the respondents were females, whereas 41,3% were males. The results showed that females participating in urban farming were a higher proportion compared to men. The results of this study are supported by Rao's (2014) finding, which showed that women make up half of Africa's agricultural workforce overall and they produce up to two-thirds less per unit of land than men. The argument for this disproportion of more females participating in urban farming was due to the fact that most households were female-headed; therefore, the participation of most females was to improve their livelihoods by enhancing food availability within the household. Results from the focus group discussion (Table 4.5) indicate that marginalised women with fewer streams of income generally benefit from urban farming as they are able to generate income to support their families. A study by

Mougeot (2000) indicated that women participate more in urban agriculture to nourish their households and allow them to work closer to home.

c). Marital status and land access

The results showed that the majority of the urban farmers who participated in the study all have access to land but varied in the type of land they have access to. Farmers that had access to rental land were 13 out of 142 with a percentage of 7,6%, whereas farmers with title deeds and full owners had a percentage of 82,6% and lastly, farmers using municipal land with a percentage of 9,9%. The results in the table above (Table 4.2) show that within the study areas, most of the participants were single, with a percentage of 47,7% with female-headed households. Married farmers were 51 and had a percentage of 29,9%, divorced at 4,1% and widowed at 18,6%. The results show that, according to a study by Mothaoe (2017), marital status is an important factor within households when it comes to issues of land. Thamaga-Chitja *et al.* (2010) study revealed that marriage was an essential factor when it came to women accessing land. In most communities, single, divorced, and unmarried women experience challenges when it comes to accessing land as compared to married women (Thamaga-Chitja, 2012).

d). Education

The level of education for farmers shows that the highest level of education for most farmers in the study is high school, with a percentage of 62,8%. The findings also revealed that only a small percentage of farmers had no formal education, with a percentage of 3,5. The results further show that 12,2% of urban farmers attended university and college and that 21,5% of farmers attended primary school. The results showed that when it comes to urban farming, people from all educational backgrounds participate. However, the urban farming sector has more farmers with no educational background (Amoah, 2008), which contradicts the study. e). Household size

The results from the table above are in Table 4.2. show that the majority of household sizes ranged between six to 10 members (80,2%), while household size of members ranging between one to five members was 9,9%. Members within the households ranging between eleven and sixteen had a percentage of 6,4% and members greater than sixteen were 3,5%. The results are supported by focus group discussion table 4.5, which further explains that households with more members allow them to participate in agricultural practices since everyone would have a

role to play; hence, a lot of work gets done and money saved instead of hiring labour. Martey *et al*. (2013), stated that a household with a bigger household size allows them to share responsibilities. Also, it allows the household to participate in activities that will enable them to cope with the economic challenges. These results are supported by Martey *et al.* (2014), who indicated that if there are more members within the household, more people will participate in agricultural activities.

f). Extension services

Results show that 62,8% of the farmers are unaware of any governmental organization that supports farmers and do not receive any support from the government. On the other hand, 37.2% of farmers are aware of extension services. Murungani (2015) explained that when it comes to farming within communities' extension, officers help farmers maintain and improve produce and navigate the formal markets. Some of the non-governmental organizations that supported farmers were the Fuze organization and Friends for Life. For governmental organizations, they included Cedara College for Agriculture, Department of Agriculture, Land reform and Rural Development (DALRRD) and local municipalities. During the focus group discussions (Table 4.5) with the study areas, especially in Sobantu, farmers stated that due to political conflicts within the communities, not all the farmers are exposed to extension services, which limits their chances of participating in the lucrative markets. For farmers who received training, it was based on irrigation activities such as crop production, fertilizer application, agricultural marketing, land preparation and pricing of the goods. g). Access to Credit

Access to credit for urban farmers is not the same; some farmers do qualify and others do not qualify because of many underlying factors. Results indicate that 94,8% of the farmers do not qualify for credit access and age is the main factor for them not qualifying. Most of the farmers who participated were above the age of 61 and had no stable income apart from welfare grants. For the middle-aged farmers who do not qualify for access to credit, it was because they are mostly dependent on social welfare grants. Results show out of the population of the sampled farmers, only 5,2% of the farmers have access to credit. During the focus group discussions (Table 4.5), farmers explained that those who had access were the ones in cooperative groups as they joint forces for land-sharing agreements. During the focus group discussions (Table 4.5), some of the farmers stated that not being able to qualify for access to credit, they resort to "*loan sharks*" for financial assistance. According to Baiyegunhi and Fraser (2014), credit is an important instrument for improving the welfare of smallholder farmers as their productivity

capacity improves through financing investments. Therefore, farmers with access to land can purchase land for agricultural activities. The results are opposed to the work of Sinyolo *et al*. (2016), who acknowledged that access to credit enhances agricultural productivity, increasing farmers' profits to sustain their livelihoods.

h). Farming experience

Results show that in terms of farming experience, farmers with 1 to 10 years' experience were the majority, with 48,3%, while 44 (25,6%) had 11 to 20 years' experience. Results further show that 21,5% of farmers had 21-30 years of experience in urban farming and 4,1% had 31-40 years of experience. There was only one farmer who had more years of experience of more than 41 years. The overall results show that the number of years of experience for some farmers means that some farmers are experienced. According to Zhou and Li (2022), farming experience can lead to farmers being business-minded compared to those without experience in farming. During the focus group discussions (Table 4.5), the farmers mentioned the methods and techniques that they use on their farms. However, these types of methods need to be improved as times are changing and we live under extreme climatic conditions, which would make the methods less effective.

i). Source of Income

Table 4.2. depicts the income sources of the urban farmers who participated. Gathering and obtaining these results were to find out whether the urban farmers primary source of income was only from urban agriculture or whether there were other sources of income. the results show that participants who were permanently employed were 15(8,7), for those self-employed there were 20(11,6%), for farmers who also did temporary work as another source of income were 28(16,3%), the majority participants received their main source of income from welfare grants and pension with 109 (63,4%). Some participants were farming for income generation as the income received from welfare grants was not enough to support their families fully and sustain their livelihoods. During the focus group discussions (Table 4.5), many farmers indicated that they sold their agricultural produce to community members and occasionally at the town taxi rank. They found selling in town more profitable, although transportation costs were a significant challenge.

Additionally, some farmers supplemented their income through temporary work or self-employment. This finding aligns with Maziya *et al*. (2017), who noted that relying solely on

agriculture for income is often insufficient for sustaining livelihoods. Diversification is necessary for the farmers to alleviate poverty and ensure household food security.

Table 4.3: On-farm income from livestock and crop sales

Socio-economic	Category	Frequency	Percentage
Crop sales	0-No	124	72,1
	1-Yes	48	27,9
	Total	**172**	**100**
Livestock sales	0-No	152	88,4
	1-Yes	20	11,6
	Total	**172**	**100**

The results in Table 4.3 further explain that apart from the main sources of income that farmers receive, some sell their produce and livestock for multiple income streams. 48(27,9%) of the farmers sell their crops whereas 124(72,1%) of the farmers grow crops just for only consumption. Regarding livestock sales, only a few farmers had livestock 20(11,6%). Most of the farmers, 152(88,4%), stated that they have not participated in livestock sales since the Covid-19 pandemic.

4.4.2. Factors affecting farmer's access to urban land: Logistic regression results

The objective of the study was to investigate the factors affecting farmers access to urban land for farming. Many factors were investigated. However, from Table 4.4 below, three factors showed a significant effect: household size, total household income and access to credit by the farmer.

a) Household size

Table 4.4 shows that the household size had a statistically positive influence (p=0.043) on the farmers access to land for agricultural practices, which complies with the expectations of the study. The regression model indicates that for every unit, an increase in the household size leads to a 3.18-time increase in the odds of the farmer accessing land. This means that households with many members need to work hard to support the children and even make means to access land to support the family and children working as a workforce. These results are aligned with

Christian *et al.* (2020), which indicate that family labour assisted in reducing costs that would have been spent on hire labour.

Table 4.4: Logistic regression table of dependent and independent variables.

Variables	**Odds ratio**	**Std. Err.**	**Z**	**p-significance level**
Gender	1.474	1.337	1.214	0.271 ns
Marital status	-0.363	0.465	0.610	0.435 ns
Education	0.726	1.120	0.420	0.517 ns
Household size	3.184	1.570	4.114	0.043 **
Total household income	-0.943	0.438	4.627	0.031 **
Access to credit	-6.067	2.032	8.914	0.003 ***
Cooperative membership	1.581	1.652	0.916	0.339 ns
Constant	2.003	3.571	0.315	0.575 ns

Notes*** and * mean significant at 1% and 10% of significance, where ns= not statistically significant.

b). Total household income

The results in Table 4.4. they revealed a significant impact (p=0.031) on farmers' access to agricultural land. The analysis shows that farmers receive income from off-farm activities. The number of households accessing land decreases by 0.94, which means that when household income increases, there is a low likelihood of accessing land for agricultural purposes. These results align with a study by Mdoda et al. (2023), who found that household income in households reduces the chances of farmers owning and utilizing land, as they believe that investing in non-farm activities will generate more money than buying or investing in land. c). Access to Credit

The table above 4.4 shows significant results on how access to credit impacts farmers access to land. These results complied with the expected sign with a statistically significant positive influence of (p=0.003). This means that farmers getting access to land improves their chances of accessing land. Access to credit influences access to land; it does not influence it positively, but it does so negatively. When someone accesses credit, the odds for them to purchase the land decrease by 6.067, most likely due to land being a long-term investment demanding further investments and inputs to realise a profit or household. These results contradict the results of a study by Mthembu (*et al*. 2014), which found that farmers having more access to credit would

give them the power to buy land or even rent from other people. However, the study is in line with a study by Mdoda *et al.* (2023), who found that household heads having access to credit would result in them investing their money in farm activities as they might be convinced that they will gain more when compared to participating in agricultural activities.

4.4.3. Challenges encountered by urban farmers when accessing land

The study further investigated the issues encountered by urban smallholder farmers when accessing land. This section discussed the results depicted in table 4.5. where the political, economic, social, technical, environmental, and legal (PESTEL) challenges were explored by the farmers using Focus Group Discussion (FGD).

Table 4.5. Table showing focus group discussions analysed using the PESTEL analysis

Theme	Concepts	Responses
Political	-What are the political disputes that affect agricultural land acquisition?	Farmers stated that land access is not much of a challenge for them as most households have land title deeds, whereas for some farmers land access is through purchase and others through inheritance. Land access becomes a challenge for those wanting to sell produce to markets as higher tonnage or yields are required in markets. They, therefore, have limited land because urban areas often have limited land for agriculture due to competing land uses such as residential, commercial and industrial development. Farmers also mentioned that those who are part of cooperatives rent out and lease land through land-sharing agreements so they can afford to pay off the land and deliver higher yields to the markets. Farmers stated that conflicts for land use do arise when it comes to land distribution by the municipality. The cause of conflicts is mainly because of access to water resources, as competition between urban farmers can lead to conflicts over water allocation and usage rights. Farmers allocated where water resources are limited leads to increased tensions, which then affects agricultural productivity. The farmers also mentioned that social class is a challenge that results in political conflicts: "*Those individuals who are close to the councillors or chiefs are at an advantage when it comes to land ownership as they are given bigger and better plots of land for agricultural". And also, some members of cooperatives are given more plots of land than others, which causes conflicts within the communities.* In terms of land use policies, the farmers stated that "*they have not been exposed to such as yet*"
Economic	How did you access land? -Are you aware of microlending institutions that are aimed at helping emerging farmers?	Some of the FGD farmers mentioned that the escalating land prices make it difficult for them to purchase land, especially because of limited financial resources. Farmers for both communities end up forming cooperatives for land sharing so that they can afford land as a collective. The farmers interviewed stated that they do not have access to credit because most only rely on welfare grants and no other stable source of income. Farmers mentioned that they are not aware of the micro-lending finances. They normally go to the banks for loans and resort to loan sharks for loans if they are not approved. Farmers at Mpophomeni mentioned, "*For financial sustainability, we plan to form Stokvel groups and contribute monthly so that once we have reached our target, we purchase land amounted to the money we had saved". This kind of saving will help us sustain our livelihoods by being food secure".*

Social	-Do social issues such as gender inequality happen within your communities regarding urban farming? -Is urban farming affected by aging, crime and unemployment? -Do members from the community provide support, such as buying from local farmers?	Farmers stated that there is not much gender inequality in their communities compared to the past. Most households are female-headed and they have access to land like men. Results showed that in these communities where data was collected when it came to agricultural practices, gender inequality was not a challenge as it is mostly women with access to land who are involved more in urban agriculture. Farmers expressed concern for the youth, as the high unemployment rates result in disinterest from the youth in farming. This then makes it difficult for the aging and retired urban farmers to pass on their knowledge and skills. Therefore, urban farming is threatened in terms of growth and sustainability. When it comes to crime, there is not much crime, and crop theft is not significant. The farmers stated that community members support them by buying vegetables. Some community members buy vegetables from us and then purchase other food products from the supermarkets.
Technological	-Are farmers using technology to determine the land prices and requirements needed to purchase land?	Despite most urban farmers owning smartphones with internet, most do not use their cell phones to gather information on land prices and requirements. *"When I want to gather information on land acquisition requirements, I go to town to the Department of Agriculture, Land Reform and Rural Development to enquire there or at the local municipality."*
Environmental	-Do you experience harsh climatic conditions?	The farmers stated that they are unaffected by climatic conditions. *"most of our farming locations are suitable for producing crops."* Farmers mentioned that some of the soil is contaminated in other areas by the nearby factories, but pesticides mostly affect them.
Legal	-Are the farmers aware of laws advocating or restricting them?	The farmers mentioned that they are unaware of any laws that might restrict them from participating in urban agriculture.

Summary of table 4.5.

The study showed several key challenges that prevent urban farmers from accessing land. ***Political conflicts over land use occur within*** communities because of social status. Farmers well-known by municipal and community leaders are given first preference for land distribution compared to those with low social status. ***Economically,*** many farmers struggle with access to credit as most depend on welfare and social grants and have no other stable income. Farmers in cooperative groups form stokvels and save money to buy plots of land as a collective. ***Socially,*** the high unemployment rates of the young generation were a significant concern, and it became more challenging as most youths did not show interest in urban farming. ***Technologically***, most older farmers lack internet access, limiting their ability to gather market information online. Therefore, it becomes a challenge, especially for those wanting to advertise their farming businesses on social platforms. ***Environmentally,*** the study revealed that weather conditions are mostly favourable as the farmers farming locations are suitable for producing crops. The main environmental challenge encountered was soil contamination from the nearby factories. ***Legally,*** farmers stated that they were unaware of any laws that might restrict them from participating in urban agriculture

4.5. CONCLUSION AND RECOMMENDATIONS

The study revealed that out of the 172 participants, 58,7% were female and 41,3% were female farmers. The study showed that women comprise half of Africa's agricultural workforce. Results from the focus group discussions indicated that marginalised women from low-income households benefit from farming, as their income allows them to support their families. The study showed that urban farmers who participated mostly in urban farming ranged between 6180 years with a percentage of 44,2%, and farmers ranging from 1-40 had a percentage of 13,4%. These results were supported by focus group discussions where farmers stated that they were concerned about the young generation not being interested in farming. The study showed that most farmers depended on social grants and welfare. It was further explained to the focus groups that most of the farmers had no other stable income apart from the grants and only a few generated profits from the crops they sold. The study further revealed the challenges the farmers experience when accessing land for agricultural practices. These challenges included access to credit, political conflicts within the communities, issues of social status, source of income, high transaction costs, age, household size, and unemployment. The binary model showed that farmers' access to credit is significant but can also influence them negatively, as some might end up not using the credit to purchase agricultural land. The results revealed that household size positively impacted access to land, being that if a household increases by 1 unit, there is a positive influence as there could be a forced workforce and easy access to the land. For the focus group discussions, the results revealed that farmers are still experiencing issues of inequality within their communities regarding land access. The results further found that most farmers are unaware of the micro lending financing businesses that might assist them.

The study recommends that urban farmers implement alternative ways of farming, such as vertical farming. Vertical farming would give farmers an advantage as crops would be protected from pesticides and soil contamination from factories. The farmers should shift to rooftop farming and container gardening because these two methods do not require much land, overcoming land shortage. Another alternative way that farmers could adopt is hydroponic farming, which is a method that uses water-based nutrients rather than the soil. The study recommends that farmers form stokvel groups and save money to buy land as a collective later. More local farmers could collaborate within the communities to establish shared garden spaces and resource sharing. The policymakers and extension officers will develop programmes to educate the farmers about efficient land use and sustainable practices, help with output maximisation, and employ the Right of First Refusal method within the communities. This

method happens when the local farmers are given first preference before the sale of the land. The study recommends that municipalities and community leaders reserve some of the land for farmers in cooperative groups for agricultural activities and for local farmers to collaborate with local schools to design packhouses that support local food systems.

CHAPTER 5: LAND AND MARKET ACCESS: EFFECTS ON URBAN FARMERS' HOUSEHOLD FOOD SECURITY IN SOBANTU AND MPOPHOMENI

ABSTRACT

Across the world, many communities rely on agriculture to generate income and sustain their livelihoods. Urban farmers are locked out because they cannot participate in lucrative activities as they have limited land to grow their produce. The rapid growth in urban areas is putting pressure on food systems. South Africa is recognized as a country that is food secure at a national level; however, it faces food insecurity at the household level. Food insecurity is still a significant challenge for many South African households, mainly urban households. The Sustainable Development Goal 2, Zero hunger, aims to create an environment that is free of hunger by 2030. The significance of farming production is closely tied to access to land and markets. The overall perception is that households participating in urban farming have improved nutritional status. This study argues that land access directly affects urban farmers' market opportunities, as having more land enables farmers to grow larger quantities of produce, which can lead to sales in lucrative markets and increased profits. The study examines how land and market access influence household food security among urban farmers. Data were collected through structured surveys of 172 purposively selected households with gardens and focus group discussions involving cooperative members. The data were analysed using descriptive statistics and Tobit regression in conjunction with the Household Food Insecurity Access Scale and Household Dietary Diversity Score (HFIAS and HDDS). The Tobit regression results indicated that food security primarily influenced marital status, education level, household size, land access and total household income. These findings highlight the importance of enhancing access to markets and land in conjunction with educational support, offering valuable insights for government and other agencies aiming to improve household food security.

Key words: Food security, Land access, Market access, Household food insecurity status, Tobit regression, urban farmers

5.1 INTRODUCTION AND CONTEXTUALIZATION

Literature on urban farming has grown since the 1980s (Bbun and Thornton, 2013). For emerging farmers, land access is an essential factor. According to the report issued by the European Commission, access to land was considered a barrier for younger farmers who wanted to enter the agricultural sector (Korthals and Willem, 2023). Urban farming plays an essential role in the country's economy as it contributes over 70%, providing employment opportunities for many communities. Land access impacts the urban farmer's access to markets because if there is limited access to land, the urban farmers do not have much access to participate in the lucrative markets (Omiti *et al*., 2009). Factors such as low education levels, land access, market information, credit and funding from the government result in farmers not having the power to exercise their ability to access the markets.

Limited land access remains an issue for smallholder farmers as it limits their chances of market participation. The increase in population in the urban areas limits land as it is used for residential and industrial purposes (Aznar-Sánchez *et al*., 2019). Therefore, smallholder farmers do not have sufficient land access, leading them to produce food only in small quantities (Zerssa *et al*., 2021). Moreover, smallholder farmers join memberships and become part of cooperatives to gain access to land and participate in the market. Limited access to land and markets significantly impacts urban farmers' food security, as insufficient land results in inadequate crop yields needed for consistent supply to lucrative markets. Land access is an essential determinant of food availability (Ndiritu and Stage, 2014; Muraoka *et al*., 2018). Land accessibility serves most households positively as they use land for agricultural purposes to sustain their livelihoods. Increasing land access influences household food security positively (Jayne *et al*., 2003). Urban farmers experience challenges in terms of land access and household food security.

According to Bellon *et al.* (2016), markets offer more diverse foods than any household can produce. Market access determines foods that are to be available for highly commercialized farm households. Market access increases smallholder farmers income and also improves the farmers food consumption, leading to a reduction in poverty rates (Abay and Hirvonen, 2017). Urban farmers experience challenges when it comes to restricted market access; this then threatens their food security. Expensive transportation and limited access to distribution markets and retail outlets (such as supermarkets) result in the urban poor relying on often expensive and nutritionally inadequate local food sources (Roth, 2013).

The study aimed to explore the relationship between land and market access in urban farming, focusing specifically on land access rather than tenure concerning market access. It provides an overview of how urban farmers access land and markets. While existing research has examined the impact of land and market access on urban farmers separately, there is limited information on their combined effect. Discussions, such as those by Cele *et al*. (2020), have addressed market participation and collective action among smallholder farmers but have not considered the critical role of land access in household food security. This study seeks to fill this gap by examining how land and market access affect the household food security of urban farmers.

5.2 MATERIALS AND METHODS

5.2.1. Study areas and description of sampled farmers

The study consists of 172 urban farmers from the study areas in and around Pietermaritzburg. The study areas are under the uMgungundlovu district but come from municipalities such as uMsunduzi and uMngeni. The Sobantu township is one of the oldest townships built in Pietermaritzburg. For agricultural purposes, the farmers use rivers and tap water as a source of irrigation. The area can be classified as a community bounded by solid relationships and everyday interests. Like most communities, Mpophomeni township faces challenges of unemployment rates and pollution, which causes soil and water quality degradation for irrigation purposes (van Deventer, 2012). Those working in formal employment work around Hilton, Howick and Mpophomeni shopping Centre and a small portion at Pietermaritzburg central. The study uses purposive sampling, as the farmers were chosen based on their farming type.

5.2.2. Research design

The study adopted a mixed methods approach, using quantitative and qualitative approaches. These approaches were beneficial as they assisted in gathering detailed information about the research question. The study employed purposive sampling, also known as selective sampling. This type of sampling is used in qualitative research and is a non-probabilistic technique. Purposive sampling is used to select respondents who are most likely to provide appropriate and valuable information (Kelly, 2010, p. 317). For this study, the targeted population were household members engaged in urban farming within the two municipalities. The study made use of the multistage sampling technique. The multistage technique is explained as sampling that divides the population into clusters and then selects some clusters at the first stage. It is based on a hierarchical structure of natural clusters within the population (Sedgwick, 2015).

The first stage of the technique was the purposive selection of the study areas, Pietermaritzburg and Howick. The second stage involved randomly selecting the urban farmers within these municipalities.

The sample size was limited by factors such as the number of individuals engaged in urban farming. The study had a sample size of 172 urban farmers, where Sobantu had (65) participants and Mpophomeni (107). The farmers' diversity was one factor considered during the selection process. Quantitative data comprises experiments and surveys, whereas qualitative data comprises focus group discussions.

The data was collected in September 2023 and also November 2023. A structured interview is one in which each subject or respondent is asked a series of questions according to a prepared and fixed interview schedule questionnaire (Brace, 2018:2). The quantitative data was collected using face-to-face structured interviews with the farmers. The interviews were conducted in both English and isiZulu, especially in isiZulu, as it is the local language. The aim of a structured questionnaire is to ask respondents the same questions simultaneously and get different answers, as people have different beliefs, thoughts and perceptions regarding farming.

5.3. Analytical framework

5.3.1. Household Food Insecurity Access Scale

Food security indicators measure the household food insecurity status of the crop urban farmers with access to land and markets. Households affected by severe food insecurity are at a greater risk of health problems, affecting the farmers. An example is a farmer who gets ill, which decreases their productivity levels, resulting in no income generation and further affecting their household food insecurity. This indicator captures the members of the household's perception of their diet regardless of its nutritional composition (Coates *et al*., 2007; Mango *et al*., 2014). According to Coates *et al*. (2007), the HFIAS has two types of questions, the first being an occurrence question. This type of question consists of nine occurrence questions about conditions associated with food insecurity during the previous four weeks (30 days). Every question included is followed by a frequency-of-occurrence question, which asks *how often* a reported condition occurred during the last four weeks (Coates *et al*., 2007).

The responses gathered from the households of the urban farmers will be firstly analysed using percentages to show how many households experience food insecurity (1 food secure, 2=mildly food insecure, 3=moderately food insecure, 4=severely food insecure). Following the

guidelines presented by Coates *et al*. (2007), the HFIAS score is calculated as the sum of the frequency of occurrence during the past 30 days for the nine food insecurity questions as follows:

HFIAS (0-27) = Q1a +Q2a+Q3a+Q4a+Q5a+Q6a+Q7a+Q8a+Q9a.

HFIAS is a cumulative scale; thus, the higher the HFIAS score, the higher the food insecurity experienced by the respondents.

For this study, a Tobit regression model was used to determine the household food insecurity of the urban farmers.

5.3.2. Household Dietary Diversity Score

The household Dietary Diversity Score (HDDS) is an indicator used to determine the different types of food consumed by a household. It indicates whether the household maintains a good healthy diet. The HDDS indicators show the household's ability to access food and the socioeconomic status based on the previous 24 hours (Kennedy *et al*., 2011).

Table 5.1: The Household dietary diversity Score indicators

Food Groups
1. Any bread, rice noodles, biscuits, or any other foods made from millet, sorghum, maize meal, rice, or wheat?
2. Are there Any potatoes, yams, manioc, cassava, or other foods made from roots or tubers?
3. Any vegetables? (Pumpkin, carrot, squash, or sweet potato that are orange)
4. Any fruits?
5. Any beef, pork, lamb, goat, wild rabbit game, chicken, duck, other birds, liver, kidney, or heart?
6. Any eggs?
7. Any fresh or dried fish or shellfish?
8. Any foods made from beans, peas, lentils, or nuts?

9. Any cheese, yoghurt, milk, or other milk products?
10. Any foods made with oil, fat, or butter?
11. Any sugar or honey?
12. Any other foods, such as condiments, coffee, tea?

5.3.3. Tobit Regression Model

The Tobit regression model is designed specifically for scenarios where the dependent variable outcomes are not continuous. Furthermore, it allows the researcher to set a threshold that will censor the regression while maintaining the linear assumptions needed for the model (Anderson 2017). The equation for the Tobit regression model:

$$\boldsymbol{YY_{ii}} = \{\boldsymbol{YY^{*}}\ ii\text{f}\ \boldsymbol{YY^{*}} > \mathbf{00},\ \mathbf{00}\ ii\text{f}\ \boldsymbol{YY^{*}} <= \mathbf{00}\},\ \text{With}\ \boldsymbol{YY^{*}} = \boldsymbol{XX_{ii}}\boldsymbol{\beta\beta}+\boldsymbol{UU_{ii}}$$

Where: YY_{ii} = HFIAS score dependent variable that will vary between '0' and '27',

UU_{ii} = error term,

i = number of observations,

$\beta\beta_{kk}$ = a vector of unknown coefficient and XX_{ii} = a vector of independent variables.

5.4. RESULTS AND DISCUSSION

This section outlined the results on the effects land and market access have on the urban farmers household food security. The section further highlights the role urban farming plays in households in terms of maintaining food security. The results were analysed using descriptive analysis, Tobit regression model, HFIAS and HDDS. Furthermore, conclusions were made based on observations and literature to obtain accurate conclusions and recommendations based on the study's objectives.

5.4.1. Demographic Profile of farmers

Table 5.2: Descriptive analysis results

Socio-economic	Category	Frequency	Percentage
Member of cooperatives	0-No 1-Yes Total	138 33 172	80,8 19,2 100
Access to water	0-No 1-Yes Total	0 172 172	0 100 100
Type of water access	Rainwater Tap water River water Total	12 154 6 172	7,0 89,5 3,5 100
Access to land	0-No 1-Yes Total	5 167 Total	2,9 97,1 100
Land size	0-1 1,001-2 2,001-3 3,001-4 4,001-5 >5 Total	37 49 14 39 32 1 172	22,7 21,5 28,5 8,1 18,6 0,6 100
Market access	0-No 1-Yes Total	141 31 172	82,0 18,0 100
Market information	0-No 1-Yes Total	99 73 172	57,6 42,4 100
Transportation costs	0-Not applicable R100-R300 R310-R600 R610-900 >R1200 Total	137 11 18 2 4 172	79,7 6,4 10,5 1,2 2,3 100

Land size: measured in hectares, e.g. 0-1ha, 1,001-2ha

a). Member of cooperatives

Results are presented in Table 5.2. above show that most farmers are not members of cooperative groups 138(80,8%) and only a small group of the sampled farmers fall under these groups. And the remaining 34 (19,2%) of the farmers are part of the cooperative groups. Farmers mentioned during the discussions that being part of the cooperatives is beneficial. "*We*

can apply for more hectares of land combined and have greater chances of accessing the lucrative markets". This study is in line with a study by Sikwela *et al*. (2016), which states that smallholder farmers who are part of agricultural cooperatives have an advantage in accessing the markets and improving their livelihoods. The farmers further explained that their household food security improved after joining as cooperative members as they could support their families and sustain their livelihoods. The study is supported by the study of Guyalo and Ifa (2023), who stated that agricultural cooperatives support smallholder farmers regarding poverty alleviation and maintaining food security. Farmers who were not in these groups mentioned that their primary focus was not selling to markets but growing crops for the consumption of their families and neighbours.

b). Access to water and type of water access

Results show that all 172 households participating in the study had access to water (100%). Results differ when it comes to the type of water access as 12(7%) households use rainwater for agricultural practices, and 6(3,5%) use river water. Most households utilize 154(89,5%) tap water for household use and farming practices. During the discussions, farmers who used river water were those in cooperative memberships, as their farming land is close to the river. Therefore, they connect pipes from the rivers to their farming land to access the water. Farmers using tap water for agricultural produce mentioned during the Focus group discussions that it is expensive to use tap water as their water bill becomes high. Farmers using river water mentioned that tap water is meant for household drinking, cooking and domestic use. These results are supported by a study by Namwata *et al*. (2015), which states that tap water supply is for human consumption and not for agricultural activities, as it is meant for drinking, cooking and other domestic or industrial uses (Namwata et al. 2015). Household farmers may use tap water to water perishable crops and pay more (Namwata *et al*., 2015). During the FGDs, farmers mentioned that as much as they use tap water for agricultural practices, it becomes a challenge when there are municipality cuts because they cannot water their crops.

Figure 5.1: Msunduzi river used by farmers in Sobantu to irrigate their crops.

Source: Study survey

Figure 5.2: Water access using river water for irrigation purposes and storing the water using water containers

Source: Study survey

c). Land access and land size

Results show that out of the 172 households, only 5(2,9%) indicated that access to land is a challenge for them, whereas 167(97,1%) have access to land. It was further noted that farmers without direct access to land were renting or leasing it from the local municipality. During FGDs, farmers indicated that the requirements for acquiring land included a letter of authorization and a certified Identity document.

Table 5.2. above shows that most farmers used their household land sites for agricultural practices. The majority of farmers had a land size ranging between 1,001-2ha 49(21,5%) and 32 of the farmers had land size ranging from 1ha-5ha of land for agricultural purposes. The results indicate that while farmers have access to land, most have small plots, restricting their ability to participate in lucrative markets due to limited production capacity. During focus group

discussions, farmers noted that their small plots constrained their potential for higher yields and, consequently, their market participation.

d). Market access and information

Results show that 141(82,0%) farmers had no market access, whereas 31(18,0%) had access. This was because 18% of the farmers were part of the cooperative membership groups, which allowed them to access lucrative markets. Analysis of market information revealed that 57.6% of farmers were unaware of it, while 42.4% were informed. Despite some farmers knowing market information, focus group discussions indicated that their primary issue is not a lack of information but limited access to land, which hinders their ability to access and participate in markets effectively.

e). Transportation costs

The results show that most of the farmers sampled (79,7%) do not sell their produce to the markets as it is mainly for consumption. For those farmers who sell their produce to markets, 10,5% of the farmers stated that it costs them between R310 to R600 for transportation costs and 2,3% stated that transportation costs are greater than R1200. Most of the farmers who transport their produce are part of cooperative groups, so they all contribute enough money to hire a bakkie to send to the markets. Some farmers stated, *"Sometimes we experience financial shortfalls by not having enough money to hire a bakkie to send our produce to the markets*". According to Khapayi and Celliers (2016), the availability of one's transportation to the markets influences the delivery time of the produce; if farmers deliver late, their produce is negatively impacted.

5.6. Results and Discussion

Tobit regression model for the impact land and market access have on the household food security of urban farmers.

The Tobit regression model was used to identify land and market access's impact on the food security of farmer's households in Sobantu and Mpophomeni. It attempts to assess the contribution of the independent variables added to the model. For the direction in which the independent variables impact respondents' household food security (dependent), they are defined by the sign of the coefficient. When the results come out with a positive coefficient, the

independent variable increases the Household Food Insecurity Access Scale score; therefore, the household food insecurity status increases. However, the negative sign of the coefficient means a decrease in the HFIAS score, which means the household food insecurity status increases. The following variables significantly influenced the food security status of the households within the study areas.

a. Marital status:

The marital status of the household head had a negative coefficient and was statistically significant in influencing the food insecurity status of households by 5%. These results imply that households with married couples are more food secure when compared to other groups. This study aligns with a study by Maziya *et al*. (2017), which found that marriage plays a role in accessing resources such as land and water, improving household food security status. The results show that as the marital status increases by one unit, the household food insecurity decreases by 3.109. This result contradicts the result of Ndlovu *et al*. (2021), who found in their study that the marital status of a household head was positively related to household food insecurity, where household insecurity increased by 2.128. The study also contradicts the study of Ojogho (2010), who found that households where unmarried people head are more likely to be food secure when compared to households headed by married heads.

b. Education level:

The results of this variable showed a negative statistical relationship between educational level and food insecurity status, with a 1% level for households. The sign of the variable did not comply with the study's expectations, as the sign of the variable was positive. According to the results, the household's food insecurity decreases by 2,26, with increased schooling. Education improves the well-being of many households because the higher the education, the better the food security outcomes. Education could probably increase their innovativeness, enhancing their chances of securing employment opportunities and starting profitable agricultural businesses with access to lucrative markets. It is also assumed that household members who went to school are more informed about managing their resources well and ensuring food security. In support of a study by Maziya *et al*. (2017), the education level that the household head attained could benefit the household. It can lead to possible advantages of implementing new technologies that will positively impact food availability. According to Mutisya *et al*. (2016), higher educational attainment positively affects food security because the household food insecurity status decreases with increased education.

Table 5.3. Tobit regression model table with dependent and independent variables

Variables	**Coefficient**	**Std. Err.**	**T**	**p-significance**
Gender	0.1597593	1.123891	0.14	0.887 ns
Marital status Married Divorced Widowed	 -3.109029 1.301923 -2.03464	 1.295731 2.649147 1.441208	 -2.40 0.49 -1.41	 0.018** 0.624 ns 0.160 ns
Education level	-2.267406	0.8053409	-2.82	0.005***
Household size	2.302232	0.9763737	2.36	0.020**
Land size	0.1290559	0.1993566	0.65	0.518 ns
Land access	-7.331421	3.235347	-2.27	0.025**
Cooperative membership	-0.7374176	1.364384	-0.54	0.590 ns
Market access	1.798966	1.534211	1.17	0.243 ns
Total household income	-1.980858	0.4418059	-4.48	0.000***
Credit access	-2.398703	2.472812	-0.97	0.333 ns

Log likelihood= -521.68147, LR chi2 (12) = 42.95, Prob>chi2=0,0000, Pseudo R2=0.0395

c. Household size

Household size is an essential determination of food accessibility and is usually a negative predictor (Naz *et al*., 2023). Table 5.3. indicates that the expectation for this variable has been complied with at 5%. The results indicate that household food insecurity increases by 2.3 points for every additional household member, with larger households more likely to experience food insecurity due to the greater number of individuals to feed. This finding aligns with Naz *et al*. (2023), which reported that larger households are more prone to food insecurity than smaller ones. Larger households often face challenges in maintaining nutritional quality, as they tend to rely more on staple foods due to the high-cost, diverse, nutritious components. The study is in line with Aragie and Genanu (2017), who found a negative relationship between household size and food security at a 5% level. The study by Maziya *et al*. (2017) also highlighted that larger household sizes positively impact food insecurity. Nevertheless, larger households can benefit from having more members to contribute as labour, supporting farming activities and local market sales, aiding livelihoods and improving food security.

d. Land access

Table 5.3. above indicated that land access negatively impacted the household's food security status, which complied with the expected sign. The results show that land access is significantly influenced by the household's food security status by 5%, which means that when the household accesses land, their food insecurity status decreases by 7.33. This means that farmers accessing land for their households will allow them to use the land acquired for agricultural purposes to generate income and support their families. The results align with those of Mthembu et al. (2014), who found that smallholder farmers accessing land improves their household food status as they produce higher yields and profit from the crops they produce.

e. Total household Income

The table 5.3. above indicates that the total household income negatively impacted the food insecurity status of the households which complied with the expected sign. The results indicate that total household income significantly affects food insecurity, with a 1% increase leading to a 1.98-point decrease in food insecurity levels. The results align with the study of Zabuloni (2023), who found that the household's total income had an influence on the food insecurity status at a 1% level. Higher-income households can afford a more diverse and nutritious diet and improve food security compared to lower-income households.

Conversely, low-income households struggle to purchase various nutritious foods due to affordability constraints, often relying on less nutritious staple foods. This finding is corroborated by Maziya *et al*. (2017), who reported that a one-unit increase in household income resulted in a 0.12 reduction in food insecurity among farmers. The study is also supported by a similar study by Ngema et al. (2018), which revealed that the higher the household income, the greater the food security status within households.

5.7. Vegetables produced by the urban farmers

Results from the table below show the common vegetables produced by the urban farmers in Sobantu and Mpophomeni. The results show that cabbage and spinach are the most grown vegetables with the exact percentages of 15,7%. For both the study areas, cabbage and spinach are mostly produced for consumption and sold to local markets and communities. These leafy vegetables are produced because of their nutritional components and dietary preferences. The results are supported by a study by Kumar *et al*. (2020); leafy vegetables are rich in nutrients

and improve human health. These vegetables mentioned are followed by Tomatoes (15,1), Beetroot (12,2%), Onions and Chillies with the same (11,0%), Green pepper (9,9%) and lettuce being slightly the least produced (9,3%).

Table 5.4: Common vegetables produced by the urban farmers in Sobantu and Mpophomeni communities.

Vegetables produced	**Percentage (%)**
Cabbage	15,7
Beetroot	12,2
Onions	11,0
Spinach	15,7
Lettuce	9,3
Green pepper	9,9
Chillies	11,0
Tomatoes	15,1
Total	100,0

5.8. Household Food Insecurity Access Scale and Household Dietary Diversity Score among Urban Farmers in Sobantu and Mpophomeni

The household food insecurity access score is in Figure 5.3. it was revealed that 56,4% of the farmer's households in the communities of Sobantu and Mpophomeni were moderately food insecure. The results further indicated that 21,5% of the households were mildly food insecure, 11% were food secure and 11% were severely food insecure. FANTA (2007) states that most moderately food-insecure households sacrifice quality more frequently by eating a monotonous diet and, sometimes, cutting the quantity consumed. These results are followed in Figure 5.4. with the household dietary diversity results. The results show that 19,2% of farmers' households had low dietary diversity, 27,3% had medium dietary diversity and 53,5% had high nutritional diversity. Therefore, farmers cultivating diverse crops reported higher dietary diversity scores, reflecting improved food security.

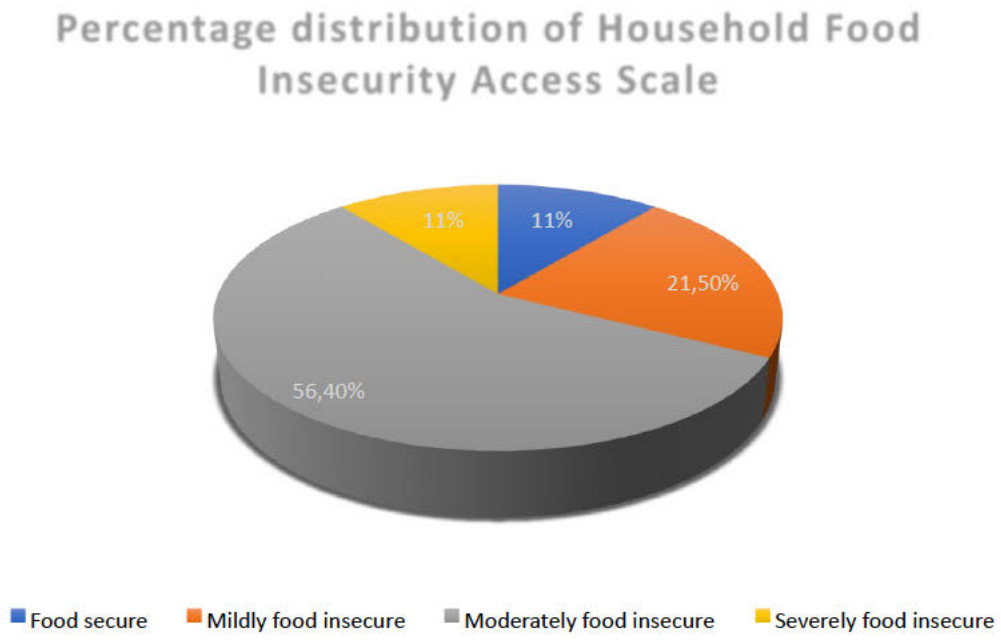

Figure 5.3: Percentage of distribution of Household Food Insecurity Access Scale

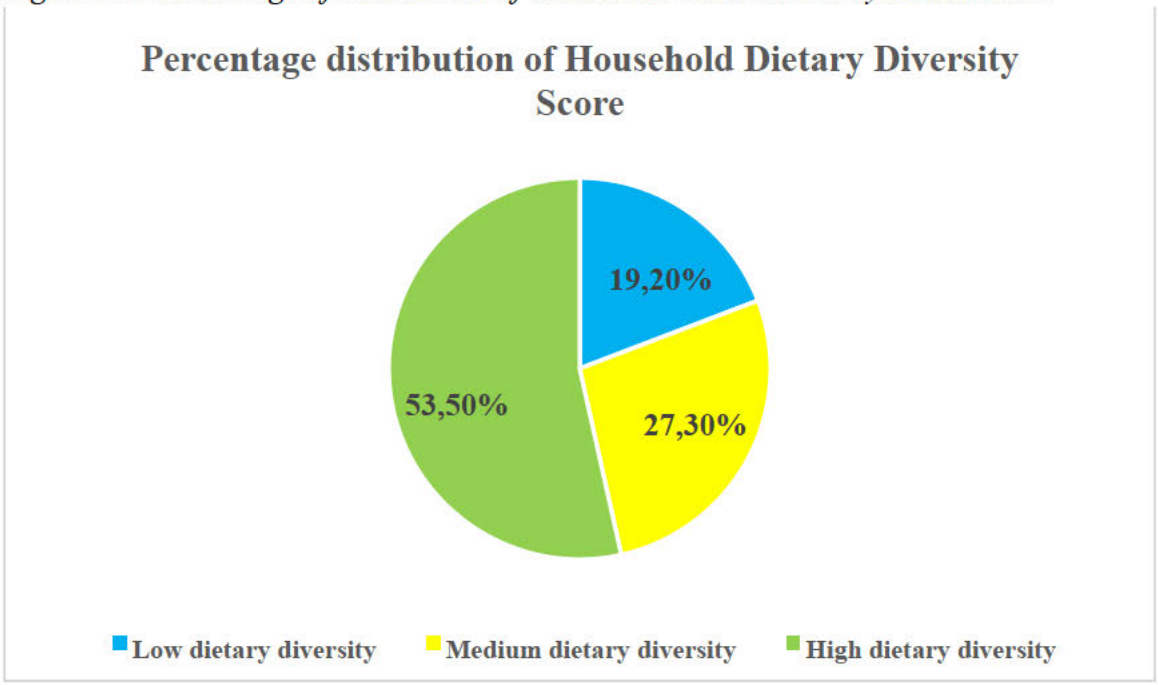

Figure 5.4: Percentage distribution of Household Dietary Diversity Score

Table 5.5 details a focus discussion data from the study areas (Sobantu township and Mpophomeni) on the challenges the farmers experience in urban farming using the PESTEL to guide them. Using the PESTEL model to analyse the focus group discussion is advantageous as it allows for a detailed explanation of factors that might influence the subject of focus groups. The factors include political, economic, social, technological, environmental, and legal aspects.

Table 5.5: Focus group discussion on issues experienced by urban farmers, generated using the PESTEL Model

Themes	Concepts	Responses
Political	-Are any political disputes or policy constraints affecting urban farming processes?	The findings imply that most farmers are unaware of the land tenure policies that have been put in place. Farmers are aware of some political issues that affect their process. There are politics when it comes to the local municipality as it favours some of the farmers more than others by giving them farming inputs and equipment to support their processes, while others do not get anything. Farmers mentioned that if you are friends with the municipal committee, you are at an advantage as you will always get farming inputs and equipment.
	How is water quality ensured for agricultural purposes?	The farmers at Sobantu mentioned that the local municipality conducts water quality checks time and again. The main reason for these assessments is the spillage from the nearby factories.
Economic	-Access to micro-finance?	Most farmers do not have access to credit as most are above the age of 61 years and have no stable income. Some middle-aged farmers do not qualify for credit access as their income source depends on welfare grants.
	-How do you finance your farming practices?	A small group of farmers received funding from the local municipality to finance their farming inputs, such as fertilisers, seedlings, rakes and shovels. Farmers who do not receive any funding source make use of the income they get from welfare social grants to buy the farming equipment they will need.
	-Are there profits generated by the farmers from the produce they sell?	The farmers in cooperatives stated that they make profits, but the market agents usually take a high percentage of their earnings as market commission. At times, the market agents take more than what was agreed upon. For part of the profits, the farmers explained that they had to deduct transport money and pay for the rental land, leaving them with just a little. Farmers from cooperatives stated, "*These agents think that we are uneducated and cannot think properly, whereas they do not know that most of us attended irrigation training courses where we were taught of direct marketing and pricing of crops*" Most farmers from the group stated that they do not sell their produce because of the limited land. Instead, they consume with their families and give gifts to their neighbours. Farmers who do not sell at the markets and only grow crops for consumption mentioned, *"We trade as neighbours; if my neighbour has cabbage and I have tomatoes, we exchange so that we can provide for our families."*

Socio-cultural	What are the social issues affecting urban farming? Unemployment, crime-related issues, Aging, disease outbreaks	For both communities, Sobantu and Mpophomeni, the farmers mentioned their concern over unemployment, especially among the youth. That is why some youth attend university and find jobs in town. The farmers face significant challenges in passing down their knowledge and skills to the younger generation because of their disinterest in farming. Therefore, the growth and sustainability of urban agriculture is threatened. Regarding crime-related issues, the farmers stated that crime levels are only to a certain degree. Crop theft does not always happen; if it does, it is insignificant. The outbreak of Covid-19 affected urban farming significantly. Farmers under cooperatives could not sell their crops to the markets or produce a lot because of the restrictions. Therefore, there was a decline in their profits.
Technological	-Do farmers have access to the latest technology? -Are farmers using social platforms to get market information?	Most farmers are above 61 years old and, therefore, do not own smartphones or any electronic device with internet access. Those with internet access do not know how to use search engines such as Google and Firefox to gather information related to markets. These search engines will allow them to learn more about crop deficits, weather conditions and other market-related information. One farmer stated, "Whenever I want to know about weather conditions and market-*related information, I ask one of my grandchildren to assist as I do not own a smartphone".* Farmers who have access to the internet are not using it for the development of their establishment as they are unaware that they can advertise their farming businesses on social platforms to get more buyers and increase profits. They are not using social platforms to get more market information, especially regarding pricing through Marketing Information Systems (MIS).

Environmental	-Are weather conditions favourable for agricultural production? -Are there water quality, soil quality and water access issues?	Farmers made it known that the weather conditions are suitable for their farming practices; they do not experience many challenges, such as floods and droughts. Farmers using municipal water experience challenges with water access as there are sometimes municipal cuts, which affect their farming practices. Farmers using river water experience challenges as nearby factory oil spills and animal feeds contaminate water. However, the community is still awaiting the results of the water quality assessment. Pesticides are an issue affecting the quality of soil. Another challenge mentioned by the farmers is that those using river water, as they are close to it, sometimes experience oil spillage from the factories and are, therefore, forced to use that water because they have no other choice.
Legal	-Are there any discrimination laws for consumers, employment, health, and safety?	The farmers stated that they were unaware of any laws restricting their farming practices. The farmers also mentioned that they do not possess the certificates required by the markets, resulting in their produce being sold at lower prices. Because of the missing certificates, the farmers explained, "Our crops are pushed to the back of the shelves, spoiling them and *we, therefore, do not make any profits when it is like that."*

5.9. Summary of Table 5.5

The study revealed several key issues affecting urban farmers. ***Politically*****,** farmers are largely unaware of land tenure policies and local municipalities are perceived to favour some by providing farming inputs and equipment, leading to inequality. ***Economically*****,** many farmers struggle with access to credit due to age or reliance on welfare grants, though some receive municipal funding. Cooperative farmers report profits but face high market commissions, transport costs, and profit cuts from agents or middlemen. ***Socio-culturally***, unemployment among youth and the challenge of transferring farming skills to younger generations are significant concerns, with COVID-19 further impacting market access and profits. Crop theft within the communities occurs as most farming plots are not properly fenced, but the theft is not significant.

Technologically, most older farmers lack internet access, limiting their ability to gather market information online. Therefore, it becomes a challenge, especially for those who want to advertise their farming businesses on social platforms. ***Environmentally,*** while weather conditions are

generally suitable, water access is problematic due to municipal cuts and contamination from nearby factories, with soil quality also affected by pesticides. For farmers in one of the cooperative groups in Sobantu utilise water from the nearby river, which is contaminated as it is closer to the factories. ***Legally*****,** farmers are unaware of relevant laws and lack necessary certificates, resulting in lower market prices for their produce.

5.10. CONCLUSION AND RECOMMENDATIONS

The study's objective was to examine the impact of land and market access on the household food security of urban farmers. The study found that common vegetables farmers grow include cabbage, tomatoes, onions, spinach, lettuce, green peppers, and beetroot, the primary staple foods they consume. The study revealed that total household income decreases food insecurity, especially for higher-income households. The study further revealed that households with married couples tend to be more food secure than other households. During the focus group discussions, elderly farmers noted that those in cooperative groups generally achieve higher profits due to their ability to access and participate in more lucrative markets. The HFIAS score and HDDS were used in this study to measure household food insecurity: 56.40% are moderately food insecure, 21.50% are mildly food insecure,11.0% are severely food insecure and 11.0% are food secure households. Moreover, the Tobit regression model was used to determine the significant variables concerning household food insecurity.

Therefore, the study recommends that community policymakers and extension officers explore strategies to empower smallholder farmers. Farmers joining cooperatives will be beneficial as it will be easier to access lucrative markets. More cooperative groups will help with microfinancing and securing agricultural grants designed to assist smallholder farmers in purchasing land and farming equipment. The study recommends training and educational workshops for the farmers to aid in skills generation and knowledge about crop management and sustainable practices. Moreover, urban smallholder farmers should be educated more on the importance of consuming nutritious foods within their households for a balanced diet. This could be done by providing the farmers with updated market information explaining which crops are in demand for a specific season. Therefore, this recommendation may increase their profits, allowing them to purchase more diverse foods for their households. Also, the farmers should be aware of the benefits of consuming and growing diverse vegetables, as it improves household food insecurity.

CHAPTER 6: RECOMMENDATIONS AND CONCLUSION

6.1 Overview of the study

The majority of the individuals who participated in the study depend on urban agricultural farming for income and to maintain their livelihoods through food security. Land access for agricultural purposes was the main challenge for the farmers. Farmers had access to land, but there was not enough land for higher produce yields. Farmers with smaller land sizes experienced limitations when accessing lucrative markets, resulting in some resorting to selling their produce within the local communities and only producing for consumption. For this study, education, household size, total household income, marital status and credit access were key factors in limiting household food insecurity. Education level increases farmers' chances of innovation and makes them aware of market and land-related information. Education is also found to result in securing job opportunities. The study found that an increase in the household size by a unit leads to a decrease in the level of food insecurity within the household. For some households, the members are used for forced labour, which leads to many income streams and the household can sustain its livelihood. The total household income plays a significant role in alleviating community poverty. However, total income varies for families; for some households, they can purchase nutritious foods and be food secure, and for households with lower income, they purchase without considering the nutritional component, making that family food insecure. The study expected cooperative membership to impact the food security status of households positively, but it was not significant. Most of the farmers in this study were not part of cooperative memberships.

In summary, these results emphasize the importance of household composition, size, income and access to land in influencing food security. Married households tend to be more food secure, larger households face more challenges in maintaining nutritional quality and higher household income significantly improves food security outcomes. Access to land for agricultural purposes further contributes to a household's ability to generate income and meet its basic needs.

The study aimed to first investigate factors and challenges that prevent urban farmers from accessing land. Secondly, the study focused on examining the impact land and market access have on the household food security of the farmers.

The study made use of questionnaires for 172 households during the data collection: 65 families from Sobantu and 107 households from Mpophomeni. For data analysis, the study used descriptive analysis, Pestel analysis, and econometric techniques. The econometric analysis methods used were binary logistic and Tobit regression models.

6.2. Conclusion

The study has drawn the following conclusions based on the results:

a). For this empirical chapter (Chapter 4), the study focused on factors affecting farmers from accessing land and the challenges that they encounter. The study found that most household heads have access to land, but land size was challenging when participating in agricultural activities. Farmers indicated that reliance on welfare grants makes accessing credit for land acquisition challenging, as many do not qualify. Most participating farmers, aged 61 and older, have no stable income beyond welfare grants, while middle-aged farmers struggle with credit access due to that they mostly depend on social grants as stable income. The study found that only 5.2% of sampled farmers had greater chances of accessing credit facilities. Significant variables in the study included access to credit, household size and total household income. However, variables such as education, cooperative membership and extension services, which were anticipated to show positive results, were found to be insignificant after modelling.

b). Despite farmers' ability to land and market access to improve their household food security status, participation in cooperative memberships is low (18,3%). The empirical chapter found that farmers who joined part of the cooperatives could sustain their livelihoods as they supported their families, being that they produced for both consumption and selling to lucrative markets. Farmers produce for consumption and sale to lucrative markets, including Spar, Boxer, Mkhondeni and Save Hypermarkets. During focus group discussions, cooperative members noted that working with agents or intermediaries is a major challenge, as these agents take a significant portion of their profits. The results also revealed that most farmers (89.5%) use tap water for irrigation, leading to high water bills. A smaller group (3.5%) uses river water contaminated by industrial oil spillages despite avoiding water bill expenses. Farmers' access to and participation in these markets enhances their household food security.

6.3. Policy recommendations

Within the urban communities, specified areas have to be designated where urban farming would be encouraged and supported by the local municipalities and government. The farmers have to be allocated farming land, which could be through leasing or community trusts. Farmers can collaborate with government community schools to utilize their underutilised plots of land for increased food production. This method is beneficial as it streamlines market access, with schools serving as storage facilities for the harvested produce. This form of assistance would give the farmers a greater chance to participate in markets and also have access, as they will produce higher yields. Also, farmers with land available for them allow them to grow crops closer to them, reducing transportation costs and increasing fresh food availability. Urban farming should explore innovative ways of planting and intensifying production from small spaces.

Education is essential; therefore, the local municipality, government and NGOs can provide training programmes and workshops to teach farmers about sustainable farming practices, land preparation, pesticide management and

crop rotation. These workshops will be beneficial as they will educate the farmers on profiting from their produce, resulting in more household income. The government can play an important role in promoting sustainable farming practices in the communities of Sobantu and Mpophomeni by motivating the formation of cooperatives. These cooperatives could enable the easy obtaining of resources, the sharing of knowledge, and the provision of collective bargaining power to ensure better access to markets, inputs, and financial services for smallholder farmers. Furthermore, facilitating access to digital platforms would be essential in connecting farmers with wider markets. This initiative will help farmers access market information, supply chain opportunities, and fair pricing, leading to an improvement in profits.

Policymakers need to develop a policy that will support urban farmers in terms of social and economic heterogeneity.

Policy recommendations would be streamlining regulations for the produce by including licensing and certification processes. This recommendation would benefit the farmers as it will reduce the barriers to accessing markets and participating and enable them to meet quality standards. Policy and recommendations focusing on land and market access for urban farmers will significantly improve the household food security status by ensuring that within the households, there is access to reliable, nutritious food, promoting sustainable farming activities and providing economic opportunities for the community members. The study findings show that most households' income comes from social grants and pensions, while farming is done part-time. Thus, it challenges urban farmers as they do not make enough profits to invest more in agricultural activities and improve their livelihoods. Therefore, policymakers should prioritise policies that advocate urban agriculture as it positively impacts the livelihoods of many households when it comes to maintaining household food security.

6.4. Areas for future research

The study has presented data on how land and market access affect the household food security of the urban farmers in the Sobantu and Mpophomeni communities. It has been identified that farmers having access to land and markets can help improve their food security status. Areas for future research would be for farmers to look for innovative planting methods such as container gardening, vertical farming and rooftop farming due to the lack of space. Future research should also sample participants randomly and not only purposively so that there could also be non-participants sampled proportionally to compare the sample results. Increasing the sample size would improve the study, as only a limited number of factors significantly affect farmer's access to land. Future research should explore the relationship between urban farming practices and food security in diverse South African regions, considering variables like climate, land availability, and local governance.

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APPENDICES

UNIVERSITY OF KWAZULU-NATAL ™

INYUVESI YAKWAZULU-NATALI

College of Agriculture, Engineering and Science. University of KwaZulu-Natal

Private bag X01

Scottsville 3209, South Africa

To be filled by the enumerator	
Name of enumerator:	**Date:**
Place:	**District:**

General Instructions:

The information to be captured in this questionnaire is strictly confidential and will be used for research purposes by staff and students at the African Centre for Food Security, University of KwaZulu Natal

SECTION A: DEMOGRAPHICS

1.1 Gender of the head of house: 0 = male ☐ 1 = female	
1.2 What is the age of the head of house in years?	1.3. Marital status: 1 = single ☐ 2 = married ☐ 3 = divorced ☐ 4 = widowed=4 ☐
1.4. Highest level of education of the head of house? 1 = No formal education 2 = primary 3 = high school 4 = University/college	

1.5. What is the source of income of the head of house? 1 = Farmer 2= permanent employment 3 = self-employed 4 = unemployed 5 = other (specify) …….
1.7 What is the total number of permanent household members (who spend 4 consecutive nights per month)?

1.8 How many dependents do you have? _____

SECTION B: AGRICULURAL PRODUCTION

1.9 Are you a seasonal farmer or permanent? __ (Seasonal farmer 1, Permanent 2) 1.10 Apart from farming do you have another occupation? _____

1.11 If yes, please specify:

_____

1.12 Have you ever attended training related to farming practices? _____

1.13 In terms of irrigation systems, have you ever taken part of the following activities below?

Skills	**No (0) Yes (1)**	**If yes who offered the training?**
a. General crop/vegetable production		
b. Land preparation		
c. Fertilizer application		
d. Agricultural commodity marketing		
e. Packaging of fresh produce		
f. Processing of farm produce		
g. Pricing of goods		

Who offered training? 0-None, 1- municipality, 2- Cedara, 3-Department of Agriculture, Land reform and Rural Development, 4- Fuze organization, 5- Friends for life.

1.14. How many plots of agricultural land do you own in irrigation scheme?.....

1.15. How long have you been farming?.....

1.16. Which of the listed crops do you grow? Please indicate the reasons for production by ticking on the relevant columns (Where 4 is not applicable)

Crop	For household consumption (2)	For sale (1)	Both (3)
Potatoes			
Beans			
Maize			
Spinach			
Onions			
Carrots			
Cabbage			
Beetroot			
Other (specify)			

For sale- 1, Consumption 2, For both selling and consumption – (3)

1.17. What is your primary source of food?

Own production, gathering, hunting, fishing (0)	**Purchased (1)**	**Food aid (2)**

SECTION C: LAND ACCESS AND ACQUISITION

2.1. Does the family own/have access to land?	No (0)	
	Yes (1).	

2.2. How did you acquire access to land?	1). Inheritance 2) Purchase 3)Lease or rent. 4) Government allocation 5). Community or communal land 6). Land sharing agreements	
2.3. What were the requirements when accessing land?		
2.4. Are there any restrictions or limitations on the land that you farm on?	0)None 1) Soil quality 2). Water availability 3). Land size 4). Land tenure insecurity 5). Infrastructure	
2.5. What are the main factors influencing your access to land?	1). Socioeconomic factors 2). Land availability and competition 3). Environmental factors	
	4). Government policies and regulations 5) Land prices	

2.6. Are there any legal or regulatory barriers to land access that you face?	Yes (1) No (0)	
2.7. Have you had any support from the government when it comes to land acquisition?	Yes (1) No (0)	
2.8. Do you have access to water?	Yes (1) No (0) If yes, what type of water do you have access to?	Rain- 1 Tap- 2 River- 3 other- specify- 4

2.9. Are you a member of a co-operation or any farmers organization?.....

2.9.1. If yes, what is the name of the organization?.....

SECTION D: MARKET ACCESS

3.1	Do you have access to produce markets?	No (0)	Yes (1)
3.2	What are the major constraints that prevent you from accessing markets?	0.Not applicable 1. Land tenure security 2. Lack of market information 3. Lack of finance 4. Transport and logistics 5. other (specify)	

3.3	What are the major constraints do you experience when participating in produce markets?	0. Does not participate 1. Stock being pushed at the back of the shelves. 2. Not having enough stock for markets. 3. Middlemen taking most of the profits. 4. Less market information. 5. Tenure security 6. High competition 7. Production, Planning and Proper marketing.
3.4	Which of the following marketing strategies do you use to market your products?	1. Farm direct marketing 2. Middleman or Agency 3.Contract marketing 4.Other (specify)

Market Participation

3.5. How long does it take you to get to the markets?

Less than 1 hr. (0)	More than 1 hr. (1)

3.6. Are you aware of all the information related to accessing markets (*market prices, how to sell and where to sell*)?

Yes (1)	No (0)

3.8. Do you transport the produce to the market as a farmers group or individually? **(0- Not applicable, 1-Individually, 2- Farmers group)**

3.9. Do you experience agricultural produce loss? 0=NO 1=YES If yes, what causes agricultural produce loss?

1=drought, 2=rotten, 3=eaten by birds/insects, 4=damaged when transporting them to the markets.

3.10.If yes, how would you rate the amount of produce lost?

0=Significant amount 1=Insignificant amount

3.11.How much do you pay for transport?

Perceptions of urban farmers with regards to the South African agricultural reform policies.

3.12.	Are you familiar with the agricultural marketing act of 1996?	No	
		Yes	
3.13.	If yes, do you think the act is doing was it was intended to do?	Yes (1) No (0)	

3.14.	Are you familiar with the land reform programme?	No	
		Yes	
3.15.	If yes, do you think the programme is doing was it was intended to do?	Yes	No
3.16.	Which of the following do you think the agricultural marketing	1. Access to markets 2. Increase productivity 3. Increase household income	
	act and the land reform programme can achieve if well implemented?	4. Reduced transactional costs	

SECTION E: INCOME AND FINANCIAL STATUS

4. Complete the table below

Sources of income	No (0) Yes (1)	Rank of income source (see codes below)	Estimate income
a. Permanent employment			
b. Temporary employment			
c. Welfare grant			
d. Remittances			
e. Crop sales			
f. Livestock sales			
g. Other			
Total Monthly Income			

3.12.After the expenses are you still able to put aside personal savings?

No (0)	Yes (1)

3.13.Do you have any form of savings?

No (0)	Yes (1)

If yes is your above answer, then which type of savings? E.g., Formal (bank 0) or Informal (Stokvel 1) or both 2

3.14.Are your family expenses covered well?

No (0)	Yes (1)

3.15.How much money did you save in the last 12 months?

None (0)	+- R1000 (1)	R2000- 3000 (2)	R4000-5000 (3)	+R6000 (4)

3.16.Have you ever taken credit or used any loan facility in the past 12 months?

Yes (1)	No (0)

3.17.Did you receive funding or any source of grant support from the government in the past 12 months?

SECTION F: HOUSEHOLD FOOD SECURITY

11. Household Food Security Codes (1-Rarely, 2- Sometimes, 3- Often, 4- Not applicable)

	Occurrence questions	Please tick. Yes=1 No=0	If yes, how often did this happen?		
			Rarely (once or twice in the past four weeks) =1	Sometimes (three or ten times over the past 4 weeks) =2	Often (More than ten times over the past four weeks) =3

(a)	In the past four weeks, did you worry that your household would not have enough food?	Yes	No			
(b)	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	Yes	No			
©	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	Yes	No			

(d)	In the past four weeks, 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?	Yes	No			
€	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	Yes	No			
(f)	In the past four weeks, did you or any household member have to eat fewer meals in a day because there was not enough food?	Yes	No			
(g)	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	Yes	No			
(h)	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	Yes	No			
(i)	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	Yes	No			

HOUSEHOLD DIETARY DIVERSITY SCORE

Food Groups
1. Any bread, rice noodles, biscuits, or any other foods made from millet, sorghum, maize meal, rice, wheat?
2. Any potatoes, yams, manioc, cassava, or any other foods made from roots or tubers?
3. Any vegetables? (Pumpkin, carrot, squash, or sweet potato that are orange)
4. Any fruits?
5. Any beef, pork, lamb, goat, wild rabbit game, chicken, duck, other birds, liver, kidney, or heart?
6. Any eggs?
7. Any fresh or dried fish or shellfish?
8. Any foods made from beans, peas, lentils, or nuts?
9. Any cheese, yogurt, milk, or other milk products?
10. Any foods made with oil, fat, or butter?
11. Any sugar or honey?
12. Any other foods, such as condiments, coffee, tea?

FOCUS GROUP

Topic: Land and market access among urban farmers in Sobantu and Mpophomeni: implications on household food security.

Focus group guide

Date of survey:	Community name:
Gender of respondent:	

1. Are there any political issues that affect the urban farming activities?
2. The land that you use for farming is it rental, municipality or ownership? (Outline the challenges encountered on the acquisition of this land.
3. Do you know any micro-lending financing institutions that assist urban farmers?
4. Do social issues such as gender inequality happen within your communities when it comes to urban farming?
5. Are community members motivated to buy from the local farmers?
6. Are farmers using technology to find out about the land prices and requirements needed to purchase land?
7. Are the farmers located in an area that is affected by climatic conditions?
8. Is there any discriminatory law, consumer law, employment law and health law that affects urban farmers?
9. What type of information have you looked for the past years (related to market access)? Were you able to easily find this information?
10. As urban farmers what challenges do you come across? (markets, transport, prices).
11. What have been the major source of financing for your farming businesses?
12. How do you maintain or sustain your household food security?
13. Do the farmers make any profits from agricultural practices?
14. In terms of irrigation systems, which activities have you ever taken part of?
15. Are there any efforts from the local authority to ensure water quality?

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

06 June 2023

Sinethemba Gwala (217037791)
School Of Agri Earth & Env Sc
Pietermaritzburg Campus

Dear S Gwala,

Protocol reference number: HSSREC/00005487/2023
Project title: Land and market access among urban farmers in Msunduzi municipality: implications on household food security
Degree: Masters

Approval Notification – Expedited Application

This letter serves to notify you that your application received on 13 April 2023 in connection with the above, was reviewed by the Humanities and Social Sciences Research Ethics Committee (HSSREC) and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number. PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

This approval is valid until 06 June 2024.
To ensure uninterrupted approval of this study beyond the approval expiry date, a progress report must be submitted to the Research Office on the appropriate form 2 - 3 months before the expiry date. A close-out report to be submitted when study is finished.

HSSREC is registered with the South African National Health Research Ethics Council (REC-040414-040).

Yours sincerely,

[redacted]

Professor Dipane Hlalele (Chair)

/dd