Resilience of Small-Scale Farmers Amidst the COVID-19 Pandemic: A Case Study of Small-Scale Farmers in Limpopo Province, South Africa

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Abstract:

This qualitative study examines the impact of COVID-19 lockdowns on small-scale farmers in Limpopo, South Africa. The closure of various market channels such as street vendors, restaurants, hotels and large social gatherings by the government left these farmers susceptible to market shocks, given their reliance on these channels. Over a span of 17 months, the study observed 21 farmers, exploring their adaptive strategies amidst the crisis. Farmer selection was based on their access to various markets: municipal markets, local informal markets, or alternative channels facilitated by intermediaries. The research underscores a pronounced correlation between market access and resilience. Farmers with market access were more resilient than those without. The study further details the various coping mechanisms adopted by these farmers, including finding alternative markets, starting new businesses, changing crop patterns, and modifying their transport system.

This research delves into the intricate connection between market access and farmer resilience, particularly for small-scale farmers facing both supply and demand disruptions. Furthermore, the study highlights that intermediaries can play a crucial role in strengthening farmers' resilience during crises. However, their effectiveness is dependent on the organisation's vision and goals. It also provides practical implications for improving market access and government response to crises. This includes government preparedness for similar future disruptions can be achieved by collaborating with the private sector to establish localised markets in rural communities. Also prioritising the development of these local markets is essential for bolstering both local food systems and farmers' resilience in the face of the shocks.

Keywords: COVID-19, small-scale farmers, resilience, market, intermediary

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Chapter 1: Introduction

1.0. Overview of the Impact of the COVID-19 Crisis on South African Farmers

The initial case of COVID-19 in South Africa was confirmed on the 5th March 2020 (NICD, 2021). In response to rising infections, President Ramaphosa announced a strict 21-day lockdown commencing on 27 March 2020, later extended by 14 days until 30 April 2020 (The Presidency, 2020). This lockdown was characterised by severe restrictions on movement allowing only essential services such as medical care, emergencies, farming production and supermarkets. All other movement of people and goods was strictly prohibited (Minister of Cooperative Governance and Traditional Affairs, 2020). The essential service providers were required to obtain a permit to operate. While farmers were classified as essential services, certain small-scale farmers (SSFs) faced challenges in obtaining permits, either due to communication barriers or information inaccessibility. Consequently, these farmers could not access their farms to continue with production, hence incurring losses. Those with permits encountered challenges with law enforcers (Global Food Governance Working Group of the Civil Society & Indigenous People's Mechanism of the United Nations Committee on World Food Security, 2020; Plaas, 2020) due to misunderstandings about who could operate or not. Subsequently, some farmers used alternative routes to deliver their produce, while others returned to their farms or homes, this impacted the production and selling of their products.

In addition, the government's decision to close various markets, including street vendors, restaurants, hotels, weddings, funerals, or any large gatherings left SSFs susceptible to market shocks, as they primarily operate within these affected markets. The government's emphasis on keeping major supply chains open, such as supermarkets, raises concerns about favouritism towards large-scale farmers or organisations, inadvertently excluding SSFs interests (Battersby, 2020; Plaas, 2020).

The lockdown resulted in a significant income loss for numerous households, leaving many consumers unable to afford essential food items. Consequently, SSFs encountered low demand for their produce and loss of income (Plaas, 2020; Technoserve, 2020; Wills et al., 2020). As most of the SSFs are poor, the decrease in their income exacerbates issues of hunger and other desperation because they may not be able to live on the food they produce, which may be of one kind only. The COVID-19 crisis not only impacted the demand but also had repercussions on the supply side. Farmers faced challenges in accessing essential inputs such as seeds, seedlings, transport, markets, and technical services, hindering the continuity of production and the sale of their produce (Technoserve, 2020).

The severity of the COVID-19 crisis was exacerbated by pre-existing challenges, including but not limited to constrained access to markets and information, limited access to credit, insufficient technical skills, poverty, trade barriers, elevated transactional and transportation costs, structural and

gender inequalities, food insecurity, and the added uncertainty induced by climate change (Groenewald, 2004; Haverst SA, 2012; Mukwevho & Anim, 2014; Oettle, 2020; Paganini et al., 2020).

Farmers have encountered various adversities throughout their lives, including droughts, floods, disease outbreaks, and the impacts of climate change. Farmers are expected to have the capacity to cope and adapt to the dynamics of such shocks. Resilience is the ability of a system to withstand and recover from shocks, allowing for continued operation (Walker et al., 2004). Farmer resilience is defined as the capacity of the farm system to keep operating and producing even in the face of disruptions by depending on three capacities: buffer capacity, reflecting the system's resilence to withstand a shock without fundamental change; adaptive capacity, signifying the system's flexibility to adjust its operations in response to a shock; and transformative capacity, highlighting the system's potential for innovation and implementing solutions that lead to a fundamentally improved system in the face of disruption (Darnhofer, 2014). According to Perrin et al., (2020), farmer resilience is the ability of the farm system to resist disruptions and recover from them efficiently, creating stability that allows for uninterrupted farming. Farmers' knowledge of factors that strengthen or weaken a farm's ability to recover from challenges is essential for building and sustaining farm resilience (Kerner & Thomas, 2014). This study defines resilience as the capacity of farmers to cope with market shocks and external stresses and be able to sustain and maintain their production in the long run.

Historically, most shocks have primarily affected either the production or market side. However, unlike previously studied shocks, the COVID-19 pandemic presented a distinctive challenge, as it simultaneously disrupted both the supply and demand sides. This unprecedented crisis serves as the foundation for my research study, aiming to address the following question: **What factors influence small-scale farmers' resilience during the COVID-19 shock, and how did they respond to this multifaceted crisis?** The subsequent section provides an overview of existing literature, identifies gaps, outlines research methods, describes data collection and analysis, discusses the research design, presents findings, and summarises the ensuing discussion.

1.1. Literature Overview and Associated Gaps

This study integrates two bodies of literature: small-scale farmers' resilience and access to markets.

To mitigate the impact of shocks, farmers need to possess the ability to cope, adapt, and undergo a transformation (Darnhofer, 2014; Perrin et al., 2020; Walker et al., 2004). SSFs often face heightened vulnerability to the shocks, leading to production and income losses, and adverse effects on household food security (Simppula, 2020). Scholars suggest enhancing farmer resilience through diversification, whether on the production or market level. Such diversification involves the integration of livestock

and crops, cultivating various crops, engaging in off-farm employment, and exploring different income streams (Bujones et al., 2013; Irwin & Campbell, 2015; Tiwari & Rao, 2019; Tripathi & Mishra, 2017; Yoshida et al., 2019). Additionally, farmers can improve their resilience by adopting sustainable farming methods like agroecology, biodiversity, and natural practices (Altieri et al., 2015; Gitz, 2012; Walsum et al., 2014). While these sustainable farming methods are recognized as critical in mitigating the effects of climate change, some SSFs who have adopted these approaches still face constraints in accessing stable markets (Calderón et al., 2018).

There has been scholarly conversation on whether and how farmers' livelihoods and income can be improved through enhanced market access. This would enable the farmers to accumulate assets, increase food availability, and enhance their ability to respond or recover from shocks (Adzawla et al., 2020; Global Resilience Partnership, 2018; Irwin & Campbell, 2015; Simppula, 2020; Walsum et al., 2014). Irwin and Campbell (2015) argue that benefits derived from market participation hinge on the resilience of the market system to withstand the shocks and the stressors. While market access is crucial for improving farmers' livelihoods, many SSFs face significant barriers to entry. The situation is further exacerbated by the impact of COVID-19, pushing many SSFs further to the periphery of the mainstream economy due to their limited ability to access markets. Challenges hindering SSF market access include lack of human capital, limited access to credit, insufficient information, inadequate infrastructure, and an inability to meet specified formal retailers' standards like quality, size and volume (C. Bacon, 2005; Mukwevho & Anim, 2014; Nandi et al., 2017).

Scholars emphasize collaboration among various stakeholders as crucial for facilitating market access for SSFs. Intermediaries, such as cooperatives and initiatives like Foodflow, play a crucial role in this process. Foodflow is a specific example of a market channel created during lockdown to address temporary disruptions. The initiative aimed to connect farmers with local community groups (non-governmental organisations (NGOs), Kitchen soups, etc.). It used donor funds to buy crops from farmers and deliver them to communities. More broadly, intermediaries serve as middlemen, brokers, and organisations that facilitate knowledge transfer, distribution of information, and access to essential resources for SSFs (Das & Mohan, 2019a; Gagnon et al., 2019; Howells, 2006; Rubinstein & Wolinsky, 1987). These resources encompass product quality guarantees, information, input, services, finances and training (Aanyu et al., 2020; Michelson et al., 2018; Rubinstein & Wolinsky, 1987; Spulber, 1999; Susilowati et al., 2020; Xhoxhi et al., 2019; Yang et al., 2014). Examples of intermediaries include farm organisations, cooperatives, NGOs, companies, developmental agencies, and middlemen (Das & Mohan, 2019b; Yang et al., 2014).

Moreover, intermediaries have the potential to enhance their members' income. Studies performed on the Swiss Gran Aplin cooperative in Switzerland (Bardsley & Bardsley, 2014) and the PRODECOOP coffee cooperative in Nicaragua (C. M. Bacon, 2015) reveal that members received

higher income than the open market. However, scholars caution that there is a potential risk of farmers' exploitation by intermediaries due to power imbalances and information asymmetry (Susilowati et al., 2020; Xhoxhi et al., 2019). Some intermediaries may establish trade conditions that are not always favourable to the farmers, resulting in over-dependency and impeding production, investment strategies and business diversification (Ahn et al., 2011; Susilowati et al., 2020; Xhoxhi et al., 2019).

Furthermore, intermediaries can facilitate market access through contract farming. Contract farming is an agreement between farmers and buyers of a product, typically established before production begins (Eaton & Shepherd, 2001; Ton et al., 2018). These agreements can be formal or informal. Kangogo et al. (2020) argue that contract farming strengthens farm resilience by fostering a strong farmer-buyer relationship. Contract farming provides lucrative markets to SSFs and alleviates some of the constraints they face (Das & Mohan, 2019b; Tekalign, 2019). It involves the provision of input, capital, technical assistance, and income (Aanyu et al., 2020; Eaton & Shepherd, 2001). Although contract farming is seen as a means to improve the livelihood of SSFs, many are still excluded from such arrangements due to their inability to meet specified criteria in the contract or the prerequisites for participation (Nandi et al., 2017; Ton et al., 2018).

Resilience is a complex concept necessitating specific trade-offs to ensure system stability and sustainability (Peter & Swilling, 2014). For example, the impact of climate change has led to small-scale coffee growers in Central America facing a trade-off between achieving high yield and preserving the coffee agro-system (K. S. Morris et al., 2016). Similarly, small-scale dairy farmers in Bangladesh must make a trade-off between operating within a single formal market to enhance efficiency and exploring diverse markets to improve resilience (Pennotti, 2013). Additionally, Kuhl (2018) identified conflicting tensions between market system interventions connecting farmers to the market and programs aimed at enhancing SSFs' resilience, necessitating certain trade-offs. For example, farmers might choose diversification for resilience over larger-scale market production or opt to supply supermarkets despite lower prices for a more stable income.

While the literature extensively explores farm resilience and market access for SSFs, a noticeable gap exists in connecting these two aspects. While Irwin & Campbell (2015) initiated the connection between resilience and market systems, their focus was on market systems development and resilience programming. The existing body of literature lacks a comprehensive examination of the relationship between farm resilience and market access.

Moreover, current discussions on farm resilience primarily concentrate on climate change and the adoption of corresponding adaptation strategies, addressing the supply side. Scarce attention has been given to understanding adverse shocks that simultaneously impact both supply and demand. Pennotti (2013) highlighted the vulnerability associated with operating within a single market channel and stressed the importance of diversifying into various markets. However, insufficient research exists

to determine whether participating in diverse markets genuinely enhances the resilience of SSFs against dual-sided shocks, like the COVID-19 crisis.

Additionally, while Kangogo et al. (2020) suggested that being a member of a farm organisation can bolster farm resilience against climate change, it remains unclear whether such organisational affiliations also contribute to resilience during crises affecting both supply and demand. The existing literature lacks comprehensive insights into the role of farm organisations in mitigating the impact of dual-sided shocks on SSFs. Closing these research gaps will provide a deeper understanding of the intricate interplay between farm resilience and market access for small-scale farmers.

1.2. Overview of Research Method, Design, Data Collection and Analysis

I adopted an inductive approach to gain a profound understanding of farmers' experiences during the COVID-19 pandemic and associated lockdowns. I chose this approach for its capacity to unveil the lived experiences of respondents, enabling a meaningful and scientifically grounded exploration of the human experience, thereby ensuring qualitative rigour (Gioia et al., 2013; Patton, 2015). Furthermore, I employed a qualitative research method because it enables the researcher to comprehend how and why phenomena unfold in real life, providing a detailed and comprehensive description of events within their real-world context (Patton, 2015).

To understand the phenomenon under investigation, I used a case study approach and observed 21 farmers as my cases. The selected cases are in four sites in Limpopo province. As I approached the resilience of small-scale farmers during the COVID-19 pandemic from a market perspective, I selected these cases guided by the following criteria:

- Farmers engaging in an alternative market created by an intermediary during the lockdown.
- Farmers participating in municipal markets, which remained operational during the lockdown.
- Farmers operating in local markets, especially informal ones, which were closed during the hard lockdown period. The goal was to understand how these farmers, who relied on the closed markets, were affected and how they responded compared to farmers who could still sell in other markets.

The sampling of the cases was purposeful to ensure they provided rich information about the phenomenon being studied. I also included five intermediaries in my sample to bring diverse perspectives. I employed a longitudinal study approach and observed selected cases over 17 months.

To address the research question, I started to collect data from May 2020 until October 2021 using telephone and face-to-face interviews, including two site visits after ethical clearance. I analysed my data using the within-case analysis method to fully comprehend each case and derive some insights

(Eisenhardt, 1989). This involved writing case reports to immerse myself deeply into each case, enabling the identification of specific patterns before transitioning to the cross-case analysis method. Subsequently, I used cross-case analysis to compare the cases and identify similarities and differences. Using both within and cross-case analysis methods enabled a comprehensive understanding of the phenomenon under study.

I employed inductive coding, prioritizing the use of respondents' words or phrases as recommended by Gioia et al. (2013) and Strauss & Corbin (1998). I coded the data using Nvivo 12 and Excel spreadsheet software. Initially, 39 codes were generated and then organized into 29 categories. These themes were further analyzed, and 16 significant categories were identified for this study. Given the considerable number of categories, I scrutinized them to distil six overarching themes. Furthermore, a literature review helped in identifying frequently mentioned themes by scholars. Themes extensively covered in the literature were excluded from the list to ensure I focused on less-cited ones and contributed to the existing body of literature.

1.3. Overview of Findings and Discussion

Before the lockdown, most respondent farmers operated in multiple market channels. However, the government's decision to close various markets, such as street vendors, restaurants, hotels, weddings, and funerals, amongst others, left small-scale farmers vulnerable due to the loss of income, as most respondents primarily operated within these market channels. In response to the market closure, most respondents sought alternative markets, and these markets were predominately locally based, with some newly formed. These new markets were either initiated independently by "Opportunist Street Vendors or Traders" or facilitated by an intermediary like Foodflow. However, these newly formed markets had a short lifespan, lasting until the beginning of level 3 (June 2020), due to the "Opportunist Street Vendors" returning to work and diminishing Foodflow donor funds. Despite the diminishing of newly formed markets, those with access to markets (new or pre-existing) were more resilient than those without such access. Furthermore, some respondents also adapted their transport system in response to changing conditions. This included various strategies such as hiring passing-by vehicles, adjusting delivery schedules, transitioning from using their own bakkies to hiring trucks and borrowing vehicles to supply newly formed markets.

To mitigate the losses caused by market closures, some farmers responded by drying their crops to prolong their shelf life. These dried crops were then utilised for self-consumption, sold in new markets, or used as animal feed. The ability of farmers to preserve crops in this manner demonstrates their adaptive capacity during the crisis, thereby enhancing their resilience. Additionally, to alleviate the lockdown's impact, some farmers opted to grow crops for self-consumption or relied on existing crops to sustain themselves. Interestingly, this strategy was not immediately adopted but rather emerged around 6 to 9 months into the lockdown period (between September 2020 and January 2021). Some

respondents, despite facing difficulties sourcing food and experiencing low income, chose not to adopt this strategy due to various reasons.

In response to the lockdown's impact, some farmers adopted new farming practices to mitigate the challenges. This included changing crop patterns, growing, or repurposing damaged crops for animal feed, and making their own seedling or seeds. The farmers' capacity to adjust their farming practices to the changing conditions enabled them to reduce input costs and increase their resilience.

To cope with the lockdown's impact, the respondents relied on additional income from either the government in the form of social grants or COVID-19 relief fund, as well as self-generated income from other sources. In some cases, farmers sought innovative ways or adapted the existing systems to generate additional income during the crisis. Some farmers started new businesses to compensate for their farming business, while some relied on the existing business to generate additional income. Additionally, some farmers relied on alternative income like salaries, pensions, rentals, or income generated by family members. The ability of the farmers to access additional income enabled them to sustain their production and livelihood and thereby increase their resilience.

Moreover, most respondents tapped into their social capital networks as part of their mitigation strategy against the lockdown's impact. This strategy encompasses various forms of support, such as the provision of food and financial assistance by family members, skills and knowledge enhancement through mentors and fellow farmers, and access to alternative markets facilitated by local community members. Farmers' ability to draw from their social capital network enables them to adapt to changing conditions and thus enhance their resilience.

Furthermore, some respondent farmers adopted an off-season planting strategy before and during the lockdown. Harvesting off-season creates a high demand for products in the markets, thus increasing business profitability and enhancing farmer's resilience. Evidence indicates that those with products ready during the off-season period generated sufficient income despite the market closures or lockdowns.

In addition, the lockdown also created a "mushrooming of home gardens" phenomenon, impacting the off-season period and subsequently diminishing markets farmers relied on. Despite this challenge, those farmers with products ready before the mushrooming of home gardens managed to cope better with its effects compared to their counterparts. This is because they had already generated sufficient income before the occurrence of this phenomenon.

Given the above findings, the study investigated farmer resilience through the lens of market participation. This study underscores the significance of market access during crises and its role in strengthening farmer resilience. It reveals that those with market access were more resilient than those without such access. This finding echoed that of Irwin and Campbell (2015), indicating that households

participating in market systems can improve resilience by generating income. The study's findings also contradict the notion that diversity through the integration of livestock and crops enables farmers to withstand adverse conditions (Altieri et al., 2015; Etana et al., 2020; Kuhl, 2018; Manda et al., 2018; Perrin et al., 2020; Peterson et al., 2018; Stark et al., 2016; Szymczak et al., 2020). This was not the case, as those with a crop-livestock system or integrated livestock with their crop farming system were more vulnerable to market closures than those with only a crop system. They relied on the income generated from crop production to sustain their livelihood and production.

The literature review suggested that operating in multiple market channels reduces farmer's vulnerability against shocks (C. Bacon, 2005; Pennotti, 2013). However, this study's findings present a contrasting perspective. Despite most respondent farmers operating in multiple market channels before the lockdown, they remained vulnerable to market shocks as various key channels, such as restaurants, hotels, hawkers, and school feeding schemes, were closed. Consequently, they sought alternative markets that were not susceptible to the lockdown's impact.

To contribute to the knowledge gap regarding how intermediaries strengthen farmers' resilience during the crisis, this study investigated their role in connecting farmers to the markets. Specifically, it examined four cases involving Foodflow, an intermediary that facilitated access to alternative markets for the farmers. These farmers were not impacted by the lockdown despite the market closure and being assisted for only six weeks. These findings underscore the significant role intermediaries can play in mitigating the impact of shocks by providing access to alternative markets. However, the effectiveness of this role hinges on the intermediary's capacity to innovate, exhibit flexibility, and adapt during crises. The success is also contingent on the vision and goals of the entity, as exemplified by Foodflow, which was established to offer alternative markets during the crisis when regular markets were closed.

The study also found a contrasting scenario with cooperative entities. Unlike Foodflow, these cooperatives did not facilitate market access before or during the crisis. Their primary focus, established at their inception, was acquiring government grants and services. This highlights the importance of an intermediary's core mission and vision in its effectiveness during crises.

The study also includes practical recommendations aimed at addressing the exclusion of small-scale farmers during the crisis. These recommendations involve establishing a multi-disciplinary team to develop inclusive solutions for all farmers and ensure effective implementation of crisis management responses. To better prepare for similar future disruptions, the government should collaborate with the private sector to establish localised markets in rural communities and prioritise the development of these markets to bolster both local food systems and farmers' resilience in the face of the shocks. Integrating small-scale farmers into school feeding schemes is another crucial strategy to facilitate market access. Further elaboration on these practical implications is provided in the discussion chapter.

Chapter 2: Literature Review

2.0. Introduction

The literature review integrates two related bodies of research: small-scale farmers' resilience and farmers' access to the market. It is structured into four sections. Section one delves into farmers' resilience. Section two focuses on the role of intermediaries in connecting small-scale farmers to the market. Section three discusses small-scale farmers' access to markets through contract farming. Lastly, section four provides a brief overview of the early scholarly literature on the impact of COVID-19 on the food system.

2.1. Small-Scale Farmers' Resilience

As explained above, farmer resilience is the capacity of the farm system to maintain operations and production in the face of disruptions (Darnhofer, 2014). Understanding the factors that influence a farm's ability to recover from challenges is crucial for building and sustaining resilience (Kerner & Thomas, 2014). This study defines resilience as the capacity of farmers to withstand market shocks and external stresses while maintaining long-term production.

The agricultural sector is exposed to various shocks, namely: economic, environmental, social, institutional, and health. Some social and economic shocks farmers face stem from price uncertainty due to market liberation and limitations on market access caused by political volatility, economic conflict, lockdown restriction, and events like Brexit (C. Bacon, 2005; Bruneckiene et al., 2019; Hazell, 2020; Kahiluoto, 2020; Maye et al., 2018). Most resource-poor SSFs are vulnerable to these shocks because they cause production losses and adversely affect food security and farmers' income (Simppula, 2020).

Farmer resilience involves a complex interplay of factors, including production diversification, market participation, and the ability to cope with shocks. Farmers can enhance resilience through strategies like adopting sustainable farming practices, integrating livestock and crops and accessing diverse markets (Altieri et al., 2015; C. Bacon, 2005; Calderón et al., 2018; Etana et al., 2020; Irwin & Campbell, 2015; Kozicka et al., 2020; Kuhl, 2018; Mercy Corps & Tango, 2013; Peterson et al., 2018; Ramanjaneyulu et al., 2019; Tiwari & Rao, 2019; Valencia et al.,019; Walker et al., 2002; Walsum et al., 2014). However, trade-offs often arise between resilience-building strategies and factors like efficiency (Himanen et al., 2016; Peter & Swilling, 2014).

Market participation is crucial for improving farmers' livelihoods and building resilience. Several studies highlight that market participation can improve farmers' income and livelihoods, ultimately enhancing farmers' resilience (Adzawla et al., 2020; Irwin & Campbell, 2015; Simppula, 2020). Market access plays a significant role in improving farmers' livelihood through income

generation, enabling them to accumulate assets and improve their ability to respond or recover from the shock (Adzawla et al., 2020; Global Resilience Partnership, 2018; Walsum et al., 2014). However, many SSFs face significant limitations in accessing markets. The COVID-19 pandemic exacerbated this issue, pushing SSFs further to the periphery of the mainstream economy. Several factors contribute to this limited access including lack of human capital, credit, information, and inadequate infrastructure (Mukwevho & Anim, 2014; Nandi et al., 2017). Most SSFs do not participate in the supply chains as they are unable to meet the requirements specified in the standards such as quality, size, and volume (Nandi et al., 2017). Scholars propose creating platforms linking SSFs directly to markets as a solution (Da Silva et al., 2014; Das & Mohan, 2019b; Reardon et al., 2012). This could be achieved through collaboration between different stakeholders, including agribusinesses, government, retailers, and consumers.

Furthermore, Irwin and Campbell (2015) argued that households' resilience can be strengthened through engagement with the market systems because they provide income that enables households to accumulate assets and increase access to food. The authors also highlighted the sustainability of benefits gained through market participation is dependent on the market system's resilience to withstand the shock and stresses. However, the market shock experienced in the coffee industry left most small-scale coffee farmers vulnerable due to the instability of the global coffee markets (C. Bacon, 2005; Watson & Achinelli, 2008). The shift in the global market or liberation of the market resulted in an oversupply of coffee in the market, causing prices to drop significantly. Many scholars suggest that farmers should diversify to reduce their vulnerability to shocks.

Building resilience requires farmers to diversify their operations, either at the production level, market level or ideally both. Farmers can diversify (production level) by integrating livestock and horticulture into their farming system (Altieri et al., 2015; Etana et al., 2020; Kuhl, 2018; Peterson et al., 2018; Ramanjaneyulu et al., 2019; Tiwari & Rao, 2019; Valencia et al., 2019). Also, farmers can reduce shock vulnerability by participating in multiple markets (C. Bacon, 2005; Irwin & Campbell, 2015; Pennotti, 2013). A study in Somalia found that diversifying income without diversifying risk factors is insufficient to build resilience (Mercy Corps & Tango, 2013). The authors highlighted the importance of creating independent multiple income sources not susceptible to the same risk factors. For example, if a farmer engages in both livestock and crop production, it may create different income sources, but drought could still impact both. Susilowati et al. (2020) added that some contracted farmers have limited opportunities to create additional income due to intensive management at the farm level to meet the contract obligation. Resilience is complex and requires trade-offs at either the farm or market level.

According to Peter and Swilling (2014), certain trade-offs should be made to ensure the stability and sustainability of the farm system. To withstand the effect of climate change, some small-scale coffee

growers in Central America who adopted agroecology farming methods needed to make trade-offs between high yield versus preserving the coffee agro-system (K. S. Morris et al., 2016). Pennotti (2013) found that the small-scale dairy farmers in Bangladesh were vulnerable to market shock as they participated in one formal market. The author argued that strengthening SSFs' resilience requires certain trade-offs to be made, i.e. either participating in a single market to increase efficiency or participating in diverse markets to increase resilience, as a way to build redundancy in the system (Pennotti, 2013).

According to Himanen et al. (2016), farm diversification does not necessarily increase resilience as it usually competes with efficiency, hence a trade-off between diversification and efficiency is required, with efficiency often the overriding factor. A study conducted in Ethiopia and Honduras found competing tensions between market system interventions aiming to connect farmers to the market and programs focusing on strengthening SSFs' resilience (Kuhl, 2018). As a result of this tension, certain trade-offs were made. According to Kuhl (2018), proper risk assessment should be conducted when linking farmers to the market as increased production (introducing a variety of crops) for market demand may have unintended consequences on farmers' resilience during the shock. For example, the author highlighted that in Ethiopia, specific chickpeas were introduced for the international market, while SSFs were used to grow indigenous chickpeas at the end of the rainy seasons due to their ability to withstand drought. Chickpea also provides a source of protein to poor households. The shift posed a threat to SSFs' resilience during the drought due to the loss of adaption options and biodiversity (Kuhl, 2018; Shiferaw et al., 2007).

Studies suggest that adopting sustainable farming methods can enhance SSFs' resilience against disturbances such as drought, climate change, diseases, and economic shocks (Altieri et al., 2015; Kozicka et al., 2020; Ramanjaneyulu et al., 2019). However, adopting sustainable farming methods like agroecology among others still requires investment from farmers. Some farming methods require less external inputs and are considered suitable for adoption by resource-poor farmers (K. S. Morris et al., 2016; Ramanjaneyulu et al., 2019; Valencia et al., 2019). Even though some SSFs have adopted sustainable farming methods, they are still constrained in accessing the markets. The study conducted in Guatemala highlighted that farmers who adopted sustainable farming methods (agroecology) still faced challenges accessing stable markets (Calderón et al., 2018). SSFs still need support from different actors to enhance their human capital and financial capacity. Literature suggests that SSFs can be linked to the market through intermediaries.

2.2. The Role of Intermediaries in Connecting Small-Scale Farmers to the Market

Many scholars emphasize the importance of building resilience for SSFs, enabling farmers to absorb, adapt, and transform amidst shocks. Some key building blocks for resilience are; the ability to accumulate assets or wealth, access to credit, having savings to fall back on, skills and knowledge, access to input, generating income, and technical support (Ayinke, 2011; Das & Mohan, 2019a; Elbehri

& Benali, 2013; Michelson et al., 2018; Tekalign, 2019; Yang et al., 2014). The livelihood and income of resource-poor farmers can be improved by integrating them into a supply chain through intermediaries.

Literature highlights the importance of intermediaries in connecting small to medium-scale businesses to markets, which on their own were not possible due to limited resources such as finance, skills, knowledge, and limited production capacity (D Chikazunga et al., 2013; Da Silva et al., 2014; Kundurpi et al., 2021). Intermediaries connect buyers and sellers and also guarantee product quality to minimise the high risk associated with the product quality (Rubinstein & Wolinsky, 1987; Spulber, 1999). Intermediaries also provide information, input, services, finances, and training to their suppliers to ensure product quality (Aanyu et al., 2020; Michelson et al., 2018; Susilowati et al., 2020; Xhoxhi et al., 2019; Yang et al., 2014). Intermediaries can be defined as middlemen (Rubinstein & Wolinsky, 1987), brokers (Das & Mohan, 2019b), and organisations specific to knowledge transfer and information distribution (Gagnon et al., 2019; Howells, 2006).

Similarly, intermediation is used in the farming sector to connect farmers to markets. Often SSFs have limited capacity to produce the required quantity and quality specified by domestic formal and export markets (Ahn et al., 2011; Franz et al., 2014). This lack of capacity often disadvantages SSFs as they are frequently excluded from the supply chain (Tekalign, 2019). Normally, intermediaries try to bridge this gap by matching suppliers with buyers (D Chikazunga et al., 2013). This can also be facilitated through contracts between buyers and sellers. There are many forms of intermediaries, including farm organisations or cooperatives, NGOs, companies, developmental agencies, and middlemen (Das & Mohan, 2019b; Yang et al., 2014).

Some scholars argue that participation in intermediary organisations can improve SSFs' income. For instance, Bardsley & Bardsley (2014) found that members of the Swiss Gran Aplin cereal farmer cooperative received higher income than they could in the open market. This success stemmed from the cooperative's ability to establish itself and negotiate better prices for its products. C. M. Bacon (2015) strengthens this argument by examining the PRODECOOP coffee cooperative in Nicaraguan. This fair trade-driven cooperative pays its members 20-30% higher than the national average prices. Several factors contributed to their higher returns:

- Network building: The cooperative built relationships with alternative trade organisations.
- Quality focus: They prioritised producing high-quality coffee.
- Certifications: They obtained organic and fair-trade certifications, signifying responsible practices and ethical sourcing.
- Market skills: They developed the skills necessary to penetrate markets and negotiate favourably.

Additionally, producing coffee under special conditions and with eco-friendly labels like organic and fair trade attracts a premium price (C. Bacon, 2005). This explains why PRODECOOP members received higher returns. However, the author also highlighted the challenges faced by SSFs who were not part of cooperative or market associations. These SSFs often lack the volume and certifications required to participate in the certified markets or hold the contract with buyers, hence they did not reap the benefit of this arrangement. Although participating in the fair trade and organic market pays a high premium, C. Bacon (2005) points out that two cooperatives in his study used half of the coffee income towards servicing outstanding debt, providing services to farmers, and expanding the production infrastructure, resulting in associated members (SSFs) receiving a lower price for the coffee.

Furthermore, Kangogo et al. (2020) argue that farmers' resilience can be strengthened by acquiring membership in a farm organisation such as a cooperative, enabling them to access inputs and other services that may enhance their ability to adapt to climate change. K. S. Morris et al. (2016) added that in Mexico, the development of cooperatives assisted SSFs in improving their adaptive capacity. The authors also highlighted that cooperatives operate within a specific historical context, and it cannot be concluded that members will continue to benefit from these organisations. Furthermore, membership in these cooperatives was linked to support of government structures and other agrarian organisations (C. M. Bacon, 2015). Also, a study performed in Switzerland found that cooperatives implemented some activities to reduce the risk of production of organic cereal in mountainous areas and provided insurance to recover seeds from harvest losses due to unfavourable climate conditions (Bardsley & Bardsley, 2014). Meuwissen et al. (2019) added that SSFs can reduce risks by joining a cooperative that provides insurance coverage. On the contrary, farmers incorporated in the Food Chain Partnership (FCP) value chain in India, were responsible for all risks associated with crop failure, as the service provided by FCP did not include insurance cover in case of adverse events (Franz et al., 2014). Bardsley & Bardsley (2014) also highlighted that the collaboration of cooperatives and other actors in the field helped bring tailor-made assistance for organic cereal production that is resilient to climate change.

Although intermediaries are viewed as a vehicle to connect SSFs to the market and improve their social standing, there is a risk that intermediaries could exploit farmers due to power imbalances and information asymmetry (Susilowati et al., 2020; Xhoxhi et al., 2019). Ahnet et al. (2011) argue that the input providers structure trade conditions that are not always beneficial to farmers. Susilowati et al. (2020) and Xhoxhi et al. (2019) argue that power imbalances create a dependency phenomenon affecting farmers' production and investment strategy. Susilowati et al. (2020) added that SSFs' dependency on intermediaries may hinder their ability to diversify their business, limiting opportunities to generate additional income through off-farm activities or growing different crop varieties. This was not the case for members of the Gran Aplin cooperative in Switzerland, as they diversified their income by incorporating livestock in their farming system and generating additional income from off-farming activities like working in the skiing industry or holding other jobs (Bardsley & Bardsley, 2014).

In addition, SSFs dependency on intermediaries may leave them vulnerable to the monopsony force exerted by these organisations (Eaton & Shepherd, 2001; Elbehri & Benali, 2013; Mwagike, 2015; Susilowati et al., 2020). In Algeria, SSFs growing dates often avoid the monopsony of the intermediaries on market prices by storing their dates in a cooling station and selling them later when market prices improve, and by accessing alternative markets (Leonardelli et al., 2021). The authors also highlighted that during the lockdown, watermelon growers in Morocco were compelled to sell their produce at reduced prices due to the monopsony of buyers, including intermediaries. This is not limited to cropping space; in aquaculture, Aanyu et al. (2020) indicated that in Uganda, some middlemen take advantage of SSFs by paying low prices for their fish. The author also highlighted that the contract holders sometimes change quality standards to reject produce from the respective farmers due to unfavourable market prices. This is supported by other scholars, as due to unexpected market price changes, contract holders tend to reject produce under the disguise of poor product quality (Eaton & Shepherd, 2001; Susilowati et al., 2020; Tekalign, 2019). This results in farmers carrying all financial losses caused by market uncertainty. Issa (2020) added that in Tanzania, intermediaries' failure to facilitate trade between farmers and buyers caused farmers and traders to experience lower pricing, making their business unprofitable. Also in India, cooperatives failed to link SSFs to the market due to corrupt activity and political interference (Das & Mohan, 2019b).

Although formal markets are viewed as a mechanism where SSFs can improve their livelihoods through income generation, the study performed on tomato growers in Limpopo found those who participated in informal markets had higher incomes compared to those who participated in the formal markets due to high prices fluctuations during the off-season, while tomato prices in informal markets remained steady during off and on seasons (D Chikazunga et al., 2013). According to Da Silva et al. (2014), linking SSFs to school feeding schemes was beneficial to rice grower farmers in Ghana, with increased income and evidence of improved food security. However, this was not the case for other SSFs in the same country, as the integration of farmers into the school feeding schemes was not efficient, as traders and intermediaries were not driving sourcing from local farmers, and sometimes buyers were using credit, meaning farmers did not always have cash at their disposal when needed. Similarly, C. Bacon (2005) noted that some cooperatives pay their members in credit, and sometimes they have to wait for an extended period, possibly well over two months, to receive payment, resulting in some farmers opting to sell their coffee to middlemen for lower prices to address cash shortages.

Another way intermediaries can facilitate market access is through contract farming, which could positively impact SSFs' resilience.

2.3. Small-Scale Farmers' Access to Markets Through Contract Farming

Contract farming is an agreement between farmers and product buyers, usually made before production starts (Eaton & Shepherd, 2001; Ton et al., 2018). Contracts can be formal or informal

(verbal). Verbal agreements often disadvantage farmers, lacking guarantees on purchase quantities and prices, creating uncertainty for both farmers and buyers (Aanyu et al., 2020). Kangogo et al. (2020) argue that contract farming strengthens farm resilience through nurturing the farmer-buyer relationship. The authors highlighted that the relationship's nature influences the farmer's investment decisions, enhancing adaptive capacity. However, the farmer-buyer relationship alone does not improve the farmer's adaptive capability. It also depends on farmer cooperative membership and entrepreneurial characteristics. Asmamaw et al. (2019) added that farmers belonging to farm organisations like cooperatives are more likely to become resilient compared to their counterparts. Conversely, Adzawla et al. (2020) found that farmers belonging to farm organisations with access to credit and high consumption expenditure were less resilient to climate change.

Contract farming can link SSFs to lucrative markets and solve some constraints they face (Das & Mohan, 2019b; Tekalign, 2019). It provides farmers with resources like inputs, capital, technical assistance, and income (Aanyu et al., 2020; Eaton & Shepherd, 2001). However, this model, despite its potential to improve livelihoods, faces criticism for potentially exploiting farmers due to power imbalance, knowledge gaps, and political affiliation between farmers and buyers (Ayinke, 2011; Baumann, 2000; Bitzer & Bijman, 2014). Susilowati et al. (2020) and Tekalign (2019) warn that contract farming may turn farm owners into 'mere' workers, losing control of farming production to a third party and receiving less than minimum wages. However, all production risks, like labour and harvest loss, remain farmers' responsibility. Contract farming may also result in farmers incurring huge debts, potentially reaching uneconomical levels (Eaton & Shepherd, 2001; Manda et al., 2018).

The literature highlights that power imbalances between contractors and farmers can be addressed by creating new partnerships and inclusive learning platforms (Pouw et al., 2019). Waters-Bayer et al. (2004) added that these partnerships' effectiveness depends on creating a space where all stakeholders, including SSFs, are involved in the collaboration process and joint learning.

Contract farming is considered a vehicle to improve SSFs' livelihoods. However, most of the poorest SSFs are often excluded from such arrangements (Ton et al., 2018). Resource-poor farmers are typically excluded for failing to meet contract criteria or the pre-requisites for participating in this kind of arrangement (Nandi et al., 2017; Ton et al., 2018). Additionally, inclusion terms may disadvantage the resource-poor farmers due to their dependence on contract holders for resources (McCarthy, 2010; Schouten & Vellema, 2019; Susilowati et al., 2020; van Westen et al., 2019; Xhoxhi et al., 2019). As a result, some farmers have forfeited their land to the contract holders (Tekalign, 2019).

In addition, Meemken & Bellemare (2020) found no significant income difference between contracted and non-contracted farmers in six African and Asian countries. They also argue that contract farming does not necessarily improve community well-being (Meemken & Bellemare, 2020). Chikazunga et al. (2013) present a case study of avocado growers in Venda who incurred losses due to

production costs exceeding revenue within a large agribusiness contract. The authors point out insufficient production volume as a possible reason for lower income.

However, not all studies show such negative results; other studies indicate that contract farming can improve participating farmers' income and livelihoods (Da Silva et al., 2014; Tiwari & Rao, 2019; Ton et al., 2018; van Westen et al., 2019). Aanyu et al. (2020) observed improved livelihoods for Tilda Uganda Limited contract participants. Farmers could afford better housing, cars, and education for their children, which was impossible before participating in the contract. Elepu and Nalukenge (2009) found that Ugandan sunflower growers under contract enjoyed higher incomes than non-contracted farmers. Furthermore, the contract managed to extend benefits to entire communities, as shown by the construction of schools, hospitals, and improved infrastructure surrounding contracted farms.

These contrasting findings highlight the importance of a strong relationship between contracting companies and farmers to ensure a sustainable model that benefits all parties involved.

As mentioned earlier, before the coronavirus outbreak, most SSFs were already grappling with many constraints hindering their ability to operate viable businesses and improve their livelihoods. Government-imposed lockdown restrictions severely impacted SSFs' livelihoods due to disruptions in the food system, as many were not integrated into the formal food supply chain. In South Africa, the government did not prioritise the informal food supply chain, leaving many SSFs vulnerable to the effect of the lockdown measures.

2.4. Disruption of the Food System due to COVID-19

Movement restrictions imposed during the COVID-19 pandemic significantly affected the functionality of food supply chains. This disruption impacted farmers, access to agriculture inputs, operations of agro-processing plants, transportation of goods, and food availability to some extent, (Cullen, 2020; FAO, 2020; Nchanji & Lutomia, 2021). The pandemic exposed the vulnerabilities within the existing food system, including structural and gender inequalities, market dominance by a few companies, and heightened food insecurity (Angeles, 2007; FAO, 2020; IMF 2020; Paganini et al., 2020). For example, South Africa grapples with structural inequalities rooted in its colonial past, including the legacy of apartheid and post-apartheid policies that continued to exclude the majority of the population from economic opportunities (IMF, 2020; Marissa, 2009). Although the post-apartheid government made efforts to bridge the gap of inequalities, it has not yet succeeded. Some scholars echoed that women, particularly female farmers in rural settings, were more susceptible to food insecurity in the event of an adverse shock compared to their counterparts. Rural women faced numerous challenges, including managing household food security and nutrition, limited access to land and land rights, discrimination, unequal power dynamics within households and society, and limited capacity to negotiate. These existing gender inequalities significantly constrained their ability to cope

with additional shocks like pandemics (Botreau & Cohen, 2020; de la O Campos & Garner, 2014; Koralagama et al., 2017; Leonardelli et al., 2021; Ros-Tonen et al., 2019).

Another weakness exposed by the pandemic was the dominance of a few large companies in the global food system due to market liberalization policies. This concentration enabled these companies to operate both in supplying farm input and selling the produce to consumers. While market liberalization benefited a few big companies, it also increased the vulnerability of most low-income farmers to various shocks (e.g., price fluctuations and supply chain disruptions)(IPES-Food, 2020; Paganini et al., 2020; Pretty, 2020). The COVID-19 disruption sparked many discussions among scholars, researchers, and practitioners. These conversations highlighted the urgent need to transform the food system into a more inclusive one, addressing inequities in the current system and vulnerabilities exposed by the crisis (FAO, 2020; Kahiluoto, 2020; Paganini et al., 2020).

Lockdown restrictions on movement hampered access to fresh produce, dairy, and fish for many urban consumers (Galanakis, 2020; Technoserve, 2020), leading to food price spikes in markets (HLPE, 2020; Paganini et al., 2020). The World Bank (2021) reported a 40% global food price increase in month compared to January 2020. This trend mirrored the rise in food price increases observed in Sub-Saharan Africa. According to FAO (2020), cereal prices in Benin, Burkina Faso, Ghana, Mali Carpe de Verde, Senegal, and Togo were 40% higher in June 2020 compared to February 2020. Food price variations were observed during various lockdown stages worldwide. For example, the United States of America (USA) experienced a decline in food prices during the lockdown's onset due to lower demand and supply chain challenges. However, these challenges caused increased volatility for import and export producers facing market shocks. As the lockdown period persisted, food prices, particularly meat products began to rise. A shortage of domestic supply caused meat prices to increase by 16% in the USA by May 2020 (Mead et al., 2020). The inverse was observed in Africa, with food prices increasing at the beginning of the lockdown and declining as the lockdown persisted (FAO, 2020). The FAO (2020) argued that the decline in food prices was caused by reduced purchasing capacity among many households.

The COVID-19 lockdowns significantly impacted farmers. Disruptions in the supply chain and reduced consumer demand due to income loss in many households led to substantial spoilage of perishable produce (Amjath-Babu et al., 2020; Cullen, 2020; Hartley et al., 2021; HLPE, 2020; The World Bank, 2021; Wills et al., 2020). Most SSFs faced difficulty selling their products during lockdowns and were often forced to accept lower prices or abandon crops due to movement restrictions and limited transportation (Leonardelli et al., 2021; Timilsina et al., 2020).

In addition, many SSFs struggle financially, making them particularly vulnerable to income reduction. This vulnerability stems from their limited ability to survive solely on the food they produce, often of a single variety. For example, In Algeria, the second wave of COVID-19 infections caused a

significant drop in date prices (Leonardelli et al., 2021), directly impacting the farmers' income, and forcing them to reduce expenses.

Movement restrictions imposed during lockdowns caused labour shortages (local and migrant) in several regions, including East Africa, the USA, and Europe (de la Peña García et al., 2020; Galanakis, 2020; Leonardelli et al., 2021; Nchanji & Lutomia, 2021; OECD, 2020; The World Bank, 2021). The labour shortages affected the planting and harvesting of crops on farms. For example, in Morocco, one of the areas where farmworkers used to assemble in search of a job was barred, resulting in farmers having limited access to labourers. It is important to note that labour shortages, particularly migrant, seasonal, and skilled workers were already a concern in some regions, such as European countries and the UK, even before the COVID-19 pandemic (McGuinness & Grimwood, 2017). This pre-existing labour shortage exacerbated the challenges posed by the pandemic-induced labour shortages and further threatened farm production and food systems. The uncertainty caused by lockdowns led some farmers to reduce their production, raising concerns about potential future shortages (Oxfam et al., 2020). Delays in planting or harvesting can significantly impact farm yield and revenue and potentially contribute to food shortages and price increases (Phillips, 2019; The World Bank, 2021; Timilsina et al., 2020). For example, Leonardelli et al. (2021) highlight a case in India where some farmers reduced investments in growing flowers due to lockdown uncertainties. They were unsure how long the lockdown would last and whether they would be able to sell or not.

Also, lockdown measures including social distancing, curfew and worker absenteeism due to COVID-19 infection or fear of illness, negatively impacted agricultural production output (Aday & Aday, 2020; FAO, 2020; Vilakazi & Landani, 2021). Amjath-Babu et al. (2020) highlighted the potential for income loss to discourage farmers from investing in input for the next production cycle. Some farmers could not access their farms as they did not have a work permit at their disposal, resulting in halted farming production and affected output (Paganini et al., 2020). Moreover, some farmers faced challenges accessing inputs such as seeds, seedlings, and manure, impacting the production process and output (Amjath-Babu et al., 2020; Cullen, 2020; Technoserve, 2020).

Most SSFs operate outside formal supply chains like supermarkets, relying on informal markets like hawkers, restaurants, and hotels. The closure of these channels during the lockdowns left them vulnerable due to income loss (Kemerink-Seyoum & Leonardelli, 2021; Plaas, 2020). Some farmers could not harvest their crops knowing their normal markets were closed (Plaas, 2020). The South African government's decision to close informal markets, despite considering SSFs essential workers, displayed a lack of consideration for their dependence on these channels. Restrictions on social gatherings, including funerals and weddings, further reduced SSFs' market access and income (D. Morris et al., 2020). Additionally, school closures not only disrupted SSFs participating in school

feeding schemes but also jeopardised the nutritional needs of 10 million children who relied on these programs (Cullen, 2020; Paganini et al., 2020).

The negative impacts of lockdowns extended beyond farmers' income and livelihoods. Mental health concerns also emerged, with reports of suicides amongst SSFs in India. One farmer could not find workers to harvest wheat, leading to income loss and inability to repay his debt. (The Telegraph online, 2020). It is important to acknowledge that farmer suicides in India are a complex issue, with pre-existing contributing factors like access to financial support, resource limitations, and trade barriers (Hossain et al., 2020). However, the additional stress of lockdowns likely exacerbated these existing vulnerabilities.

2.5. Summary: What We Know About Small-Scale Farmers' Resilience and Access to the Markets and How COVID-19 has Shown What We Don't Know

Studies indicate that market participation can improve SSFs' livelihoods, enabling asset accumulation and strengthening resilience (Adzawla et al., 2020; Global Resilience Partnership, 2018; Walsum et al., 2014). Despite these benefits, market access remains a significant constraint for many SSFs. Overcoming this requires collaboration among food system stakeholders. By working together, actors can co-design resilient systems promoting inclusive growth (Da Silva et al., 2014; Das & Mohan, 2019a; Reardon et al., 2012)

Literature extensively explores farm resilience and market access for SSFs, but their connection remains understudied. While Irwin & Campbell (2015) initiated the connection between resilience and market systems, their focus was on market systems development and resilience programming. Existing literature lacks a comprehensive examination of the relationship between farm resilience and market access.

Literature highlights that SSFs should participate in multiple markets to increase resilience against shocks (C. Bacon, 2005; Irwin & Campbell, 2015; Pennotti, 2013). Pennotti (2013) emphasises vulnerability in single-market operations and the importance of market diversification. However, SSFs face trade-offs between market diversification, efficiency, and economies of scale (Morris et al., 2016, Pennotti, 2013). Himanen et al. (2016) argue that resilience trade-offs often prioritise efficiency. While market diversification can provide independent income streams and reduce vulnerability to market shocks (Mercy Corps & Tango, 2013), it does not guarantee protection against systemic risks like COVID-19. This study investigates if diverse markets genuinely enhanced SSFs resilience against the COVID-19 pandemic or not.

Moreover, current discussions on farm resilience primarily concentrate on climate change and the adoption of corresponding mitigation strategies, addressing the supply side (Etana et al., 2020; Harvey et al., 2018; Shiferaw et al., 2007; Tripathi & Mishra, 2017; Valencia et al., 2019). Scarce attention has

been given to understanding adverse shocks that simultaneously impact both supply and demand. Additionally, intermediaries play a significant role in building resilience through the provision of input service and market access (Aanyu et al., 2020; Michelson et al., 2018; Susilowati et al., 2020; Xhoxhi et al., 2019; Yang et al., 2014.) Intermediary literature focuses on either supply-side climate change mitigation or market shocks. No studies assess farm resilience from crises affecting both supply and demand simultaneously. While affiliation with intermediaries like cooperatives can bolster farm resilience against climate change (C. Bacon, 2005; Bardsley & Bardsley, 2014; Kangogo et al., 2020), their role in dual-sided crises remains unclear. The literature lacks insights into intermediaries' role in mitigating dual-sided shock impacts on SSFs. Closing these research gaps will provide a nuanced understanding of farm resilience and market access dynamics for small-scale farmers.

To address these gaps, I will use the following research question: **What factors influence small-scale farmers' resilience during the COVID-19 shock, and how did they respond to this multifaceted crisis?**

Chapter 3: Research Methodology

3.0. Introduction

This chapter presents the research methodology employed in this study. It outlines and justifies research sites, explains the chosen research method, approach, and paradigm, details participant sampling and interview procedures, and describes data collection and analysis methods. The chapter also confirms adherence to university ethical clearance guidelines throughout the interview process.

3.1. Study Site

To comprehend the phenomenon under investigation, I employed multiple case studies for their effectiveness in theory building and cross-case analysis (Eisenhardt, 1989; Eisenhardt et al., 2007). The study focuses on small-scale farmers in rural areas of Limpopo Province, South Africa (Figure 1). This particular site was selected for its potential to provide insights into the COVID-19 pandemic's impact (Patton, 2015). Despite being in the same province, these cases differ in the markets they operate in, namely municipal or fresh produce markets, retailers, intermediary-created alternative markets, and local informal markets such as hawkers and school feeding schemes.

Municipal or fresh produce markets are municipally owned, managed, and operated under provincial government authority (Davison Chikazunga et al., 2008; Nyawo, 2020).

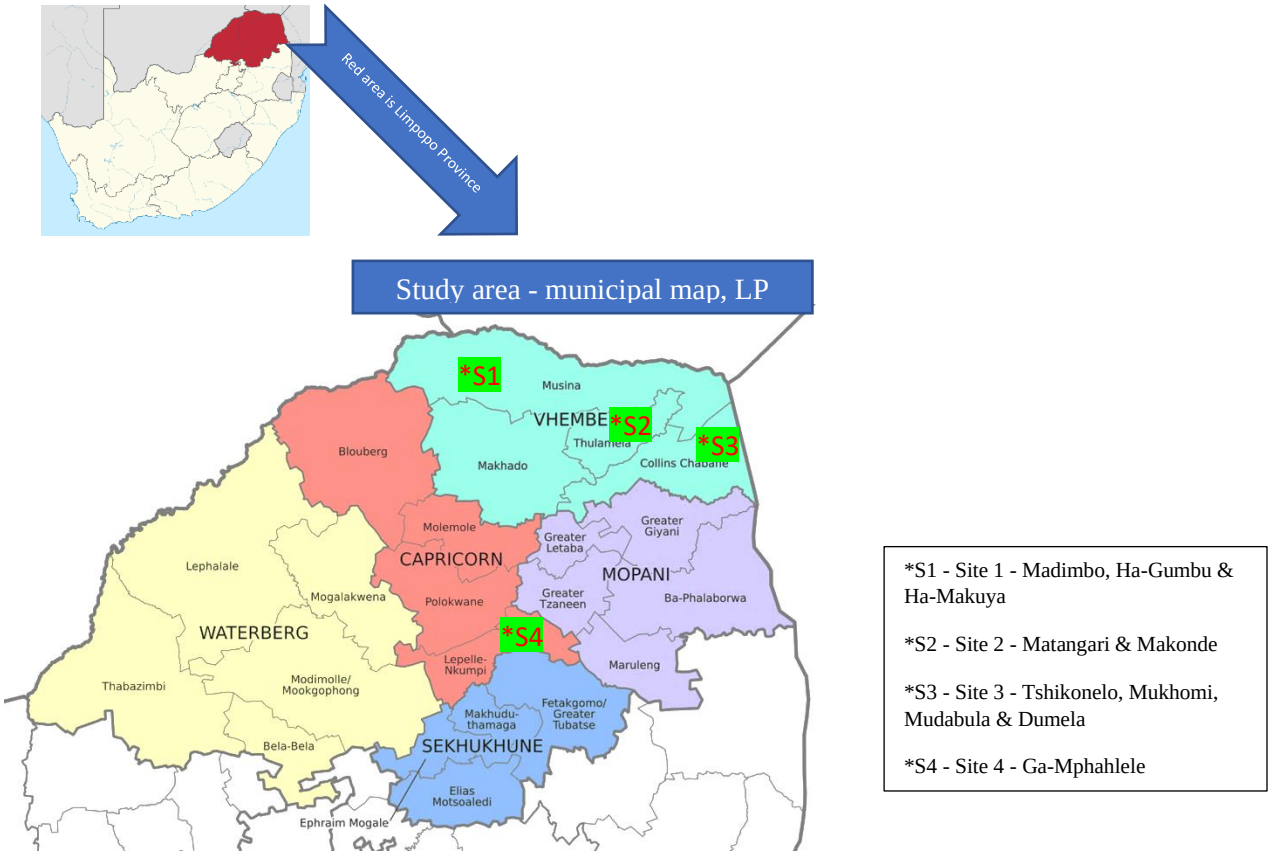

Figure 1: Municipality map illustrating study sites.

Source: https://en.wikipedia.org/wiki/Limpopo & https://en.wikipedia.org/wiki/List_of_municipalities_in_Limpopo

This study spans four sites across two district municipalities, Capricorn and Vhembe, encompassing four local municipalities: Lepelle-Nkumpi, Musina, Thulamela, and Collins Chabane (Figure 1). Musina municipality has a hot desert climate, while other areas have a hot semi-arid climate. Six farmers reside in the Ga-Mphahlele, comprising 30 villages in Lepelle-Nkumpi, Capricorn district. Ga-Mphahlele is located 20 km southeast of Lebowakgomo and 60 km north of Polokwane, the largest and capital city of Limpopo Province. Lepelle-Nkumpi municipality has a population of 230 350 with agriculture as a primary economic driver in the region (Lepelle-Nkumpi, 2013; Municipality et al., 2020). Respondents engage in local trade between Lebowakgomo and Polokwane, operating in formal or informal markets including retailers, hawkers, restaurants, and the Polokwane Fresh Produce market.

On the other hand, the remaining three sites are in the Vhembe district, with respondent farmers residing in various villages across three distinct local municipalities. The first site in this district is Niani, encompassing Madimbo, Ha-Gumbu, and Ha-Makuya villages in Musina municipality. Niani is approximately 80 km southeast of Thohoyandou and 90 km east of Musina. Musina municipality, with

a population of 32 009, relies on mining and agriculture as the primary economic drivers (Vhembe District Municipality et al., 2020). Niani farmers trade their produce in Johannesburg municipal markets and informal markets, attracting customers from as far as Mozambique, Zimbabwe, Cape Town, and eThekwini.

The second site includes Matangari and Makonde villages in Thulamela municipality, situated about 22 km southeast of Thohoyandou. Thohoyandou, the former capital city of Venda and current administrative centre of Vhembe and Thulamela, is the agricultural hub of Venda with a population of 497 237. Respondent farmers engage primarily in local trade within and around the city, participating in both formal (retailers) and informal markets.

The third site is in Malamulele, encompassing Tshikonelo, Mukhomi, Mudabula, and Dumela villages in Collins Chabane municipality. Malamulele is approximately 40 km east of Thohoyandou and north of Giyani. Collins Chabane, with a population of 347 974, relies on agriculture and community services as its main economic drivers. Respondent farmers engage in local trade, participating in both formal and informal markets, including retailers, hawkers, and school feeding schemes, between Malamulele and Thohoyandou cities.

3.2. Study Design

The phenomenon under study was contemporary during field observation (evolution of the COVID-19 outbreak), unlike examining a historical event (Yin, 2018). To address the research question, I adopted a constructivist approach, emphasizing knowledge construction through interactions with multiple realities that may evolve as the environment changes (Golafshani, 2003; Miller & Whicker, 1999). Focusing on the lived experiences of small-scale farmers during the COVID-19 pandemic, this paradigm enables me to comprehend their perspectives (Mertens, 2015). Constructivism involves interpreting multiple constructed realities through interactions with respondents during in-depth interviews, recordings, observations, and document reviews (Johansson, 2016; Kember & Corbett, 2018).

My study employed an inductive approach to understand the farmers' experiences during the COVID-19 pandemic and the government's lockdown. The inductive approach was chosen due to its ability to capture the lived experiences of the respondents, allowing the researcher to impart a meaningful and scientifically grounded exploration of the human experience, thus ensuring qualitative rigour (Gioia et al., 2013; Patton, 2015). This approach facilitated a thorough interpretation of respondents' experiences, ensuring accurate representation (Corley & Hamilton, 2012). The qualitative research method was deemed suitable for this study as it enabled the researcher to comprehend how and why the phenomenon unfolded in real life, offering a detailed description within the real-world context (Patton, 2015).

In addition, qualitative research design can be used in a single-case or multiple-case setting. The literature highlights a single case as a powerful example (Siggelkow, 2007) of theory building with the potential for generalisation (Gioia et al., 2013). Conversely, the literature also shows that multiple case studies and cross-case analysis enhance theory building (Eisenhardt, 1989, 1991; Eisenhardt et al., 2007). My study design focused on multiple case studies with 21 farmers as cases. Within-case analysis followed by cross-case analysis was used to develop themes, patterns, and trends. This approach allowed an in-depth understanding of each case and uncovered patterns specific to each case before generalising patterns across cases. Cross-case analysis allows for multiple perspectives, thereby enhancing the validity of research outcomes (Eisenhardt, 1989).

As the study aimed to capture participants' lived experiences during the COVID-19 pandemic and how they coped with its impact, longitudinal research was used (Calman et al., 2013; Saldaña, 2003). Data was collected over 17 months, from May 2020 to October 2021, including two site visits and telephone interviews at the beginning and the end of the data collection period.

3.3. Data Collection

For case studies, data can be collected using various sources of evidence such as fieldwork, archives, verbal reports, observations and combinations of these (Eisenhardt, 1989; Eisenhardt et al., 2007; Patton, 2015; Yin, 1981). This study primarily sourced data from interviews with the respondent farmers and observational field notes taken during the site visits. The observation was conducted simultaneously with the interviews.

Additionally, to gain diverse perspectives of the phenomenon, intermediaries including two founders (Foodflow and Ga-Mphahlele Homecoming), three cooperatives, and one extension officer were interviewed. Multiple data sources enabled triangulation, thereby enhancing the validity of research outcomes (Flick, 2013). To ensure rigour, whenever new information emerged from one respondent, all previously interviewed farmers were contacted to inquire about the same topic. Furthermore, the interview protocol was adjusted to accommodate insights from subsequent interviewees.

Respondent farmers were interviewed either at their homes, on farms, or in a restaurant depending on the day of the week. On weekdays, most farmers resided on or near the farm, hence interviews were conducted at the farms. On weekends, most farmers did not work and were at home, so interviews were conducted in those settings. Interviews ranged from 21 to 67 minutes. All interviews were recorded and transcribed, producing a total of 330 pages. Interviews were conducted in English, Tshivenda, and Xitsonga, to allow respondents to share their experiences in their preferred language. No translator was required as I could speak all three languages. All vernacular interviews were

translated into English during the transcription process before data analysis. The overview of data collected is shown in Figure 3 in Section 3.6.

3.4. Respondent Interviews

To gain insights into the phenomenon, I used semi-structured questionnaires to guide the interviews; as detailed in Appendix 1 (interview protocol). The initial part of the enquiry gathered background information on experience, market participation, and strategies employed to deal with previous shocks. Subsequent questions focused on understanding the impact of COVID-19 on livelihood and adaptations implemented to mitigate its effects. The enquiries also assessed the influence of lockdown measures on production and market dynamics and ascertained the repercussions of this disruption on farmers and their responses.

Semi-structured questions enabled consistency among the respondents while allowing flexibility for probing new emerging themes. Most interviews were conducted face-to-face during two-phase visits, with some conducted telephonically at the onset of the lockdown and the end of the assessment period. Figure 2 shows some respondents interviewed during site visits. Due to the weak network coverage in some parts of the study area, this method was not fully adopted. Consequently, face-to-face interviews became necessary despite the ongoing lockdown, raising COVID-19 transmission concerns during interviews. Before proceeding with these interviews, my supervisor sought special permission from the ethics committee, which granted approval under specific conditions: social distancing, mask-wearing, sanitization, and conducting interviews in open or well-ventilated spaces. I ensured compliance with university regulations throughout the interview process,

In addition, I resorted to telephone interviews only when face-to-face interviews were not possible, either due to respondents' unavailability during the field visits or for follow-up on progress or clarification during data analysis. Moreover, the use of other online platforms such as Zoom, Microsoft Teams, Skype, and WhatsApp was precluded due to network coverage challenges and high data costs.

Figure 2: Some respondents interviewed during site visits

3.5. Sampling

A purposeful sampling approach was used to identify specific farmers in four different areas within Limpopo province, namely Ga-Mphahlele, Niani, Malamulele and Matangari/Makonde, (refer to Table 1). These cases were chosen due to their potential to yield comprehensive insights into the phenomenon being studied (Patton, 2015). As the researcher approached the small-scale farmers' resilience during COVID-19 from a market perspective, the following criteria guided case selection:

- Farmers engaging in an alternative market created by an intermediary during the lockdown.
- Farmers participating in municipal markets, which remained operational during the lockdown.
- Farmers operating in local markets, especially informal ones as they were closed during the hard lockdown period. The goal was to understand how these farmers, who relied on the closed markets, were affected and how they responded compared to farmers who could still sell in other markets.

To identify suitable cases that meet these criteria and answer the research question, various methods were employed. The selected cases were observed for 17 months.

Firstly, my supervisor connected me to the Foodflow Founder who created an alternative market for small-scale farmers during the lockdown period. Foodflow linked various South African farmers to this alternative market, including four farmers from Ga-Mphahlele in Limpopo province. Four of these farmers were selected for inclusion in this study due to their active participation in the alternative market. Additionally, to gain a more comprehensive perspective, two more farmers who were not participants in the alternative market within the same area were included in the sample.

Secondly, I engaged with an extension officer responsible for the Niani area to facilitate connections with farmers in that region. Six farmers from Niani were selected for inclusion in the study because they primarily participated in the Johannesburg Fresh Produce Market (municipal market). This market is located approximately 590 km from the study site. Unlike other informal markets such as school feeding schemes, hawkers, weddings, and funerals, municipal markets in the country remained open during the hard lockdown period. These cases were selected to understand how the livelihood and production of farmers participating in municipal markets were affected by the lockdown compared to those without access to such markets.

Thirdly, I consulted the Director of the Vhembe District (Agriculture) to request permission to study the farmers in Collins Chabane municipality, and interview two extension officers in the district, (refer to Appendix 2). Nine farmers across these two municipalities were selected for inclusion in the study because they primarily sold produce in local markets, such as supermarkets, hawkers, school feeding schemes, funerals, and similar outlets. Notably, only two out of nine farmers supplied

supermarkets. Unlike farmers mentioned previously, these farmers did not participate in municipal markets like Johannesburg Fresh Produce markets due to considerable distance and high transportation costs. Since most local markets were closed during the hard lockdown, except for the supermarkets, these cases were selected to investigate how these farmers were affected by the lockdown compared to those with access to municipal markets and the Foodflow market.

My sample comprised participants with a wide age range, from 27 to 70 years of age. Farming experience varies from 0 to 40 years and operational land size ranges from backyard plots to 10 hectares. Furthermore, most respondents own larger plots of land; however, this study specifically focused on the land in use during the assessment period.

Lastly, to enrich the study with diverse perspectives, interviews were conducted with two founders who facilitated the connection of four respondent farmers to the alternative market. Given that the respondent farmers were either part of a family cooperative or not affiliated with any cooperative, three independent cooperatives were identified with the assistance of an extension officer in Thohoyandou. Additionally, one extension officer was included in the sample (refer to Table 2 for further details).

Table 1: Respondent farmers for the study

Interviewees	Gender	Farm site	Age group	Experience	Land size-operational (ha)	Date interviewed
Farmer 1	Male	Ga-Mphahlele	37	6	0.5	19-05-2020 23-09-2020 25-06-2021
Farmer 2	Female	Niani	38	1	3	19-09-2020 29-06-2021
Farmer 3	Male	Ga-Mphahlele	32	4	2	18-05-2020 23-09-2020 25-06-2021
Farmer 4	Male	Makonde	52	34	7	22-09-2020 26-06-2021
Farmer 5	Male	Niani	44	0	2	19-09-2020 29-06-2021
Farmer 6	Male	Niani	26	7	6	19-09-2020
Farmer 7	Male	Matangari	37	2	7	22-09-2020 29-06-2021
Farmer 8	Male	Niani	52	14	10	20-09-2020
Farmer 9	Female	Matangari	70	40	1	22-09-2020 26-06-2021
Farmer 10	Male	Matangari	52	18	10	21-09-2020 26-06-2021
Farmer 11	Male	Collins Chabane	52	8	3	24-09-2020 27-06-2021

Interviewees	Gender	Farm site	Age group	Experience	Land size-operational (ha)	Date interviewed
Farmer 12	Female	Niani	62	1	1	20-09-2020 29-06-2021
Farmer 13	Male	Ga-Mphahlele	33	7	5	23-09-2020
Farmer 14	Female	Ga-Mphahlele	28	4	1.5	19-05-2020 23-09-2020 25-06-2021
Farmer 15	Male	Collins Chabane	52	7	6	21-09-2020 27-06-2021
Farmer 16	Female	Ga-Mphahlele	30	3	2	18-09-2020 23-09-2020 22-09-2021
Farmer 17	Female	Collins Chabane	27	6	2	24-09-2020
Farmer 18	Male	Niani	44	1	4	19-09-2020 02-10-2021
Farmer 19	Female	Collins Chabane	42	4	2	23-09-2020 24-09-2021
Farmer 20	Male	Ga-Mphahlele	30	0	1	23-09-2020 25-06-2021
Farmer 21	Female	Collins Chabane	60	5	2	25-09-2020

It should be noted that in some cases, only one interview was conducted due to respondents' unavailability. This was due to COVID-19-related complications, funeral attendance, or other commitments that led to withdrawal from the study.

Table 2: Additional respondents to gain intermediaries' perspectives

Interviewees	Gender	Site	Date Interviewed
Cooperative 1	Male	Matangari	26-06-2021
Cooperative 2	Male	Matangari	26-06-2021
Cooperative 3	Male	Matangari	26-06-2021
Founder 1	Female	Ga-Mphahlele	28-05-2020 18-10-2020
Founder 2	Female	Cape Town	14-04-2020
Extension Officer	Male	Thohoyandou	28-06-2021

3.6. Data Analysis

I embraced Eisenhardt's (1989) approach of overlapping data analysis and data collection to interpret the data during the initial stage of my research process. Initially, I employed the within-case analysis method to delve deeply into each case and extract detailed insights. This approach proved invaluable in managing the extensive volume of data (Eisenhardt, 1989). Additionally, I compiled case

reports to fully immerse myself in each case, enabling the identification of specific patterns before transitioning to the cross-case analysis method. These case reports typically ranged from four to ten pages in length.

Subsequently, I utilised the cross-case analysis method to compare the cases, identifying similarities and differences among them. This approach facilitated the identification of overarching themes that transcended individual cases, thus enabling the formulation of generalizations. By employing a combination of within-case and cross-case analysis methods, I attained an in-depth knowledge of the phenomenon being investigated. This approach allowed for the elucidation of specific themes within each case, as well as the identification of broader categories that manifested across multiple cases.

Moreover, I employed inductive coding, endeavouring to utilise respondents' words or phrases whenever possible (Gioia et al., 2013; Strauss & Corbin, 1998). Initially, I coded the data using NVivo 12 and Excel spreadsheets. During the coding process, I adhered to the notion that everything might be relevant and coded as extensively as possible (Yin, 1981). The first cycle of coding generated 39 codes. To provide a closer examination of the themes generated within and across my cases, I employed Excel to create graphical representations of the codes (Yin, 1981). Figure 3 illustrates all the themes generated during the coding process.

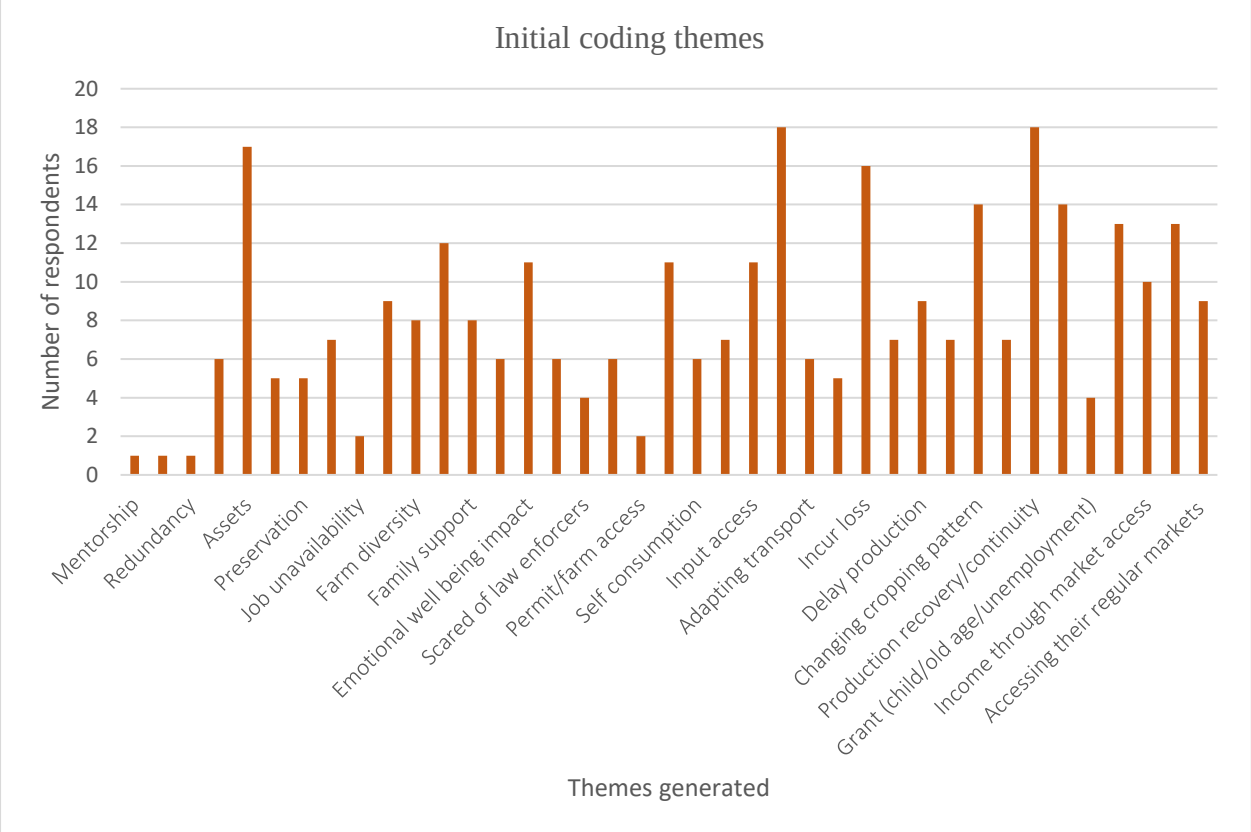

Figure 3: Themes generated during the first coding

Furthermore, I identified similarities within the themes and organized them into 29 categories (Patton, 2015). These categories underwent further analysis to determine which themes held greater significance and provided deeper insights. This process resulted in the refinement of the categories to 16, as detailed in Table 3.

Table 3: 16 categories of refined themes

16 Categories
Multiple market channel
Diversity (crop variety, crop-livestock)
Money savings
Social grant
New/existing businesses
Adapting transport
Changing crop pattern
Additional income
Assets acquired
Growing or turning damaged crops for animal feed
Self-consumption
Family support or social capital
Off seasons
Social media
Preservation
Making own seedlings

Finally, due to the large number of categories generated, I further scrutinized these themes and identified six overarching themes, as detailed in Figure 4. This was accomplished by identifying similarities within the existing themes, and generating new categories while retaining some old ones. Additionally, a review of the literature helped identify frequently mentioned themes by scholars. The themes extensively covered in the literature were removed from the list to focus on those less cited and contribute to the existing body of literature. These six overarching themes serve as the structural backbone for the discussion in the findings section.

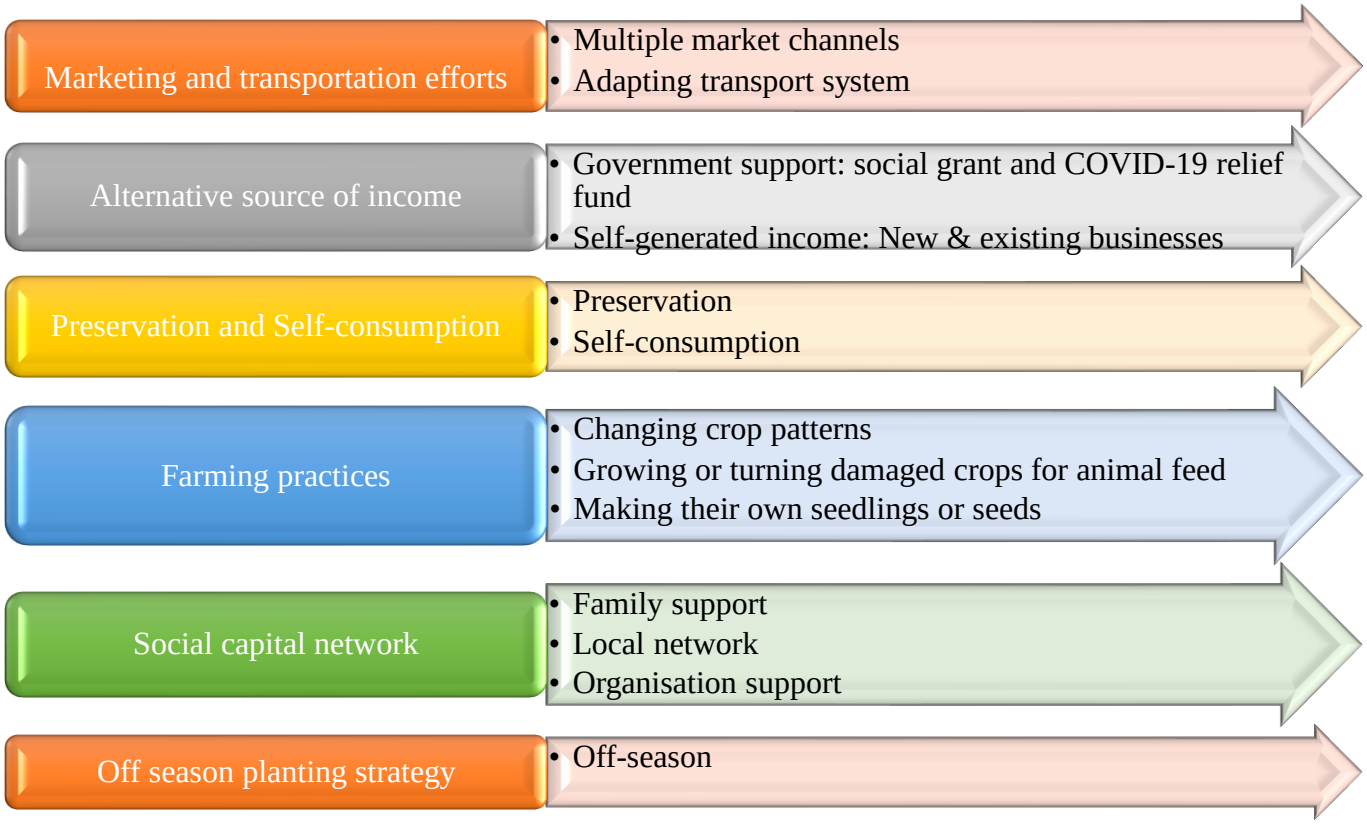

Figure 4: Six overarching themes

3.7. Research Ethics

As I was connected to respondent farmers through extension officers and NGOs, and because I approached farmers during a crisis, some respondents might associate me with government or aid organisations. This perceived association created an expectation before interviews. I addressed these expectations during the introduction process, explaining that I am a University of Cape Town (UCT) student and unaffiliated with the government or other organisations. Further, the university requires a signed consent form before the interviews, but to ensure inclusivity and minimise coronavirus spread, I read the consent form and requested verbal permission, which was recorded. I explained that the participation was voluntary and uncompensated, and withdrawal was possible at any point.

To foster inclusivity and adhere to COVID-19 safety measures, I translated the consent form into Tshivenda and Xitsonga languages where necessary. No participants were paid, but, in some cases, I bought produce from the farmers as a gesture of appreciation. I requested permission to record the interviews and assured participants of the anonymity and confidentiality of the gathered information. Recorded information was kept on my password-protected laptop. Participants' identities are known only to me and my supervisor. Lacking agriculture industry experience or knowledge prevented me from influencing respondent narratives. Interviews were conducted respectfully and transparently,

adhering to the university's ethical code and guidelines. In addition, all interviews were conducted after receiving ethical clearance from the UCT ethics committee, upholding the research integrity.

Chapter 4: Findings

4.0 Introduction

This chapter outlines the factors and mechanisms influencing farmers' resilience, elaborating on the six identified overarching themes. Furthermore, it provides an assessment of individual cases against each factor to ascertain the relative degrees of resilience.

4.1. Factors and Mechanisms Influencing Resilience

To answer the research question, several factors were identified, as depicted in Figure 5: This figure also delineates the mechanisms by which these factors influence farmers' resilience. Furthermore, each farmer was assessed against these factors to ascertain how their presence or absence diminishes or enhances resilience, as detailed in Section 4.7. Subsequent sections delve into the six overarching themes introduced in Section 3.6.

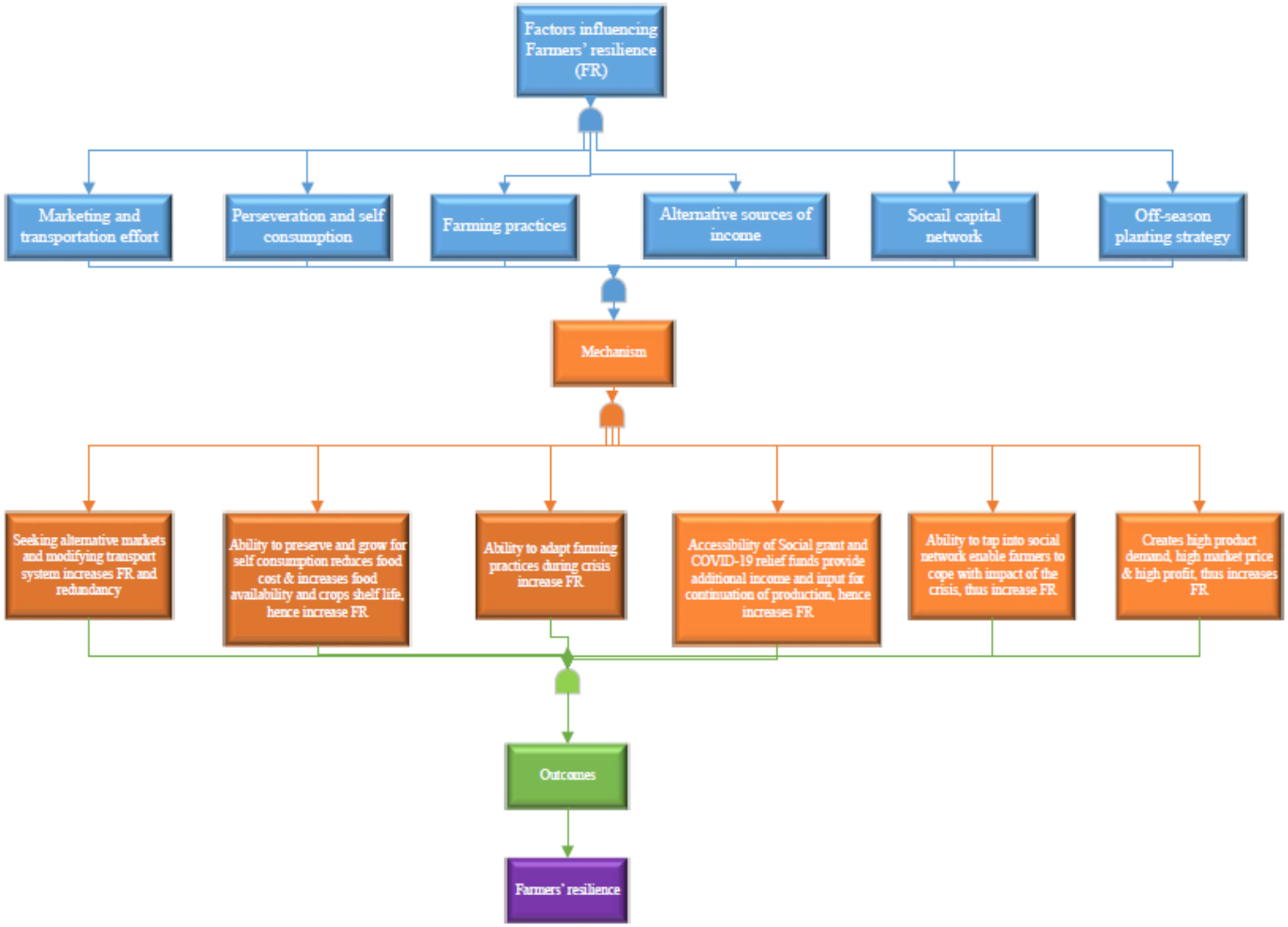

Figure 5: Factors and Mechanisms Shaping Resilience

4.2. Marketing and Transportation Efforts

Before the lockdown, most farmers (15 out of 19) participated in multiple market channels. However, the closure of various markets, including restaurants, hotels, school feeding schemes, and hawkers left them vulnerable due to loss of income, as most respondents primarily operated within these channels. *Note: two farmers only started farming during the lockdown*. Some respondents could not access their market channels completely, while others access them at a reduced capacity, such as those supplying municipal markets (Tshwane, Polokwane, Johannesburg fresh produce) and retailers.

As a result, most respondents (17 out of 21) sought alternative market channels during the hard lockdown period, encompassing levels 5 to 3 (March to June 2020). These alternative market channels were predominately locally based, with some newly established. New markets were initiated independently by "Opportunist Street Vendors or Traders" or facilitated by an intermediary. However, these newly formed markets had a short lifespan, lasting until the beginning of level 3 (June 2020). This was primarily due to "Opportunist Street Vendors" returning to work during level 3 and diminishing Foodflow donor funds, limiting the number of farmers being supported by this initiative.

The "Opportunist Street Vendors or Traders" are people who were not engaged in trading before the lockdown, but started trading during the lockdown because they saw an opportunity and took advantage of it. These are people with jobs classified as non-essential workers according to lockdown regulations (Minister of Cooperative Governance and Traditional Affairs, 2020).

The evidence shows that 5 out of 17 farmers participated in this newly formed market initiated by "Opportunist Street Vendors", generating income that enabled them to sustain production and livelihood, thus increasing resilience. Income levels vary amongst participants, with some making huge profits while others saw comparatively less profit. Notably, this market channel diminished at the beginning of level 3 as non-essential workers returned to work. Below are some examples mentioned by Farmer 11 and 8.

> "People were at home during the lockdown, they were forced to come to me for veggies. It was a different year when it comes to vegetables. They bought a lot. I had no challenges when it comes to vegetables. I used to sell all of it in one day then I closed it. I used to sell it every second Thursday. I sold both spinach and mustard on the same day, and they both got finished. There were not only Muswanas people who were buying from me but also people from Dumela, Mavhambe to Malamulele. There were lots of people and cars here. That's why I was able to sell everything in one day and get finished." [Farmer 11]

> "…I asked myself a question, with these vegetables, where the customers are going to come from? But people started coming to the farm. People from Mussina came with the bakkies. They were coming in numbers. ...these guys were coming and buying and selling on the streets

like they were hooting on the streets. Every morning there were queues of bakkies on the farm, for those vegetables. Those were new customers; I never had those customers before. It was for that period. Even, they saw an opportunity because most of them have bakkies, just sitting at home. They thought of doing something like going to the farms to get those vegetables like everyone was locked in the house. Those ones were not the regular hawkers. They were taking advantage of the situation. They were like my Messiah. During those days, you could see that God was good. It was a new market." [Farmer 8]

Furthermore, 4 out of 17 respondent farmers were directly linked to the alternative market by an intermediary called Foodflow. Foodflow sourced food directly from farmers and channelled it to local NGOs, such as Ga-Mphahlele Homecoming. These four farmers reported that they were not impacted by the lockdown because they were able to generate income to sustain both their livelihood and production as noted by Farmer 14 below. Furthermore, one of the farmers indirectly accessed this market through a friend, which enabled him to generate some income, albeit not as substantial as the other four farmers. Despite this, the farmer managed to sustain his livelihood and production. It is worth noting that the intermediary, Foodflow, reduced the number of supported farmers due to decreased donations. As a result, these four farmers were supported for only six weeks during April and May 2020.

"Foodflow became an angel for us. In terms of people not losing their jobs and not going hungry. As a farmer, my produce didn't go to waste. Farmers were able to keep their jobs because they didn't have anywhere to supply their food. Because of Foodflow, I was able to continue running the farm and sustain it. They came at the right time to rescue the business… we needed to outsource and make a variety of other things…That's where we made our cash from." [Farmer 14]

On the contrary, some respondent farmers (8 out of 17) opted for seeking alternative markets within the pre-existing market channels or maintained their participation in the existing market channels, such as supermarkets, municipal markets, or selling to hawkers. Farmers' ability to access the markets enabled them to generate income from various market channels and sustain both their livelihood and production, thus increasing their resilience. Examples as mentioned by Farmer 6 and 16.

"I walked, there are existing markets in Madimo [streets market]. I got there and told them that I have spanspek at the farm, if you want it, you can come and buy it. Then, people came and bought them. What I have learnt is that don't trust that you will take your produce to the market [municipal market in JHB] only. You must have plan B where you can plant things and sell them here locally. Because trusting the market [JHB Fresh produce], can make you lose." [Farmer 6]

> "…the business was sharp [ok] at the start [of lockdown] because most of the people were at home and were supposed to eat. When the bakkie left the farm with the vegetables and made rounds around the village, the vegetables were brought. ... we did deliver to the supermarkets. When I started selling mustards, the first week I opened, I made R18000 per week." [Farmer 15]

In addition to exploring alternative markets, some farmers (7 out of 21) also adapted their transport system in response to the changing conditions. This adaptation involved various strategies such as hiring passing vehicles to deliver products to the localised market as people could not access the farm, changing the delivery schedule to meet the new demand and reduce the cost of transport, transitioning from using own bakkie to hiring trucks to increase the quantities supplied and reach more markets, and borrowing a vehicle to supply newly formed market, as noted by Farmer 16, 3 and 12. The ability of the farmers to adapt their transport system enables them to access the market and sell their products, thus increasing their resilience.

> "I do drive my stuff. I was hiring a truck. So, every 2 weeks we are going there [Tshwane fresh produce market]. Because I don't have my truck the trailer was too small and the quantity that they wanted was too much. So, we have to hire a truck. This was during the COVID-19 [lockdown]." [Farmer 16]

> "...being a farmer if you don't have transport, it becomes harder for you. During the lockdown period, I went to a friend of mine and borrowed his car. At the time I was supplying Foodflow, I was using my friend's car." [Farmer 3]

> "I deliver myself. Once a week, on Fridays over this side [Thohoyandou], and down there [Nwanedi], now and again. When it [lockdown] came, we were having chickens. How do you deliver them? That was not so easy. I was delivering. Is just that delivering is my problem. Sometimes when I was slaughtering [chickens] for people. Maybe I would take 2 days to deliver. When the order was too big during that time, I used to make it half /half. Not do a lot of them at once. For example, they ordered 35 chickens for this particular order, so I checked the route, this one is for Mutale, Thohoyandou, and others Niani. So, I will start first with the Niani people because they are close." [Farmer 12]

Conversely, 4 out of 21 respondent farmers exclusively operated within a single market and did not seek alternating markets. Additionally, 14 out of 21 did not modify their transport system, limiting their adaptive capacity and diminishing their resilience. Several reasons accounted for this decision are:

- Customers continued to visit the farms with their own transport, eliminating the need for the farmers to adjust their transport system.

- Hiring transport or delivering small quantities was deemed expensive, making it financially unfeasible for the farmers to adopt this strategy.
- Some products, such as eggplants and chillies, are either not consumed locally or consumed in small quantities, leading farmers to rely on municipal markets in JHB or Tshwane, preventing them from seeking alternative markets locally.
- Residing in an area like Matangari, where a significant portion of the village population participates in farming, reduces the opportunity to sell the produce within the village, as the farmer relies on the customers coming directly to the farm. Below are some supporting evidence cited by Farmer 18 and 9.

  "The challenge was our products were not what local people could use like tomatoes, butternuts. We rely only on the market [municipal market in JHB]. Chillies, they don't buy locally you take them to the market [municipal market in JHB] because we had planted a lot of them." [Farmer 18]

  "In the past, we were able to boast because we planted tomatoes, the cars used to come and take everything. For me without a car, I have to look for your car, you charge R300, R400 and go and sell those sweet potatoes and come back and give you R400, what am I left with, nothing? It is better to bury it and my heart gets over it." [Farmer 9]

4.3. Preservation and Self-consumption

The market closures resulted in some farmers incurring a loss as they were unable to sell most of their produce. To minimise losses caused by market closures, some respondents (5 out of 21) decided to dry their crops to increase shelf life. Dried crops were used for self-consumption, selling on the new market, or animal feed. This strategy was observed predominantly with specific crops like mustard, maize, or beans, while other crops such as tomatoes were left in the field to rot without being dried. The decision to dry specific crops may be attributed to indigenous knowledge passed down through generations, where these specific crops have historically been dried by villagers for many generations, requiring minimal effort compared to crops like tomatoes. This knowledge influenced their choice to preserve certain crops over others. The farmer's ability to preserve crops demonstrates their adaptive capacity during the crisis and thus enhances their resilience. Some examples supporting this are:

"What I did is if they [chillies] are too red because at the market, they prefer green. There is another old man who grinds them for me, and then I put them in a small container of atchar and sell them for R15. Those who cook food [hawkers], want it for their customers. Unlike is too red and throw it away." [Farmer 12]

> "We are not in the business of selling dry leafy vegetables, we sell fresh ones. There is [market for dried leafy vegetables], but we don't have customers. If someone is looking for dried leafy vegetables, I will sell them in the bucket." [Farmer 9]

Moreover, the inability to sell their produce resulted in an income reduction for farmers, impacting their livelihood. This resulted in some respondents experiencing difficulties sourcing food in their households. Subsequently, some farmers (6 out of 21) responded by either growing crops for self-consumption or relying on existing crops to alleviate the impact of the lockdown. This strategy increased food availability within their household and reduced the overall cost of food, thus increasing their resilience. It is noteworthy that the decision to plant for self-consumption typically occurred around 6 to 9 months (between September and December 2020) into the lockdown period in South Africa, rather than an immediate response (within 2 to 4 months). This delay could be attributed to some farmers initially relying on savings or income generated during the earlier phases of the lockdown, which gradually diminished as the lockdown prolonged. Some examples are:

> "I planted maize in September [2020] ...not sell maize, it was not that much because were planted in between the watermelons. I managed to harvest 4 bags [80 kg] of maize. I didn't sell them, I decided to use them to make maize meal [feeding the household]." [Farmer 2]

> "I planted maize in November [2020] because I harvested around January and February [2021] …. when I planted maize, I wanted to make maize meal so that I can be able to eat at home. I planted on 2ha. I managed to have enough harvest even now [24 September 2021] I am still eating maize meal from it."[Farmer 19]

> "Now [Sep 2020] we planted maize... and if is not selling we can eat it ourselves, we make maize meal and eat.…is to feed me, because there is no one who can come a give me the bag of maize meal." [Farmer 9]

On the contrary, most respondent farmers (16 out of 21) did not engage in preserving or self-consuming their crops, despite some facing challenges such as low income and difficulties sourcing adequate food. Although this was the case, some farmers considered preserving their crops as an option. However, they ultimately chose not to pursue it due to various reasons. These included not regarding preserving as a viable solution for their businesses, citing factors such as insufficient resources and time required for drying crops like tomatoes and chillies, the absence of a market for preserved products, and lower prices for dried products compared to fresh ones. Additionally, some farmers also opted to feed surplus crops to their animals instead of preserving them.

Among these farmers, some (6 out of 16) did not have surplus crops to preserve because they either sold everything at the beginning of the lockdown or began harvesting post the hard lockdown period, enabling them to access the markets. Below are quotes from Farmer 1, 2, and 4:

> "Somebody told me to dry those chillies, once they are dried and red, the value goes down. The thing is, if I try to produce those things [drying chillies], still I see there will be lots and lots of work for me, in the end, is not going to pay much." [Farmer 1]

> "… we don't have the machine to dry them. There is nothing we do this side on the tomatoes; we don't dry tomatoes." [Farmer 2]

> "…is not that easy [drying], with these 6 workers, the production is to harvest tomatoes, sell them and get money, when we start getting involved in drying, with those people it will take us 3 to 4 days drying the tomatoes without money coming in. When month end comes, we are still drying, and the process of marketing and so on." [Farmer 4]

Similarly, the self-consumption strategy was not widely adopted by most respondent farmers (15 out of 21). The non-adoption of this strategy is attributed to various factors, including some farmers not being the sole providers at home as they resided with their parents, generated income from other business ventures, having spouses who contribute to household provisions, are employed, or managed to profit during the lockdown, thus sustaining their livelihoods. Below are some of the examples mentioned by respondents:

> "My father is a pensioner. He was doing everything when I was staying with him. Actually, when I was staying at my father's house, I was not contributing at all." [Famer 1]

> "I was just staying at home. There is Mom and Dad at home. They both support [buy food] at home." [Farmer 17]

4.4. Farming Practices

In response to the impact of the lockdown, respondent farmers adopted various strategies, including:

- Changing crop patterns: farmers adjusted their crop selection to adjust to changing market demands or to better withstand adverse conditions.
- Growing or repurposing damaged crops for animal feed: instead of discarding damaged crops, farmers utilised them as feed for their livestock, minimising waste and reducing input costs.
- Making their seedlings or seeds: some farmers took the initiative to produce their own seedlings or seeds, reducing input costs and ensuring continuity of production.

These strategies exemplify the farmers' resilience and their capacity for innovation during the crisis.

During the assessment period, the respondent farmers experienced double shocks; first, the lockdown due to the COVID-19 pandemic, and second, heavy rainfall in December 2020 and January, and February 2021. These shocks resulted in significant losses for the farmers, which in turn impacted their production and livelihood. Consequently, the respondent farmers sought alternative ways to cope with the impact of these shocks. Some respondents (10 out of 21) opted to change their cropping patterns as a mitigation strategy. They introduced new crops in response to either the lockdown, the heavy rainfall, or both, aiming to adapt to the changing circumstances and minimise the impact on production activities.

The introduction of new crops by respondent farmers served various strategic purposes. Firstly, these new crops were selected for their low maintenance requirements and tolerance to diseases. Secondly, some farmers introduced these new crops as supplements to their existing crops, aiming to diversify production output and minimise the impact of relying solely on a single crop. Additionally, in some instances, a farmer introduced a crop with a longer life span compared to the previous crop due to the uncertainty of the lockdown. The farmers' ability to adapt their cropping system in response to the changing environment, whether influenced by lockdown, rainfall, or both, enabled them to sustain their production levels and increase their resilience against adverse conditions. The examples below provide supporting evidence:

> "Level 4 we started planting tomatoes. Tomatoes take 3 months. But the one I planted because they have types, mine took 4 months. They got ripe at level 2. It helped me because I was able to get customers. I didn't struggle to get customers. Because we were at the level where people were able to move around. It was better because we were able to sell. It helped a lot to plant tomato late." [Farmer 6]

> "For me, it [lockdown] was just time to harvest, I was just anxious because I have the field filled with butternuts, ..., I was afraid this is going to waste and there is a lot of them. That's when I went the most out of trying other vegetables, spinach, and tomatoes. A small portion of potatoes." [Farmer 14]

> "…the decision was taken was you better reduce so that you will be left with the crop that you will be able to manage.... like what we are doing now. We are going to a crop that doesn't require more maintenance. Onion (tube), does not have a lot of pest problems. It does not require manure regularly. Now onion, all it needs is water, but you can put some bags of manure if you have money. In our case, because we don't have money now, we just water them, whenever you find one bag of manure then you will put it in so that it can become bigger. Is better because it doesn't have a lot of maintenance and weeding also… in fact, we have just started planting now [Sept 2020]" [Farmer 18]

Furthermore, 4 out of 21 respondent farmers also changed their cropping patterns. However, unlike others, their motivations were not primarily driven by the COVID-19 crisis, as they were not severely impacted by the lockdown. Instead, these changes were driven by business needs. Examples include securing a new market, getting funding for potato production, receiving seeds, and manure from the government, or receiving advisory support from extension officers. Although these changes were not directly motivated by the COVID-19 crisis, they nonetheless contributed towards making their farming business more profitable. This improvement in business profitability consequently enhances farmers' resilience and strengthens their capacity to withstand future challenges. This is evident, as noted by Farmers 7 and 10.

> "I have a client now who wants 10000 cabbages a month, so when I compared okra and cabbages, cabbages will be more profitable than okra." [Farmer 7]

> "Currently, I am farming citrus fruits, …I want to remove them and move into potatoes because the area I am working on is a potato bed. I got the funding which indicates which products I can produce. I liked potatoes before, but the problem is that the infrastructure is very expensive." [Farmer 10]

Similarly, some farmers (4 out of 21) responded by either growing or repurposing damaged crops for animal feed to minimise losses and reduce input costs. However, the implementation of this strategy varied among those who adopted it. For instance, one farmer responded to the shortage of animal feed by growing maize specifically to feed the cattle, despite not previously growing crops and primarily focusing on livestock production before the lockdown. Another farmer secured a new market that supplied specific family members identified by the NGO. Due to the complexity of packaging for the family without knowing how many members per family and the pricing thereof, a farmer decided to dry maize and feed the goats during the dry season. Meanwhile, as the crops were overgrown due to a lack of customers, other farmers either cut or uprooted them depending on the type of crops (leafy or root vegetables) and fed the animals daily until the production was finished. The ability of the farmers to adopt this strategy has minimised loss and reduced the input cost, demonstrating their adaptability and increasing resilience. The examples below provide supporting evidence.

> "My reason for planting maize was I wanted stalks because animal feed is difficult to find now…. I sold corn, and after that, I got stalks and grind them and made cattle feed. That's what I realised that it helped me to cut a lot of expenses because the stalk didn't go to waste." [Farmer 21]

> "That time [level 5], there was maize on that side, … I realized at that time was if I supply maize [cobs], the problem was how much I am going to charge it, I couldn't supply it for C-19 [new market] that time. Likely because I have these goats, then we ate some and we harvested then we dried them. Now [September 2020] because is dry for grazing, then every day we feed

them [goats]. What happened, 3/4 of those carrots could not ...because the Foodflow supply stopped. We just took them out and gave them to the pigs." [Farmer 3]

"I started reducing mustards, I cut it out and gave it to the animals. I have pigs, goats, and rabbits." [Farmer 11]

Since the farmers' income was impacted by the market closure and adverse weather conditions, some respondents (6 out of 21) started making their own seedlings or seeds to reduce input costs and sustain production. One of the six farmers ventured into the seedling supply business, initially for her own farm production and later for local farmers as well. Additionally, one respondent farmer saved harvested seeds that could not be sold due to market closures, deciding to replant them in the next production cycle. The farmers' ability to reduce input costs by making their own seedlings or keeping seeds for the next production enabled them to sustain production and thus enhance their resilience. The examples below provide supporting evidence.

"That's why I am saying we put maize seeds on the ground, there are seedlings for nightshade (muxe) that need to be planted. 'Muxe' we looked at that, why we are doing seedlings on our own because is cheaper and we can do it. Because we don't have money anymore." [Farmer 4]

"If peanuts are not finished, as I will sell and leave some for seeds, I will crack open the nuts again, and go and plant again. No one bought them [beans]. I will take them and re-plant them as seeds because people are not buying them. So, if no one comes, I will take the same seeds and plant them." [Farmer 9]

On the other hand, some respondent farmers did not adopt either changing crop patterns, growing for animal feed, or making their own seedlings strategy. Some reasons include not being impacted by the lockdown, introducing poultry instead of new crops to diversify the business, running production for a cycle due to financial constraints, not having livestock, repurposing damaged crops for manure, and not having excess crops as they managed to sell all their crops. Additionally, while most farmers did not make their own seedlings, 10 out of 16 reported buying or receiving seeds from sponsors for their crops. This practice is also influenced by the type of crops being cultivated, as certain crops such as butternuts, maize, beans, okra, etc., are traditionally sown directly on the soil without needing seedlings. Furthermore, only a few farmers continued growing the same crops or sourcing seedlings (4 and 6 out of 21 respectively) as before the lockdown, even though some were severely impacted and had to borrow money to sustain production. This limited their adaptive capacity and diminished their resilience. Below are some quotes by Famer 1,10 and 17.

"Early this year [2021], I started poultry. At the moment [June 2021], there are 300 chickens there. So still, I am doing great. I am new to that industry. But from those 300 chicks, mortality was only 7, so at least. I started selling the first week of May [2021] was my first batch, and I

sold all of them. There are these things about chickens what I learnt about these is that businesses must support each other. Let's say I am selling tomatoes, and the market is huge, or tomatoes take 3 months, I will be surviving with chicken." [Farmer 1]

"At the time [level 5-March-April 2020] I only had maize. I didn't have a problem myself, I sold everything". [Farmer 10]

"I borrowed money from one of my cousins. I went and bought seedlings for chillies and green peppers so that I can plant them again." [Farmer 17]

4.5. Alternative Sources of Income

The impact of the lockdown necessitated farmers having various income sources to cope with market shocks. Respondent farmers relied on two income categories: government support through social grants and COVID-19 relief funds, and self-generated income from other sources.

4.5.1 Government Support: Social Grant and COVID-19 Relief Fund

The evidence shows that a limited number (4 out of 21) of respondent farmers relied on social grants to sustain their livelihood and production, enhancing their resilience. Furthermore, the government increased social grants to provide relief to households most impacted by the lockdown, including respondent farmers. Although the social grant (child) increase was small (R500), it provided much-needed relief to respondent farmers who relied on it to cope with the dynamic of the lockdown. Some examples of grant beneficiaries are listed below:

. "I have 3 kids. I have to take grant money so that I can be able to buy seedlings so that I can be able to plant. So, there is no other income I get except a grant. Is the one [grant] I am able to survive with." [Farmer 19]

"…. I live from grant money. But I take grant money and buy chemicals and so on. …Is the one that provides food for me, even now [September 2020], because the maize I have planted has not yet ripe, I haven't harvested." [Farmer 9]

In addition, the government set aside COVID-19 relief funds to assist farmers in dealing with the impact of the lockdown and ensuring continuity of production during this period. The evidence shows that 7 out of 21 respondent farmers were beneficiaries of the COVID-19 relief funds. The relief fund enabled farmers to reduce input costs and sustain production, enhancing their resilience.

Conversely, most respondent farmers were not beneficiaries of the social grants (17 out of 21) or COVID-19 relief funds (14 out of 21) because they did not meet the government of South Africa's criteria. Some reasons for disqualification include being government employees, retired professionals, not having dependent children or having children older than 18 years, being younger than 60 years,

having an approved application but being informed of funds depletion, having a rejected application, not applying due to lack of documentation, or being unaware of the application process. Below are some of the quotes by Farmers 7, 13 and 21:

> "I don't qualify because I work for the government." [Farmer 7]

> "I applied and I was approved and at a later stage, I was told there is no money anymore." [Farmer 13]

> "I am turning 60 years from 15 June 2020. Is just that I don't qualify for a grant. I don't qualify because of my husband. He was working. They are very strict with a grant. If a person was working and not earning less than R5000 does not qualify to get a grant. Because I am married, if I was not married." [Farmer 21]

4.5.2. Self-Generated Income from Other Sources

Since some respondents were not beneficiaries of social grants (17) and COVID-19 relief funds (14), they relied on other income sources generated through various means. In some cases, farmers sought innovative ways or adapted existing systems to generate additional income during the crisis. Conversely, others relied on pre-existing income streams established before the crisis.

For instance, some farmers used existing farm assets to derive additional income such as a bakkie to transport school kids and deliver wood to surrounding villages or using a tractor to plough fields for neighbouring farmers, or started selling water to villagers. In some cases, some farmers (4 out of 18) responded to the lockdown's impact by starting new businesses to compensate for their farm business. Meanwhile, other farmers (6 out of 18) relied on existing businesses for an extra income source. Additionally, some farmers relied on alternative income sources such as salaries, pensions, rentals, or income generated by family members. The ability to create multiple income streams or access various income sources enabled farmers to sustain their livelihood and production, thus increasing their resilience. Below are some quotes by Farmers 5, 6 and 17:

> "What helped me is that I have a house in Gauteng, I built a double storehouse, and there are people renting. When the lockdown started, they also didn't have money to pay me, but they were able to pay half. The rental is R14000/month." [Farmer 5]

> "The tractor boosted me. I went and plough for people… the same tractor goes out and works on others' farms. It [tractor money] is the one that enables me to get some food to eat." [Farmer 6]

> "Month end of April [2020] people started to go back to school and so on. I also transported school kids after that I come back to the farm" [Farmer 17]

For those businesses that started in the lockdown, these are some of the reasons cited by responded farmers:

> "I was not farming, I was doing this thing of selling, selling sweet potatoes …. started selling sweet potatoes in November [2020]. I am surviving from selling sweet potatoes. I even took sweet potato money and bought seedlings. I bought two, the other I borrowed/loaned, so I will be able to buy other stuff so that it can be all good." [Farmer 19]

> "I opened it [street market business] in January [2021] so that when the other side [farm business] is difficult, you should be doing something. This market [business]will balance this side [household] when I start planting, I will be pushing the production from the income from the street market [business]. When I start planting, this [street market business] will back up the farm production." [Farmer 2]

Whereas the remaining farmers (3 out of 21) did not have alternative ways to generate additional income other than their farm business. This constraint limited their adaptive capacity to respond to the impact of the adverse shock and thus diminished their resilience. Although this was the case, these farmers were able to generate sufficient income, especially at the beginning of the lockdown, enabling them to sustain their livelihood and production throughout the assessment period.

4.6. Social Capital Network

The ability to adapt to changing conditions is deemed an important tool to enhance farmers' resilience. The evidence shows that 16 out of 21 respondent farmers relied on family members, friends, local networks, or organisations for support in coping with the lockdown's impact. Respondent farmers used various forms of social capital to gain support. This included family members providing food to alleviate shortages in the household. Additionally, some farmers (3 out of 16) enhanced their skills and knowledge capacity through social capital provided by mentors or fellow farmers. For example, one farmer wanted to grow maize to respond to an animal feed shortage but lacked crop production skills and knowledge. This farmer relied on one of the farmers in her social capital network for learning and skill development, thus enhancing her adaptive capacity. In some instances, farmers received financial support from families for production purposes and sustaining their production. Moreover, 9 out of 16 respondent farmers connected to newly formed markets through their social capital network and generating income. These markets were facilitated by NGOs, intermediaries or local communities. The ability of the farmers to drew from their social capital network enabled them to adapt to changing conditions and enhancing their resilience. This is evident as noted by Farmers 17,6, 8 and 21.

> "I was just staying at home. There are Mom and Dad at home. They both support [buying food] at home. The bakkie is not mine, is my brother's. I used it, for school kids and the farm" [Farmer 17]

"…people came and bought them [spanspek]**.** They also told each other at the market and came and bought them." [Farmer 6]

"I didn't call anyone. Those who came and bought and sold the vegetables, people asked them where they found the vegetables and told them they found them in Nwanedi. When they come to Nwanedi, they find Farmer 8 is the one who has the vegetables." [Farmer 8]

"Like maize, I didn't know that I was supposed to spray them with chemicals. So, Maswanganyi helped a lot. That man knows that when they come out [germinate], we spray them, what to do when we plant. He supported me ... If Maswanganyi was not there, it was not going to work." [Farmer 21]

Besides social capital enhancing the adaptive capacity of the farmers during the adverse shock, 5 out of 21 respondent farmers did not rely on this strategy to increase their resilience. Instead, these farmers relied on other income sources such as grants, other businesses, and salaries to cope with the lockdown's impact.

4.6. Off-Season Planting Strategy

Harvesting off seasons creates high product demand in markets, increasing business profitability and thus enhancing farmers' resilience. Some farmers implemented the off-season planting strategy to benefit from high market prices and demand. Although some farmers adopted this strategy before the lockdown, they continued implementing it despite the uncertainty of the lockdown. The evidence shows that those farmers (7 out of 21) with products ready during the off-season period (whether planted before or during lockdown) generated sufficient income despite market closures or lockdown restrictions. For example, one respondent harvesting in the off-season period could not access his usual markets like hawkers and school feeding schemes, especially at the beginning of the lockdown (level 5). However, as soon as the lockdown changed from level 5 to 4, the farmer sold all his products in two weeks due to the high demand created by adopting an off-season planting strategy. Others who adopted this strategy accessed the market on levels 5 and 4, and generated sufficient income.

Furthermore, the lockdown's duration impacted the off-season period, creating a phenomenon I called the "mushrooming of home gardens" in local communities. This phenomenon diminished the markets farmers relied on, particularly at the height of the lockdown, as many people stayed at home and started growing vegetables in their gardens to keep busy, resulting in low sales. Despite this challenge, those farmers with products ready before the "mushrooming of home gardens" coped better with its effects than their counterparts because they had generated sufficient before this phenomenon occurred. Notably, the "mushrooming of home gardens" lasted a relatively short period, from April to June 2020 during levels 5 to 3 of the lockdown, as most people returned to work and lockdown regulations became less stringent. The examples below provide supporting evidence.

"Level 5, I had not started planting because it was the end of March [2020]. My cycle that I use in farming, is the off-season….my life cycle is opposite from the other. …the business was sharp [ok] at the start because most people were at home and were supposed to eat. When the bakkie left the farm with the vegetables and made rounds around the village, the vegetables were brought. At the beginning of the lockdown, most people didn't plant anything, it was an advantage for us. When I started selling mustard, the first week I opened I made R18000 per week." [Farmer 15].

"I managed to... even during the lockdown, I managed to sell all my stuff. Those ones [cabbages]were bought all of them. I think in 2 weeks they were finished. By hawkers, ... because there were no cabbages around here. So, they bought all of them. Even these people of feeding schemes, I think school kids were starting to go back, grade 12s and grade what, what [grade 8]."

"….my specialty is cabbage and during winter month the market is flooded with cabbage. So, I don't plant, I start planting in October to February, … Because I know that people won't manage to maintain it." [Farmer 7]

"We were selling mustards [before lockdown]. It was selling well, fortunately, during that time, there were no mustards in the market. It means I was the only one who had the market." [Farmer 4]

Planting off-season not only creates the potential for high demand and prices but also entails risks and demands specific skills for effective implementation. Despite being aware of this strategy, 14 out of 21 respondent farmers did not adopt it. This is attributed to: some cultivated products with longer production lifespans, like chillies, and eggplants. Additionally, certain crops do not thrive in winter or hot months, requiring farmers to possess certain skills and be willing to take risks in case of crop failure. The combination of these factors constrained these farmers from adopting this strategy, both before and during the lockdown. This is evident as noted by Famers 5 and 3.

"From September [2020] it was right, let's say from last year [2020] things were better. This year [2021] the harvest was not good because of the cold. At the time when the price was high, there was nothing. I was not producing anything. But now [September 2021], I am producing a lot, but the price has dropped." [Farmer 5]

"Unfortunately, in 2017, I planted cabbages and what happened there was a storm, hail. It destroyed everything, I cried, and I was like, it was a lesson. The mistake I made at the time my schedule for planting cabbage was not right. In my mind, I was targeting for the December market. It was around this time [September]. Then it happened that it was bad timing and it destroyed everything. I cried and I picked up again." [Farmer 3]

4.7. Assessment of Relative Degree of Resilience

Following the identification of factors influencing farmers' resilience as described in Section 4.1. I proceeded to assess each farmer against these resilience attributes or factors to determine how their presence or absence contributed to enhancing or diminishing resilience. The assessment focused on the building block of resilience encompassing robustness, adaptation, and transformation (Bujones et al., 2013; M. P. Meuwissen, Feindt, et al., 2019). These three elements are defined as follows:

- Absorption or robustness: This refers to the capacity of farmers or farming systems to cope with market shocks and external stresses and sustain production and livelihood in the long run.
- Adaptive capacity: This denotes the ability of farmers to respond or adapt to changing conditions to minimise the impact of the shock.
- Transformation: This represents the ability of farmers to innovate and create solutions to improve production and market access in the long run (Peter & Swilling, 2014; Walker et al., 2004).

The assessment revealed that farmers employed various strategies to cope with the COVID-19 crisis. A key theme was the search for alternative markets to sell their produce. Farmers also relied on alternative income sources, whether self-generated (existing or new businesses) or government-support (social grants or COVID-19 relief funds). As the lockdown's impact varied across respondent farmers, they adopted a range of strategies, including preservation, self-consumption, altering transportation systems, changing crop patterns, and engaging in off-season planting. While the study identified several factors influencing resilience, not all factors were applicable to every farmer. For instance, some farmers did not qualify for social grants or COVID-19 relief funds, while others used alternative factors to enhance their resilience or mitigate the impact of the crisis.

To assess the overall impact of the crisis on livelihoods and production, and to determine the level of resilience among respondents, a comprehensive analysis was conducted. The findings revealed varying levels of resilience, with some farmers demonstrating greater resilience than others, as detailed in Appendix 3.

Chapter 5: Discussion

5.0. Contribution To Literature Gaps

This study examines the impact of the COVID-19 crisis on the farming system, focusing on South African small-scale farmers. It explores how the COVID-19 pandemic affected supply and demand dynamics within the farming system. This study aimed to identify factors influencing small-scale farmers' resilience during the COVID-19 shock and their response to this crisis. Furthermore, the study underscores the significance of market access during crises and its role in strengthening farmers' resilience. Additionally, it assesses whether intermediaries enhance affiliated members' resilience during a crisis or not.

5.1. Farmers' Resilience through Market Participation

Existing literature on resilience focuses on building mitigation strategies within farming systems to deal with diverse shocks and stressors, including drought, climate change, and diseases (Etana et al., 2020; Harvey et al., 2018; Shiferaw et al., 2007; Tripathi & Mishra, 2017; Valencia et al., 2019). Some scholars recommend adopting sustainable farming methods, such as agroecology (Altieri et al., 2015; Calderón et al., 2018; Kozicka et al., 2020; Ramanjaneyulu et al., 2019; Tiwari & Rao, 2019; Walsum et al., 2014), farm diversification through the integration of livestock and crops ((Altieri et al., 2015; Etana et al., 2020; Kuhl, 2018; Manda et al., 2018; Peterson et al., 2018), and multiple income sources (C. Bacon, 2005; Etana et al., 2020; Mercy Corps & Tango, 2013; Valencia et al., 2019), adopting various strategies, such as irrigation, climate-resistant seeds, and crop rotation (Adzawla et al., 2020; Harvey et al., 2018; Jacobi et al., 2013) to promote resilience against adverse shocks.

Furthermore, many scholars have argued that market access improves farmers' livelihoods through income generation (Kuhl, 2018; Meuwissen et al., 2019). Studies suggest that farmers can be linked to the market via governmental programs (Reardon et al., 2012; Rudolph et al., 2020), intermediaries (Chikazunga et al., 2013; Da Silva et al., 2014; Kundurpi et al., 2021), and contract farming (Aanyu et al., 2020; Das & Mohan, 2019; Eaton & Shepherd, 2001; Tekalign, 2019). However, limited research exists on crises that simultaneously impact both production and market access. This study emphasizes the crucial role of market access in enhancing farmer resilience during the COVID-19 crisis. By focusing on providing alternative, innovative and localised market access solutions, this research contributes to the existing literature by demonstrating the importance of these strategies in supporting farmers during times of crisis.

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In this study, 17 out of 21 respondent farmers had market access and demonstrated greater resilience than those without such access. These respondent farmers actively sought alternative markets or tapped into pre-existing ones, which enabled them to generate income. These alternative markets included newly formed markets by 'Opportunist Street Vendors', intermediaries and pre-existing markets they typically did not supply. However, the newly formed markets had a short lifespan due to the return of 'Opportunist Street Vendors' to work during level 3, and reduced funding from Foodflow donors, diminishing the number of farmers supported by this initiative, as detailed in Sections 4.2 and 5.1.2. Despite the short lifespan (from March to June 2020), the alternative markets significantly impacted those who participated in it. Farmers sold their products, generated income, sustained production and livelihoods, and increased their resilience.

The opposite was observed among those without market access: they totally lost their products. They relied either on credit from family members or "Matshonisa" - informal lenders charging exorbitant interest rates with stringent repayment terms, operating outside local regulatory oversight (Sinazo, 2021) or social grants to restart production post-harvest loss. Moreover, these farmers did not have a safety net to cope with the shock, they needed income generation through market participation to reinvest in production activities, adapt resilience strategies, accumulate assets (Tittonell, 2014), and improve livelihoods (Kuhl, 2018). The findings of this study echo those of Irwin and Campbell (2015), indicating that households participating in market systems can improve resilience by generating income. The authors underscored that household resilience depends on market systems' capacity to respond to disturbances.

This study highlights that while respondent farmers had access to markets before the lockdown, many of their usual outlets, such as hawkers, restaurants, and school feeding schemes, were disrupted by the lockdown due to their inability to withstand the shock. This forced farmers to seek alternative markets that were not impacted by the lockdown, thereby improving their resilience.

Market participation is further divided into three key components: integration of livestock and crops system, participation in multiple market channels, and the capacity to adapt during crises. These subsections will explore how each component influences farmer resilience from a market perspective.

5.1.1. Integration of Livestock and Crops System

Respondent farmers in this study adopted either single or dual farming systems: crop or crop-livestock system before and during the crisis. The crop-livestock system is regarded as crucial in fostering farm diversification and alleviating the impact of adverse shocks (Altieri et al., 2015; Etana et al., 2020; Kuhl, 2018; Manda et al., 2018; Perrin et al., 2020; Peterson et al., 2018; Stark et al., 2016; Szymczak et al., 2020). Unlike previously studied crises such as climate change, market shocks, drought, crop pests, and livestock diseases, the COVID-19 crisis has presented a unique challenge.

These earlier crises typically affected only one aspect of a business, either production or market, at a given time. Traditionally, integrating livestock and crops has been an effective strategy to enhance resilience against specific crises. This approach offers multiple income sources and allows farmers to access diverse markets (Etana et al., 2020; Mercy Corps & Tango, 2013; Valencia et al., 2019). However, the COVID-19 crisis exposed a vulnerability in this strategy. This study found that farmers with a crop-livestock system were more vulnerable to market closures. These farmers could not sell their livestock until early October 2020 and late February 2021 due to the extended closure of key markets, like funerals, weddings, large gatherings, and shisanyamas (places selling braai meat, predominantly in townships). Bans on alcohol sales and restrictions on social gatherings also impacted meat consumption and sales. The inability to sell livestock for extended periods resulted in farmers incurring significant livestock maintenance costs. Though these farmers had crop production income, they struggled to sustain their livelihood and overall farm production compared to their counterparts because they had high maintenance costs. In some instances, farmers borrowed money to sustain their livelihoods and overall farm production.

Conversely, those with a crop-only system were less susceptible to market closures. Some farmers accessed markets as early as April 2020, albeit at reduced capacity, with increased opportunities in late May 2020 when hawkers resumed operations. This study's findings resonate with Mercy Corps & Tango's (2013) suggestion that depending on multiple income sources (livestock and crops) might not sufficiently mitigate shocks. This vulnerability stems from their shared susceptibility to external factors like drought or, in this case, the lockdown resulting from the COVID-19 pandemic.

5.1.2. Multiple Market Channels

According to Bacon (2005) and Pennotti (2013), operating in multiple market channels (MMCs) reduces vulnerability to market shocks. This study shows that 15 out of the 19 respondents operated in multiple markets before the lockdown (two respondents started farming during the lockdown). Though operating in MMCs, they were vulnerable to market shocks as most of the market channels, such as restaurants, hotels, school feeding schemes, hawkers, funerals, and weddings they operated in were closed. For example, some respondent farmers experienced total market loss, while others with access to specific markets like Tshwane, PLK, JHB fresh produce, and retailers reported low product sales because they remained unsold for extended periods than envisioned.

Conversely, this study's evidence suggests that operating in MMCs does not adequately mitigate market shock vulnerability when those markets are exposed to a shared risk, like the COVID-19 lockdown. Alternatively, the findings indicate that a reduction in vulnerability against market shocks can be achieved by operating in MMCs that are less susceptible to such broad-based disruptions. The market channels accessed by the respondents were predominately localised and unaffected by lockdown movement restrictions, demonstrating their resilience during this crisis.

Due to the inability to access all or some of their usual market channels, most respondents sought alternative markets unaffected by the lockdown to counter vulnerability to market shocks. This strategy generated income and strengthened their resilience. These MMCs were locally based, with some newly formed by 'opportunist street vendors' (OSVs) or intermediaries (Foodflow), while others were pre-existing markets. Five out of seventeen respondents accessed the newly formed market by OSVs, enabling farmers to sell their products and generate income, as detailed in Section 4.2. Although income varied among the participants, some farmers reported making significant profits during this period, leading one farmer to increase production to capitalise on the situation. The accessibility of these locally based markets during the COVID-19 pandemic was crucial in mitigating the effects of market shock and enhancing farmer resilience. This suggests that localised markets have the potential to address similar future disruptions and require strengthening to support farmers and enhance rural economies.

Furthermore, an intermediary connected four respondent farmers to an alternative market. These farmers reported that they were not affected by the lockdown, as they were able to generate income to sustain their livelihood and production. Further discussion on this point is provided in Sections 4.2 and 5.2.1. Notably, eight farmers actively sought alternative markets within the pre-existing markets they typically did not supply or participate in before the lockdown. Farmers' ability to access these markets enabled them to mitigate their vulnerability to market shocks resulting from lockdowns, thereby enhancing their resilience.

These findings underscore the crucial role of localised markets in mitigating the impact of broad-based crises like the COVID-19 pandemic. By investing in infrastructure, promoting market linkages, and supporting local entrepreneurship, policymakers can foster resilient and sustainable rural economies. Strengthening these localised markets can not only help farmers withstand future shocks but also contribute to the overall economic development of rural areas.

5.1.3. Capacity to Adapt During Crisis

An essential aspect of resilience lies in farmers' capacity to adjust their farming system in the face of adversity (Anani, 1999; Kangogo et al., 2020; Kozicka et al., 2020; Walsum et al., 2014). Farmers are anticipated to innovate, demonstrate flexibility, and proactively seize the opportunities to instigate change amidst crises (Irwin & Campbell, 2015; M. P. M. Meuwissen, Feindt, et al., 2019; Paganini et al., 2020; Walker et al., 2004).

The evidence indicates that 7 out of 21 respondent farmers adapted their transport systems to meet changing market conditions. This included hiring passing-through transport, switching from a bakkie to a truck, or changing delivery schedules. This adaptation enabled the respondents to reach more markets, sell products, reduce transport costs, and enhance their resilience.

Meanwhile, seven respondents adopted off-season planting strategies before or during the lockdown. This approach enabled them to sell their products and generate sufficient income despite market closures. For instance, farmer #7 harvesting in the off-season period, could not access his markets (hawkers and school feeding schemes) at the lockdown's onset (level 5). However, as soon as the lockdown transitioned from level five to four, the farmer successfully sold all his products within two weeks due to increased demand from the off-season planting strategy.

Respondents demonstrated their ability to adapt their farming systems and innovate solutions, enabling them to navigate the evolving market conditions and enhance their resilience. Notably, they implemented these strategies or solutions without government or NGO assistance.

In summary, market access is crucial to enhance farmers' resilience during crises. Farmers with market access exhibited greater resilience than those without. While Bacon (2005) and Pennotti (2013) suggest operating in multiple market channels reduces vulnerability to market shocks. This study found that operating in MMCs exposed to the same risk as the COVID-19 lockdown is insufficient to mitigate market shock vulnerability. However, market shock vulnerability can be reduced by operating in multiple market channels that are less susceptible to the same risk. Localised markets proved vital during the lockdown, highlighting their importance for farmers' resilience and bolstering rural economies.

Many scholars advocate for the crop-livestock system or integrating livestock and crops into farming systems to enhance resilience. However, this study suggests that integrating livestock and crop production does not necessarily enhance resilience, as those with livestock proved more vulnerable to market closures and relied on crop production for income. Farmers demonstrated adaptive capacity by modifying transport systems and adopting off-season planting strategies, thus enhancing their resilience during the crisis.

As market accessibility during the lockdown period proved crucial for respondent farmers' resilience, it is important to explore how intermediaries can connect farmers to the markets. This will be discussed in the following section.

5.2. Intermediary Strengthening Farmers' Resilience through Market Access

Intermediaries provide market access to small-scale farmers, as achieving it independently can be challenging due to limited resources like finance, skills, knowledge, and production capacity (Chikazunga et al., 2013; Da Silva et al., 2014; Kundurpi et al., 2021). They offer financial support, training, input, and information (Aanyu et al., 2020; Michelson et al., 2018; Susilowati et al., 2020; Xhoxhi et al., 2019; Yang et al., 2014), guarantee product quality (Rubinstein & Wolinsky, 1987; Spulber, 1999), and improve associated members' income (C. Bacon, 2005; C. M. Bacon, 2015; Bardsley & Bardsley, 2014). Intermediaries can be NGOs, farm organisations, cooperatives, companies,

and so forth (Das & Mohan, 2019; Gagnon et al., 2019; Howells, 2006; Yang et al., 2014). However, limited knowledge exists on how intermediaries strengthen farmers' resilience during crises. My contribution to the literature expands the knowledge on this subject.

5.2.1. Foodflow Linking Farmers to the Market During Crisis

An intermediary plays a pivotal role in connecting farmers to markets (Chikazunga et al., 2013; Da Silva et al., 2014). This research examined four case studies of farmers supported by an intermediary established during the crisis, known as Foodflow. Foodflow is a newly formed market channel created to redirect food flow to local community groups like NGOs and Kitchen soups during the lockdown. It used donor funds to buy crops from farmers and deliver them to such community groups. In this study, food was delivered to Ga-Mphahlele Homecoming and distributed to villagers most affected by lockdown measures.

Four respondent farmers reported struggling to sell their produce before becoming part of Foodflow due to market closures. Afterwards, they sold their produce and generated sufficient income, which enabled them to buy inputs, pay workers, and save money. Two farmers reported making substantial profits during the initiative's initial stages. Accessing the market through an intermediary enabled them to cope with the impact of the shock and strengthened their resilience. Evidence indicates some accumulated assets. For example, farmer #1 saved enough money during this period and was able to build a house for himself. One farmer successfully acquired a 1-ton truck in November 2020, despite lacking money to manage farm production or a vehicle for deliveries at the lockdown's onset. To address this challenge, he borrowed a friend's vehicle to fulfil supply commitments to FoodFlow.

Despite the challenges posed by market closure, these four farmers maintained or increased production scale. For example, one farmer expanded his cultivated area from 0.4 to 3 hectares between the lockdown's onset and the end of the assessment period. This suggests that participating in market channels created by an intermediary enhances resilience, enabling members to generate sufficient income, increase production, accumulate assets, and improve their livelihood.

The findings underscore the significant role intermediaries play in mitigating the impacts of shocks by providing alternative markets. However, the intermediary's effectiveness hinges on its capacity to innovate such as developing new marketing strategies or exploring alternative distribution channels. Flexibility is also crucial, allowing for rapid adjustments to changing market conditions. For example, Foodflow quickly adapted to the crisis by creating alternative market channels, directly connecting farmers with local community groups, and enabling sales between donors and the farmers, otherwise not possible before the establishment of this initiative. Success also depends on the entity's vision and goals, as exemplified by Foodflow, established to offer alternative markets during the crisis when regular markets were closed.

Conversely, a different scenario unfolded for cooperative entities. They did not facilitate market provision both before or during the crisis, as their primary purpose was obtaining government grants and services, as detailed in Section 5.2.2. The lack of capability to innovate and adapt during the crisis diminished members' adaptive capacity and resilience. Consequently, farmers had to rely on themselves to seek alternative markets.

5.2.2. The Role of Cooperatives During the Crisis

Existing literature underscores that joining cooperatives can improve farmers' resilience to address climate change, socio-ecological risk, and agro-food supply chain disruptions by providing inputs, services, market, and insurance coverage against potential losses (Bardsley & Bardsley, 2014; Falkowski, 2015; Jacobi et al., 2013; Kangogo et al., 2020; Kos et al., 2019; K. S. Morris et al., 2016; Nemec et al., 2014). Most respondent farmers in the Vhembe district belonged to cooperatives, with many of these being family-owned. These cooperatives were not necessarily formed to assist members with market access, inputs, and services provision, but to obtain government assistance like funds, inputs, and extension officer services. Beyond government assistance before and during the crisis, cooperatives did not create the expected value. Hence, during the lockdown, members did not benefit from the cooperatives' market or other support services provision, as they were not fully functional. Nonetheless, the members relied on themselves to find alternative markets to sell their produce.

Typically, cooperatives enable farmers to tap into larger markets, enhance bargaining power, facilitate resources and skills sharing, and establish links with financial institutions (Bijman & Wijers, 2019; Gouët & Paassen, 2012; Ortmann & King, 2007; Sifa, 2016; Yang et al., 2014). However, the cooperatives examined in this study exhibited limited functionality, primarily focusing on receiving government grants and extension officer services. This limited functionality diminished members' adaptive capacity during the crisis, compelling them to rely on their own efforts to seek alternative markets and find ways to reinvest in production strategies. This finding contradicts the notion that being a cooperative member inherently enhances farmers' adaptive capacities and strengthens their resilience (Kangogo et al., 2020).

Moreover, given that most respondent farmers were associated with family-owned cooperatives, the research scope broadened to encompass three independent cooperatives operating in the Vhembe district. In this case, independent cooperatives involve non-family members and often have larger memberships. Cooperative establishment typically requires a minimum of five people (Republic of South Africa Co-operative Bill, 2002; Pletts, 2010; South African Institute of Professional Accounts, 2018), leading most respondents to enlist family members to meet this requirement. The distinguishing factor between the two cooperative types lies in the number of members, ranging from five family members to over 100 community members. These cooperatives are similar as they were established to receive government grants and services. This is because the government does not assist farmers in an

individual capacity. Neither of these cooperatives provided market access or services to members during the initial South African lockdown wave, as offices were closed. Being a cooperative member did not significantly enhance farmers' resilience during the COVID-19 crisis. Farmers relied on themselves to find alternative markets, generate income and enhance their resilience.

In summary, an intermediary can strengthen members' resilience by providing market access. However, strengthening the members' resilience during the crisis solely depends on the entity's vision and goal. Foodflow's main objective was to provide an alternative market for farmers when regular markets closed. In contrast, cooperatives focused on receiving government grants and services, not assisting members with markets and services. Members relied on themselves to find alternative markets, generate income and enhance their resilience.

5.3. Limitations and Opportunities for Future Research

This study primarily examines the farmers' response to the COVID-19 crisis. Respondent accessibility throughout the crisis progression played a pivotal role in research success. This provided an opportunity to document firsthand experiences as the crisis unfolded. Although travel restrictions at the crisis onset challenged respondent access, I successfully collected data through telephonic and face-to-face interviews during the actual crisis. This approach bolstered the robustness of the research findings.

The first limitation is network coverage in the rural parts of the country. The selected cases are nested in rural areas of Limpopo province, where network coverage remains a challenge, and the data costs are a constraint. Consequently, conducting interviews using virtual platforms proved unsuccessful. Although some data was initially collected at the onset of the crisis through telephone interviews, its quality was low, necessitating interview repetition. This presented an opportunity to conduct face-to-face interviews, establish rapport, build trust, observe emotions, and explore respondents' expressions more deeply to gain a profound understanding of their experiences, which virtual platforms cannot fully capture.

The second limitation is the study's timeframe, observing respondents for only 17 months from the onset of the crisis. Although the crisis abated after 17 months, the extent of respondent progress remains unknown. Further extended studies could track these cases to understand their post-crisis emergence. Future studies could determine whether respondents grew their farming businesses, ventured into different business spheres while maintaining their farms, or completely relinquished agricultural pursuits.

The third limitation is case selection, as this study covered only a few small-scale farmers in Limpopo. Expanding the study to include more cases within the same province or globally could enhance the generalizability of the findings. This study highlights the importance of localised markets

during crises and the necessity of strengthening such markets to support farmers and improve the local economy. Future studies could explore developing these markets to ensure small-scale farmer inclusivity.

5.4. Practical Implications

According to Irwin and Cambell (2015), households resilience depends on market system resilience. The COVID-19 pandemic revealed market system fragility, with food system disruptions disproportionately affecting vulnerable groups, leaving them in a dire state. Most small-scale farmers operate outside the main food supply chain. The government's decision to close various markets, like hawkers, restaurants, and hotels, prioritised supermarket food availability, neglecting the repercussions on small-scale farmers. The government's response underscored unpreparedness for such crises and the need to enhance response capacity.

To alleviate small-scale farmers' marginalisation during crises, the government should explore creating a multi-disciplinary team comprising food practitioners, scholars, farm organisations, social activists, and social entrepreneurs. This team would collaborate with the government to develop inclusive solutions for all farmers and ensure effective crisis management response implementation. Policymakers must ensure that the policies being implemented prioritise vulnerable groups, as they are disproportionately affected by the crisis. Furthermore, the effectiveness of implemented policies should be assessed to ensure that the intended benefits reach the targeted groups.

The crisis highlighted the food system's vulnerabilities (Paganini et al., 2020) as lockdown restrictions disrupted most market systems, preventing farmers from accessing their usual markets. This study underscores the crucial role that localised markets played in bolstering farmers' resilience during the crisis. New market formation and access to these markets enhanced farmers' resilience against market shocks. Although these new markets had a short lifespan, they played a crucial role in improving farmers' resilience.

To better prepare for similar disruptions in the future, the government and private sector must collaborate in establishing localised markets in rural communities. Localised market creation should encourage diverse stakeholder participation, ensuring inclusivity and accessibility for all farmers. This approach will contribute to creating reliable and sustainable markets for farmers, enhancing their resilience in crisis.

Prioritising the development of these local markets is essential for bolstering both local food systems and farmers' resilience in the face of the shocks. By providing farmers with direct access to consumers, these markets can improve their livelihoods, reduce income volatility, and empower them to adapt to future shocks. Additionally, localised markets can reduce transportation costs, minimise food waste, and promote the consumption of fresh, locally-produced food.

To further strengthen localised markets, the government can integrate local farmers into school feeding schemes. Directly sourcing from local farmers would not only decrease transportation costs but also guarantee the availability of fresh food and provide a stable market for farmers. Additionally, localised market creation can be facilitated by expanding nutrition programs to Early Childhood Development centres and establishing connections between local farmers and these markets. Similarly, farmers can be integrated into the health department's food services network, presenting an alternative market for farmers. Policymakers should emphasise sourcing directly from local farmers within these programs. Regular monitoring of program implementation is essential to ensure its effectiveness to maximise the benefits for the participating farmers.

The crisis compelled the government to establish various COVID-19 relief schemes to mitigate the lockdown's impact. Among these initiatives is a COVID-19 relief fund specifically designed for small-scale farmers aimed at ensuring production and food supply continuity during the pandemic. While the relief fund provided essential support to those who received it, there were instances where eligible respondents did not receive the assistance. This study reveals that among the respondents who received the relief fund, some were not significantly affected by the lockdown, while the opposite was observed in those who did not receive the relief fund and were severely impacted. Issues highlighted included a lack of documentation (like lease or contract), relief fund depletion, and non-approval despite meeting the criteria.

To enhance the provision of documentation, extension officers should raise awareness about the significance of obtaining the lease document from the landlords. Farmers should be discouraged from entering into verbal lease agreements, which often place them at a disadvantage. Also, farm organisations and communities can collaborate with the government to map out the farms in the area, facilitating easier access and provision of required aid.

To ensure relief funds reach those severely impacted, the government should develop an assessment management tool and conduct onsite visits to analyse the impact of the crisis. Collaboration between extension officers, farm organisations, farm communities and civil society can be instrumental in ensuring the effectiveness of this approach. Additionally, the administration of disaster relief funds should be enhanced or integrated with other systems to streamline the vetting process, guaranteeing that the funds are directed to eligible candidates. The government must ensure the equal distribution of relief funds among the farmers who meet the criteria, thereby preventing the exclusion of qualifying farmers.

Appendices

Appendix 1: Interview Protocol

MPhil research interview protocol

I am a student at the University of Cape Town, Graduate School of Business. I am doing a Master of Philosophy (MPhil) specializing in inclusive innovation. My research topic focuses on small-scale farmers' access to markets and how they respond to COVID-19.

The purpose of the interview is to gain an understanding of the factors that enable small-scale farmers to access markets, and how this has been influenced by COVID-19. I seek to explore the lived experience of the participant farmers before, during, and after the pandemic.

The focus area of the study is Nwanedi and Tshikonelo Villages in the Musina and Thulamela municipalities, respectively, in Limpopo.

These questions will be used for inquiry-based conversations.

1. Tell me more about yourself, how have you started farming and how long you have been in the farming sector?
2. What farming methods do you use, like conventional or industrial, biodiversity, agroecological, organic, etc?
3. What motivated you to start farming? What were/are the challenges you had/ have to deal with? How did you manage to resolve them?
4. Who are your regular customers? Is there any kind of agreement such as a contract between you and your regular customers? How do you normally reach out to your customers?
5. Are you part of a cooperative or farm organization? What are the benefits and the challenges of being part of the cooperatives or farm organization?
6. On previous events such as drought, floods, pests, and diseases, what mechanism or strategy did you use to cope or absorb the shock and adapt or recover from the shock?
7. How did COVID-19 and lockdown affect your livelihoods? What changes or adjustments did you need to make during this time? At the start of level 5 of the lockdown (27 March to 30 April 2020), how did you transition? How did the move from level 5 to 4 impact your production or sales
8. Was there any interruption on the production side or market side? How did the interruption impact you as a farmer and how did you respond?
9. As a farmer, do you work together with the other farmers in your community? How has this collaboration come about and how has it benefited the farming community?
10. What support have you received and from whom? How has it benefited you?

Appendix 2: Request to Perform a Research Study on the Small-Scale Farmers at Collins Chabane Municipality

Graduate School of BUSINESS

To: Director of Vhembe District (Agriculture)

Date: 12 September 2020

Enquires:
Thanyani Ramarumo
Cell: +27 83 54 77 451
Email: thanyani67@gmail.com and [redacted]

REQUEST TO PERFORM A RESEARCH STUDY ON THE SMALL-SCALE FARMERS AT COLLINS CHABANE MUNICIPALITY

My name is Thanyani Ramarumo, a student at the University of Cape Town's Graduate School of Business, studying towards a Masters of Philosophy (MPhil) in inclusive innovation. My research topic focuses on small-scale farmers' (SSFs) access to markets, how the lockdown imposed by the government has impacted the SSFs' livelihood and how they are responding to the COVID-19 pandemic.

The purpose of the study is to gain an understanding into factors that enable small-scale farmers to access markets, and how this has been influenced by COVID-19. The research seeks to explore the lived experience of the participant farmers before, during, and after the pandemic. The research also seeks to uncover the conditions and capabilities or characteristics that influence SSFs' resilience during a crisis. I am interested in studying 8 to 12 small scale farmers in the Collins Chabane Municipality.

In order to get diverse perspectives and multiple realities to the research, I would like to request two extension officers in the Collins Chabane and two in Musina municipalities to also participate in the study.

Based on the above-mentioned information, I would like to request permission to conduct the research on the small-scale farmers (about 8 to 12 SSFs) and extension officers in the Collins Chabane and Musina municipalities.

Thanks in advance for the opportunity to conduct my study in your area of responsibility.

Should you require any further information, please do not hesitate to contact me.

Kind regards

Thanyani Ramarumo

Appendix 3: Assessment of relative degree of resilience

	Marketing and transportation efforts		**Alternative source of income**			**Preservation and self-consumption**		**Off-season planting strategy**	**Farming Practices**			**Social capital network**	**Outcomes**
			Self-generated income	**Government support**									
Farmers	**Multiple market channels.** Participation in various market channels increases farmers' resilience by creating multiple income sources and increases redundancy	**Adapting transpor**t. Adjusting transport needs based on changing market conditions enables farmers to reach more markets or reduce transport cost	**Additional income.** Making extra income by providing services or goods to cope with an adverse shock.	**Social Grant.** Relying on child, elderly or unemployment grants to sustain livelihood and production during lockdown	**Covid 19 (C-19) relief fund.** Assisting farmers in overcoming pandemic effects and sustaining production.	**Self-consumption.** Growing crops for self-consumption to cope with lockdown's impact	**Preservation.** Drying the product to extend its shelf life in response to market closure.	**Off-season.** Using an off-season planting strategy before and during lockdown creates high product demand despite market closure.	**Changing cropping pattern.** Changing crops to low-maintenance, disease-resistant varieties, either to compensate for losses or for business reasons.	**Growing for animal feed or using damaged crops for animal feed.** To reduce the input costs or loss.	**Making own seedlings/seeds** Farmer making their own seedling or seeds to reduce input costs	**Family support or social capital network** Leveraging social capital networks to mitigate lockdown impacts**.**	**Outcomes**
Farmer 1	He accessed various markets, like the local community (residents purchasing vegetables), and the Tshwane fresh product market **[factor strong]**. Additionally, he was also connected to the newly formed market in the lockdown via an intermediary, Foodflow. The income generated through these markets enables the farmer to sustain his livelihood and production and **increase resilience**. "I supply neighbours and the local communities. They will come individually. It really makes a difference. They are coming slowly but, in the end, I made lots of money from local communities". "Foodflow has been great for me. I managed to buy fertilisers, pesticides, tomatoes' poles, and tomato seedlings." "They didn't want [prescribe] the quantity at first, maybe for the first 3 deliveries. I was just taking everything there. I now [May 2020] have to take it[chillies] to Pretoria,"	No evidence supporting adjusting transport requirements to meet the changing market conditions **[Factor weak]**. People came to the farm, and he also did deliveries as usual. He also mentioned that hiring own transport is costly. The inability to adapt the transport system prevents the farmer from reaching more customers and selling his produce and thus **diminishes his resilience**. "I normally supply chillies to the market in Polokwane, which currently they are not taking it. I now [May 2020] have to take it to Pretoria, which is costing me R4500 in transport costs because of the distance, and they [Pretoria] also pay less per kg as compared to the Polokwane market. This setup is not cost-effective for me."	No evidence supporting generating additional income **[factor weak].** The absence of additional income **diminishes the farmer's resilience**.	Not a beneficiary of either child or elderly grant as he has no kids, and he is 37 years old [**factor weak**]. This factor **does not apply.**	Not a beneficiary of C-19 relief fund **[factor weak].** The absence of the C-19 relief voucher minimises the availability of input for production and thus **diminishes resilience.** "I applied but I did not receive anything."	No evidence supporting growing crops for self-consumption **[factor weak]**. The farmer's inability to implement this approach limits his ability to adapt, thus **reducing his resilience**. However, he is not responsible for providing food for the household as his father fulfils that role. Additionally, he has not mentioned encountering challenges in acquiring food, hence, thi**s factor was considered not applicable.** "My father is a pensioner. He was doing everything when I was staying with him. "When I was staying at my father's house, I was not contributing at all."	No evidence supporting crop preservation **[factor weak].** The farmer did not consider preservation as a viable option for his business due to the resource requirements. The absence of preservation reduces the farmer's adaptive capacity and, thus, **diminishes his resilience**. "I could not do anything with chillies. I don't have cold storage for them." "Somebody told me to dry those chillies, once are dried and red, the values go down." "The thing is if I try to produce those things [chillies], still I see there will be lots and lots of work for me, at the end is not going to pay much."	Farmer uses the off-season planting strategy (before and during) because it creates a high demand for products **[factor strong]**. This enables the business to be profitable despite the market closures, thus **enhancing resilience**. "Now [Sep 2020], people are farming butternuts. Why, because during the rainy time, it will be formed, or fruit and it won't be damaged by the rain. Now they are scared of cabbage, tomatoes." "If tomatoes come alright, I will be selling crates for R150-170. It will be on-demand than butternut." "I think I had 6000 tomatoes in September [2020] and sold them around November, December 2020" "I managed to sell everything because everybody went to butternuts". "Tomatoes always have a	No evidence supporting changing crops **[factor weak]**. The inability to seek alternative crops weakens farmers' adaptive capacity and thus **diminishes resilience**. Instead, the farmer **introduces livestock** to diversify the production. The ability to diversify minimises the impact of shock and thus **enhances resilience**. "Early this year [2021], I started poultry. At the moment there are 300 chickens there. So still, I am doing great. I am new to that industry. But from those 300 chicks, mortality was only 7, so at least. I started selling the first week of May [2021] was my first batch, and I sold all of them. Now [June 2020] I am on the third batch, the first one was 200, the second one was 200 and the third one is 300."	No evidence supporting growing crops for animal feed **[factor weak].** He only introduced livestock in 2021 when lockdown restrictions were less stringent and could access the market easily. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**.	He started to make his own seedlings to minimise input costs **[factor strong]**, thus **increasing resilience**. "They [beetroots] are seeds, not seedlings. But is cheaper with those [seedlings] because that tin is 100g tin is around R89 and you can plant the whole land with one tin of R90. That one[seedlings] does not make more money."	A farmer was connected to a newly formed market by one of his employee's cousins, allowing him to generate income. Also, he stayed with his parents who provided food for the household **[factor strong].** Accessibility of social capital enables the farmer to cope with the impact, and thus **enhance resilience**. "When I was staying at my father's house, I was not contributing at all. I was a child when I was staying there. I was only buying the toiletries when I was staying there. " "[linked to Foodflow] Through one of my employees' cousins who knows Founder 2 who runs the NGO Ga-Mphahlele Homecoming. I asked for her number, and I called her. That's how he got connected."	**More resilience** He accessed various markets which enabled him to generate sufficient income. The farmer demonstrated adaptability by making his own seedlings to reduce input costs and diversifying his business by introducing livestock. He relied on social capital for linking to alternative markets. The ability to connect to alternative markets, enabled the farmer to make a profit, in turn, build his house. Additionally, he adopted an off-season planting strategy before and during lockdown which created high demand for products and increased business profitability despite market closures. Despite the absence of other factors either due to minimum impact or relying on alternative factors, the overall resilience remains high.

								market, even now, if you can remember very well, around April May [2021] the crate of tomatoes was R150, R170, there were no tomatoes at all.".					
Farmer 2	She accessed the JHB municipal market and localised market in the village **[factor strong]**. Although she had access to the municipal market, her income was **less** due to low sales and relied on the localised market to sustain her livelihood and production, thus **enhancing her resilience**. The localised market formed by OSVs and lasted for a short period [June 2020] "Okra was going to the market [municipal] and was not affected. It was only affected from the customers' side or the buyers because there were no buyers." "Not going faster [market], since COVID-19 started, you can take your stuff this week before last week's stuff is sold. You find that they were in the market for about a month, maybe started selling half, half, and started selling them R10, R15 because they stayed for long in the market. I got little money during level 5, although things were difficult, the things that encouraged us on the farming side that enabled us to live were things we were able to sell in the local market, like tomatoes. People in the local area were able to buy tomatoes, during level 5."	The farmer hired pass-by vehicles to deliver tomatoes to the nearby villages as customers were no longer coming to the farm because of the lockdown. This transport arrangement lasted until the end of level 5. Thereafter the customers were coming to the farm **[factor strong].** The ability to adapt the transport system in response to changing market conditions enables this farmer to access the market and sell her products, thus **enhancing her resilience.** "People in the local area were able to buy tomatoes, during level 5. They called the farm, and the vehicle delivered the tomatoes to the houses. The vehicles passing by the road, we hired them to deliver, because it was difficult for people to meet... from these other levels, bakkies were able to come to the farms with maybe 40 crates, we load it then it goes. That's when things started to change, not the same as level 5."	The farmer started a small business to increase income following the lockdown and rain impact **[Factor strong].** Additional income enables the farmer to sustain her livelihood and production and **enhance resilience**. "I opened it [street market business] in January [2021] so that when the other side [farm business] is difficult, you should be doing something. This market [business]will balance this side [household] when I start planting, I will be pushing the production from the income generated from the street market business. When I start planting, this [street market] will back up the farm production."	This farmer relied on a child social grant to sustain her livelihood and production. **[factor strong]**. The farmer has 2 kids who receive a social grant. The government also increased social grants by R500 to bring a relieved to the most vulnerable households. The availability of social grants enabled the farmer to sustain her livelihood and production thus **enhancing her resilience.** "I won't say much about food that I was affected, because we got children grants to use in the household. "I was given an increment".	Not a beneficiary of C-19 relief fund [**factor weak**]. The absence of the C-19 relief voucher minimises the availability of input for production and thus **diminishes resilience**. "We didn't get an R50000 voucher, but others got it." "The things they were looking for, I didn't have. That's what makes me not apply."	She relied on maize to cope with the impact of the lockdown **[factor strong].** This increases food availability and reduces the cost of food in the household thus **increasing her resilience**. "The maize, I have harvested them and have them in the house. I did not sell maize; it was not that much because was planted in between the watermelons. I managed to harvest 4 bags [80 kg] of maize. I didn't sell them, I decided to use them to make maize meal."	Farmer dried maize to make maize meal as all customers cancelled the order [**factor strong**]. The ability of the farm to extend the shelf life of the crop for later use indicates an adaptive capacity during the shock, thus **enhancing resilience**. "They contacted us that we won't be able to come and take things from your farm anymore because even us there is nowhere, we can take your produce. We had corn." "For corn, we decided to dry it. We will use it for maize meal. Maize meal won't be sold because we agreed that we will share the bag of maize meal. After all, there is no money there."	No evidence supporting using an off-season planting strategy **[factor weak].** The inability to adopt this strategy reduces product demand as well as profit and thus **diminishes farmer's resilience.** "When we go back will be able to plant watermelons and butternuts, because is the season for watermelons and butternuts."	No evidence supporting changing crops **[factor weak].** The inability to seek alternative crops weakens her adaptive capacity and thus **diminishes her resilience**. .	No evidence supporting growing crops for animal feed as she does not have livestock. Unsold crops got on the field [**factor weak].** The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. "Most of them get rotten on the farm."	She made tomato seedlings from the seeds harvested from the previous production **[factor strong].** Also, other crops are planted directly from seeds. This reduces the cost of input and thus **enhances farmers' resilience.** "...make my own seedlings because the ones from the nursery are expensive. When we harvest, squeeze the seeds from tomatoes and dry them. Then we make our own seedlings. We plant them under the tree and water them. This is the only crop I plant as seedlings. For the other crops, I buy seeds and plant them as they are.	She did not receive support from the social capital network **[factor weak].** This hinders the ability to cope with the impact of lockdown and thus **diminishes resilience**. "There was no support I received. "I haven't got any support from anyone	**More resilience** She accessed various markets which enabled her to generate income. A farmer showed an adaptive capacity by hiring pass-by vehicles to supply a localized market, preserving, and growing crops for self-consumption, and making her seedlings to sustain their livelihood and production. Furthermore, she started a new business to compensate the farmer business, which created additional income. Despite the absence of other factors either due to minimum impact or relying on alternative factors, the overall resilience remains high.
Farmer 3	This farmer was unable to access his regular markets at	As the farmer did not have transport to deliver his	The farmer started a landscaping	Not a beneficiary of either child or elderly grant as	Received C-19 relief funds **[factor is**	At the beginning of the lockdown, a farmer was	He dried maize for animal feed **[factor strong]**.	The Off-season strategy was not adopted due to	He introduced new crops because he was	At the beginning of the lockdown, a farmer was	No evidence supporting a farmer making	The farmer borrowed a car from a friend	**More resilience**

	the beginning of the lockdown, however, he was connected to the newly formed market during the lockdown via an intermediary [food flow]. He also supplied street hawkers and retailers' markets. **[factor strong]**. Accessing a newly formed market and other markets enables the farmer to generate income and manage to sustain livelihood and production, this **enhances farmers' resilience.**	produce, he borrowed a car from his friend so he could supply the newly formed market **[factor strong].** The ability to organise transport enables the farmer to supply the newly formed market and source some produce from other farmers, thus **enhancing his resilience.** "...being a farmer, if you don't have transport, it becomes harder for you. During the lockdown period ...I went to a friend of mine and borrowed me his car. At the time I was supplying Foodflow, I was using my friend's car."	business because he saw an opportunity **[Factor strong].** Additional income enables a farmer to sustain his livelihood and production and **enhances his farmer's resilience**. . "Landscaping, I started last week Monday [14 June 2021]. Is on the school, Nwanankomi" "I did put some trees last week, so these are the last ones." "Plus-minus R20000… yes, just to plant trees only."	he has no kids, and he is 32 years old [**factor weak**]. This factor **does not apply.** .	**strong].** The C-19 relief voucher increases the availability of input for production and thus **enhances resilience.** " I received an R50000 voucher"	unable to sell maize and use it for self-consumption **[factor strong].** The maize was on a small scale. This increases food availability and reduces the cost of food in the household thus **increasing his resilience**. "That time [level 5], there was maize on that side...I realized at that time was if I supply maize [cobs], the problem was how much I am going to charge it.... we were supplying a family now; I couldn't supply it to Foodflow at that time." ...then we ate some …"	The ability of the farmer to extend the shelf life of the crop for later use **enhances his resilience**. "Likely because I have these goats...we harvested then we dried them [maize]. Now [Sept 2020] because is dry for grazing, then every day we feed them [goats]"	previous experience **[factor weak].** The inability to adopt this strategy reduces product demand as well as profit and thus **diminishes farmer's resilience.** " Unfortunately, in 2017, I planted cabbages and what happened there was a storm, hail. It destroyed everything, I cried, and I was like, it was a lesson. The mistake I made at the time my schedule for planting cabbage was not right... it happened that it was bad timing and it destroyed everything. I cried and I picked up again."	struggling to sell spinach due to the home garden increase during the lockdown **[factor strong]**. The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience.** "People grow their own in their backyard. I found out when I had already planted that one [spinach],... when you are struggling with something, you start asking yourself questions like what's happening, ...the main problem that time, ooh most people have spinach in their back yards." "That's when I started, let me go for mealie, plus in a large quantity and when you start making cheap like one mealie tree can give you 3 or 4 mealies then you can start making a profit from that one."	unable to sell maize and dried it for animal feed. After the Foodflow supply contract ended, a farmer had lots of carrots without a market, he used them to feed the pigs **[factor strong**]. This reduces the cost of input or animal feed, thus **enhancing resilience.** "Likely because I have these goats...we harvested then we dried them [maize]. Now [Sept 2020] because is dry for grazing, then every day we feed them [goats]." "What happened, 3/4 of those carrots could not sell them because Foodflow supply stopped. We just took them out and gave them to the pigs. "	own seedlings. A farmer continued using both seeds and seedlings as normal **[factor weak**]. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes his resilience**.	which enabled him to supply Foodflow and generate income. He also stays with his parents who provide food for the household as well as financial support **[factor strong].** Accessibility of social capital enables the farmer to cope with the impact of lockdown, and thus **enhance resilience**. "… if you are a farmer, and you don't have transport it becomes harder for you, ..." "I went to this friend of mine and borrowed me his car. At the time I was supplying Foodflow. I was using my friend's car" I got support from my friend, the one who borrowed me the car so I can do some ups and downs and supply. There was this time they [parents] lend me money so I can put petrol."	The farmer managed to access various market channels which enabled him to generate sufficient income to sustain his livelihood and production The farmer showed his ability to adapt during the crisis by arranging transport to supply a newly formed market, preserving crops for animal feed, self-consuming some of the existing crops, and changing crop patterns. The ability of the farmer to start a new business and tap into his social capital network enabled the farmer to cope with the impact of the shock. Despite the absence of other factors, the overall resilience was high.
Farmer 4	Farmer accessed various markets namely Spar, a localised market in the village, and grant paying point **[factor strong]**. When his produce was not going well at Spar, he relied on a localised market formed by OSV. Though the localised market was not sufficient as he generated less income, overall, he was able to sustain his livelihood and production and **enhance resilience**.	No evidence supporting altering the transport system to meet the changing market conditions **[Factor weak]**. People were coming to the farm, though in small numbers and he also did deliveries as normal. The inability to adapt the transport system prevents the farmer from reaching more customers and selling his produce and thus	There is no evidence of a farmer generating additional income **[factor weak].** The absence of additional income **diminishes the farmer's resilience**	Not a beneficiary of either child or elderly grant as he has older kids, and he is 52 years old [**factor weak**]. This factor **does not apply.**	Received C-19 relief funds **[factor strong**]. The C-19 relief voucher increases the availability of input and thus **enhances resilience**. "I got an R50000 voucher. I want to buy manure."	He dried some mustards for self-consumption because there were no customers **[factor strong].** This increases food availability and reduces the cost of food in the household thus **increasing his resilience.** "The other ones [mustard] we are drying it out, for me to eat and the workers."	A farmer dried mustards in response to the impact of the lockdown **[factor strong]**. The ability of the farmer to extend the shelf life of the crop for later use enhances his adaptive capacity during the shock and **increases resilience**. " Mustard does not have customers. The other ones we are drying it out ..."	He uses an off-season planting strategy (before and during) lockdown because it creates a high demand for products **[factor strong].** This enables the business to be profitable despite the market closure, thus **enhancing resilience.** "We were selling mustard [before lockdown]" "Selling well, fortunately, during that time [level 5], there	He changed crop patterns because of the impact of lockdown and rain which affected both production and income. He opted for the low-cost maintenance crops so he could sustain production, but at a reduced scale [**factor strong**]. The ability to adapt production system enables him to cope with the impact of the shock and thus **enhance resilience**.	No evidence supporting adopting this strategy even though he has livestock **[factor weak].** The damaged crops were buried for manure. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. "I buried the mustards, if you go there where there are those tomatoes, if you	A farmer started to make his own seedlings to minimise the cost of input **[factor strong**], thus increasing resilience. "There are seedlings for nightshade (muxe) that need to be planted. …why we are doing seedlings on our own because is cheaper and we can do it. Because we don't have money anymore. "	Not received support from the social capital network **[factor weak]**. This hinders the ability to cope with the impact of lockdown and thus **diminishes resilience**.	**More resilience** The farmer managed to access various market channels which enabled him to generate sufficient income to sustain his livelihood and production. Also, adopting an off-season planting strategy before and during lockdown created high demand for products in the market, and increased the profitability of business despite the market closure. The farmer showed his ability to adapt during the crisis like preserving, self-consumption, and changing crop patterns. which enabled the farmer to cope with the impact of the shock. Despite the absence of other factors, the overall resilience remains high.

	"...selling well 30 days in lockdown, because some we were taking it to Spar. Some we were selling it locally." "That's when we felt that there are a lot of mustards because we were now looking at the people in the village [customers]. Mustard was a lot for the people of the village [to buy all of it]." "I got new customers. Because everyone was sitting at home, they thought there were not many people who had access to move around, they just decided to go and get tomatoes and sell them in the villages. People that I sold tomatoes to, I saw more new customers than old customers. Although these new customers were coming for two crates because they were selling in small bags going around the villages." "No, it was a small market and not enough for me."	**diminishes his resilience**. "						was no mustard in the market. It means I was the only one who had the market."	"That's why I am saying we put maize seeds on the ground." We are trying all ways. that's why we end up planting maize. Because we are fighting to go back to the farm. "...is the first time planting it [maize] since I was born. Even nightshade is the first time planting it, and sweet chard is the first time." ".... Maize is 3 months. Nightshade grows up in 20-something days " "When we are waiting to harvest maize, we will be selling nightshade or switch chard and so on that's how it is."	look closely, you will find mustard weeds. Because that mustard, we just left it until it flowered until we planted these tomatoes."			
Farmer 5	Farmer accessed JHB and local markets in the village [**factor strong].** As the farmer started farming in level 5, his produce was ready from level 3 onwards when there was less movement restriction, as a result, customers from Durban and Cape Town were able to come to the farm. Accessing these markets enables the farmer to generate income, sustain livelihood and production and **enhance resilience.** "I was able to take it myself to the JHB market." "In my area is better now because there are Indians. We sell to the Indians; they come and buy in	The farmer used to deliver some of his produce to the JHB market, as the quantity was small enough for the bakkie. Thereafter, changed to the truck because the quantity produced increased. The ability to change transport enabled the farmer to send more products to the market, thus **enhancing his resilience**. " Last year [2020] I used to take my stuff there City Deep with my bakkie. But this year I saw that I won't be able to take it there on my own. I post in the truck because there are a lot of them."	The farmer generated additional income from the construction business, rental, and wife income **[factor strong].** Additional income enables the farmer to sustain his livelihood and production and **enhance resilience**. "…lockdown came after I had spent a lot of money... I didn't have money. I was getting little money from my house in Gauteng, from rentals. That is the money that saved me." "... and the one [money] generated by the wife. She has a street market	Not a beneficiary of either child or elderly grant as he does not qualify as he has a business, and he is 44 years old [**factor weak]**. This factor **does not apply.**	Not a beneficiary of C-19 relief fund **[factors weak].** The absence of the C-19 relief voucher minimises the availability of input and thus **diminishes resilience**. "I was not getting anything because I was not registered. I was working as a subcontractor. "I didn't apply for COVID-19 because there are missing papers for my contract because I was not registered with SARS and so on."	No evidence supporting growing crops for self-consumption livelihood **[factor weak].** The inability to adopt this strategy limits the farmer's adaptive capacity and thus **diminishes his resilience**. However, the farmer mentioned relying on construction work and rentals to buy food. "I was getting little money from my house in Gauteng, from rentals. That is the money that saved me."	No evidence supporting crop preservation **[factor weak]**. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes his resilience.** However, he only had one crop which was harvested post-hard lockdown and was able to access the market and sell his produce. This factor **does not apply.**	No evidence supporting using an off-season planting strategy **[factor weak].** The inability to adopt this strategy reduces product demand as well as profit and thus diminishes **farmer's resilience.** "The big farmers said, okra is planted in March, ...so I was waiting for that. So around 15 March, I started planting."	The farmer introduces a new crop to minimise the impact of relying on a single crop **[factor strong].** The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience**. "This year [2021] I was able to plant okra and habanero. But habanero, I only started harvesting now [September 2021]. Which means the price of habanero is better for now. I don't know going forward. But okra...the price dropped because	No evidence supporting growing crops for animal feed, and he does not have livestock **[factor weak]**. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience.** However, there were no damaged crops because he started selling in June 2020 when the movement restrictions were less stringent. This factor **does not apply.**	No evidence supporting making own seedlings to reduce input costs **[factor weak]**. He mentioned buying seeds as usual during the planting season. Okra is easily grown from the seeds. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes his resilience**. "I already bought seeds, and pesticides while I had money. I put everything in the storeroom."	He relied on social capital networks for market connections **[factor strong]**. This enables the villagers to access the market and generate income, thus **enhancing resilience**. "The customers are those people who come around our villages looking for okra. If they arrived at a particular household, the owner of the house would go around looking for suppliers saying, I have someone in my house looking for okra, because you have planted some, can you sell me some."	**More resilience** The farmer managed to access various market channels which enabled him to generate sufficient income to sustain his livelihood and production. He also had savings, a rental house and a construction business which generated additional income and enabled him to cope with the impact of the shock. The farmer showed an adaptive capacity by hiring a truck to supply the municipal market and introducing a new crop, this enabled him to increase the quantities and sell more produce and mitigate reliance on a single crop. The social capital network made provision for market access in the local village which enabled him to sell his produce locally. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, his overall resilience remained high.

	crates. I think this is better because I am able to make R10000 per week on that 2 ha".		business, she cooks and sells by the roadside market" " The rental is R14000/month" ".. there were little changes because I was now able to go to Gauteng with a work permit [farming]. I was able to call others who gave me a job, which means I was able to do small jobs. Level 4 was better because I was able to bring in some cash." " If I was able to work 5 days in a week with 3 people, after paying them I could be left with R6000. Then I can come back home and survive for 2 months if we are talking about food." " This year [2021] I started in February. The work was continuing, it didn't stop." " In a month, I can make R60000 before deduction. After paying the people I am left with R15000-R18000."						there is oversupply..." " That's why this year I was able to do okra and chillies [habanero]. So that each month there is an income coming in."			"The community is the one that connects us to a person who arrived in the village looking for okra. Or when I hear that there is a person in our village looking for okra, I can go there and ask if I can bring my okra. I can get information from the community."	
Farmer 6	He accessed the JHB municipal market and localised market in the village **[factor strong]**. As his produce was not selling at the municipal market, he sought an alternative market in the local village. Though the localised market was not sufficient as he generated **less income**, overall, he was able to sustain his livelihood and production and **enhance resilience**. "They were going nowhere because the market [JHB] was not working or things were going slow or you take your produce there and get rotten, they	No evidence supporting altering the transport system to meet the changing market conditions **[Factor weak]**. The farmer either posted his produce by truck or had customers coming to the farm. This farmer did not sell most of his produce. The inability to adapt the transport system prevents the farmer from reaching more customers and selling his produce and thus **diminishes his resilience**	He generated additional income using his tractor to plough for other farmers in the area [**factor strong**]. Additional income enables the farmer to sustain his livelihood and enhances this **farmer's resilience**. However, the tractor generated **less money**. "The tractor boosted me. I went and plough for people… the same tractor goes out and works on others' farms."	Not a beneficiary of either child or elderly grant as he does not have kids, and he is 26 years old [**factor weak**]. This factor **does not apply.**	Not a beneficiary of C-19 relief fund **[factors weak].** The absence of the C-19 relief voucher minimises the availability of input for production and thus **diminishes resilience**. "I applied but did not receive it."	No evidence supporting growing crops for self-consumption [**factor weak**]. The farmer also mentioned struggling to source food. The inability to grow crops for self-consumption reduces food availability and thus **diminishes his resilience.**	No evidence supporting crop preservation despite having unsold crops [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes his resilience**.	No evidence supporting planting off-season **[factor weak].** The inability to adopt this strategy reduces product demand and profit and thus **diminishes farmer's resilience.**	The farmer planted tomatoes that have a longer life cycle due to the uncertainties of lockdown **[factor strong]**. The ability to adapt the production system enables the farmer to cope with the impact of the shock because it ripens when the lockdown restriction is no longer stringent and could get customers, and thus **enhance resilience**. "Level 4 we started planting tomatoes. Tomatoes take 3	No evidence supporting using damage or growing crops for animal feed. Also, he does not have livestock. The damaged crops were buried for manure **[factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**.	No evidence supporting making own seedlings to reduce input costs. He also incurred a huge loss **[factor weak]**. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes his resilience**.	He relied on local communities to market his produce by sharing information [**factor strong**]. This enables a farmer to generate income and thus **enhance resilience.** "I walked, there are existing markets in Madimo [streets markets]. I got there and told them that I had spanspek at the farm, if you want it you can come and buy it. Then people came and bought them. They also told	**Less resilience** A farmer was able to access various market channels but made less profit. He showed an adaptive capacity to deal with the impact of the lockdown like ploughing for other farmers using his tractor and generating additional income. He introduced a longer life cycle crop due to the uncertainty of lockdown which enables him to sell his products during the easing of lockdown restrictions. The social capital network assisted the farmer with marketing his produce through word of mouth, this enabled him to reach more customers and sell more products. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.

	said they were not sold because there were no people." "The other plan, we end up selling to local people in the village, but they didn't buy all of it because it was a lot. …at least I got little something [money] ... most of it ends up in the field [rotten]" "I went and convinced people in the villages. There are existing markets in Madimo. I got there and told them that I had spanspek at the farm, if you want it you can come and buy it. Then people came and bought them..."		"Yes [during lockdown], tractors were being hired and were moving around." "It [tractor money] is the one that enables me to get some food to eat."						months. But the one I planted because they have types, mine took 4 months. They got ripe at level 2. It helped me because I was able to get customers. I didn't struggle to get customers. Because we were at the level where people can move around. It was better because we were able to sell. It helped a lot to plant tomato late,"			each other at the market and came and bought it."	
Farmer 7	He accessed various markets **[factor strong].** On level 5, he had a client supplying Spar, on level 4, supplied hawkers and from levels 3-1 supplied the municipal market. Accessing these markets enables the farmer to generate income and sustain livelihood and production, thus **enhancing resilience**. "I also had a client who was supplying Spar, that also assisted because those supermarkets never closed. It also assisted to push our products to the market." "By hawkers, because there were no cabbages around here. So, they bought all of them. Even these people of feeding schemes," "Those cabbages were bought all of them. I think in 2 weeks they were finished." "The products like green beans, we take them to Tshwane and JHB., last week [September 2020] I sent 251 boxes of green beans."	No evidence supporting altering the transport system to meet the changing market conditions [**factor weak**]. The inability to adapt transport system limits his adaptive capacity and thus **diminishes his resilience.** Nevertheless, the farmer managed to sell most of his produce as people could access his farm and he also posted some using a truck, hence this strategy was not adopted. "The person who came and bought cabbages from me was taking them to Spar. "I also had one who wanted them who was supplying Boxer. But by the time he came, we no longer had lots of cabbages. We were left with small ones.	He is a government employee **[factor strong]**. Additional income enables the farmer to sustain his livelihood and production and **enhances farmers' resilience**. "I am also a government employee and farming is not a full-time job" "I am a community development worker, at the Department of Cooperative Governance and Human Settlement and Traditional Affairs."	Not a beneficiary of both grants because he is a government employee [**factor weak**]. This factor **does not apply.** .	Not a beneficiary of the C-19 relief fund because he is a government employee **[factor weak].** This factor **does not apply**. "I don't qualify because I work for the government."	The farmer did not grow crops for self-consumption; however, he ate from the existing crops **[factor strong**], thus **enhancing his resilience**. "If we want cabbage, we will go and cut some and come and eat, but not grow for self-consumption."	No evidence supporting crop preservation despite having unsold crops l [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes his resilience**.	He specialises in cabbages and only plants them during the off-season to create high demand. Although in level 5, the farmer struggled to sell them, in level 4, all his products were sold out quickly as there were no cabbages in the market **[factor strong]**. This enables the business to be profitable despite the market closure, thus **enhancing resilience**. "By hawkers because there were no cabbages around here. So, they bought all of them. Even these people of feeding schemes, I think school kids were starting to go back, grade 12s and grade 8...even though those of feeding schemes were not buying at full capacity but, I managed to push." "… My speciality is cabbage and during winter months the market is flooded with cabbage. So,	A farmer stopped growing okra to accommodate the new cabbage client. This is market driven not lockdown impact [**factor strong**]. Even though this is the case, the ability to adapt the production system enables the business to make a profit and in turn **enhance resilience**. "I have a client now who wants 10000 cabbages a month, so when I compared okra and cabbages, cabbages will be more profitable than okra."	No evidence supporting the adoption of this strategy. He also does not have livestock. The damaged crops were buried for manure **[factor weak]**. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. "I also had mustard. I planted 10000 seedlings. Just during the lockdown, everyone was staying at home. People went there and bought their own seedlings and planted them in their own homes. So, there was nowhere I can sell it. I buried it [mustard]."	No evidence supporting making own seedlings to reduce input costs. He bought both seeds and seedlings as usual during the planting season. Also, a certain type of crop grows easily from the seeds **[factor weak**]. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes his resilience**. However, the farmer made money during the lockdown, and he could sustain his business and livelihood, hence this strategy was not adopted. " I planted 10000 seedlings [mustards]. plant cabbages around 20000 cabbages [seedlings], planted 200 000 seeds of green beans."	Not receiving support from social capital networks **[factor weak]**. This hinders the ability to cope with the impact of lockdown and thus **diminishes resilience**.	**More resilience** The farmer managed to access various market channels which enabled him to generate sufficient income to sustain his livelihood and production. He is also a government employee, and this provided additional income. He adopted an off-season planting strategy before and during the lockdown which created a high demand for products and increased business profitability despite market closures. He also used existing crops for self-consumption to sustain the livelihood and change the crop pattern to address the business needs. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, his overall resilience remained high.

								I don't plant, I start planting in October to February, … Because I know that people won't manage to maintain it." "During the winter months, I usually prefer these products that will go to the municipal markets." yes [off-season guy], I will start harvesting in October [2021], we just started to plant this past weekend [June 2021]."					
Farmer 8	He accessed various markets [**factor strong].** In levels 5-4, he supplied leafy vegetables to the newly formed or localised market by OSV. From level 4 onwards, he supplied tomatoes to the Tiger brand. He generated sufficient income from the newly formed market. Accessing these markets enables the farmer to generate sufficient income and sustain the livelihood and production, thus **enhancing resilience**. "People from Mussina came with the bakkies. They were coming in numbers." "... Every morning there were queues of bakkies on the farm, for those vegetables." "Those were new customers; I never had those customers before. It was for that period. Even they saw an opportunity because most of them have bakkies, just sitting at home. They thought of doing something ... Those were not the regular hawkers. They were taking advantage of the situation. ..it was a new market"	No evidence supporting altering the transport system to meet the changing market conditions [**factor weak**]. The inability to adapt transport system limits his adaptive capacity and thus **diminishes his resilience.** However, he did not adopt this strategy as it was not profitable to the business due to the small quantities required. "I was approached by Spar in Thohoyandou; they needed a bundle for R3. Transporting those things from Nwanedi for more than 80 km for R900. You see, I spent most of the money just to get finished on the way. I had to get petrol, I had to pay for people who were picking. So, it was very little, I decided that I should just agree that this is part of farming. I just ploughed it back into the soil."	The farmer owns a company that provides training [**factor strong**]. Additional income enables the farmer to sustain his livelihood and production and **enhance resilience**. "I also have my own company which is contracted with SEDA. I do training for SEDA customers. I do train them on cooperatives and on starting a business and improving on their businesses."	Not a beneficiary of either child or elderly grant as he has older kids, and he is 52 years old [**factor weak**]. This factor **does not apply.** .	Received C-19 relief funds [**factor strong**]. The C-19 relief voucher increases the availability of input and thus **enhances resilience**. "I also got this COVID-19 voucher. The voucher was for R50000. R25000 goes for fertilisers, and R25000 to chemicals, which means to me is really a bonus because I didn't experience that much, COVID-19 [lockdown impact]. I have never experienced much like losing crops. Like when I got this, I said ooh…what support."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and **thus diminishes his resilience**. Nonetheless, the farmer made lots of money during the lockdown hence this strategy was not considered.	No evidence supporting crop preservation despite having unsold crops [**factor weak].** The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes his resilience**.	Just before lockdown, he decided to plant mustards and other leafy vegetables, i.e. winter crops. **[factor strong]** The availability of these crops in level 5, created a high demand for his produce and the farmer made a lot of money during this time despite the closure of the market, thus **enhancing his resilience**. "I did grow things that I wasn't growing before. Like with vegetables, I used to plant vegetables around March, this year [2020], I don't know what happened, but around February, I started planting mustard, there is another vegetable called rape, and another found in Zimbabwe." "Levels 5 and 4 and made more money."	He introduced new crops just before the lockdown **[factor strong].** The ability to adapt production created a huge demand for the product in the market, and thus **enhanced resilience**. "I did grow things that I wasn't growing before. ... I started planting mustards, there is another vegetable called rape, and another found in Zimbabwe. "	No evidence supporting adopting this strategy. He does not have livestock. The damaged crops were buried for manure **[factor weak]**. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. "People were no longer coming...I just ploughed it back into the soil or buried it."	No evidence supporting a farmer making own seedlings to reduce the cost of input [**factor weak]**. A farmer bought both seeds and seedlings as part of the norm during the planting season. Also, certain types of crops grow easily from the seeds. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes his resilience.** Also, the farmer did not struggle to sell his produce at the beginning of the lockdown hence this strategy was not adopted.	He relied on local communities to market his produce by sharing information [**factor strong**]. This enables a farmer to reach more customers and generate income thus **enhancing resilience**. "I didn't call anyone. Those who came and bought and sold, and people asked them where they found the vegetables and they told them, they found them in Nwanedi. When they come to Nwanedi, they find Farmer 8 is the one who has the vegetables." "Exactly, mouth-to-mouth marketing."	**More resilience** The farmer accessed various market channels which enabled him to generate sufficient income to sustain his livelihood and production. He adopted an off-season planting strategy before and during the lockdown which created high demand for products and increased business profitability despite market closures. He showed adaptability, by changing crop patterns which minimises the impact of the lockdown. The existing business provided additional income to the farmer. Social capital network assisted with marketing his produce through word of mouth, this enabled him to reach more customers sell more products and generate more income. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, his overall resilience remained high.

	"During the lockdown, I think is the time I made money. ..level 5 and level 4 and made more money." "Level 3, vegetables were no longer making money, but now, Tiger Brands started to collect tomatoes, so we are getting money from them"												
Farmer 9	She was unable to access the market at all. No evidence supporting seeking or participating in the alternative market channel **[factor weak].** The farmer did not generate any income, and this **diminished farmers' resilience**. "Who was going to buy it when people were on lockdown? Because those who buy from me come from far." "It was not bought because people were not coming to us. We didn't sell, we buried all of it."	No evidence supporting altering the transport system to meet the changing market conditions **[Factor weak]**. She relied on customers coming to the farm and did not sell anything as no one was coming. She did not hire transport to push her products to the market. The inability to adapt transport system prevented the farmer from selling her produce and impacted her livelihood and production, thus **diminishing her resilience**. "...For me without a car, I have to look for your car, you charge R300, R400 and go and sell those sweet potatoes and come back and give you R400, what am I left with, nothing? It is better to bury it and my heart gets over it."	The farmer's husband received an elderly grant [**factor strong**]. Additional income enables the farmer to sustain her livelihood and production, thus **enhancing resilience.** "We are living from Mandela [grant]. Mandela when he gives us grant like me and the old man [husband], we are able to buy a bag of maize meal and put it on the table, and able to take the same money and take maize to the milling to make maize meal and eat"	She relied on an elderly grant to sustain her livelihood and production [**factor strong**], thus **enhancing her resilience**. "As you can see, I live from grant money. But I take from grant money and buy chemicals ..." "…Is the one that provides food to me, even now [September 2020], because the maize I have planted has not yet ripened, ... When I get the grant. I will buy manure again and get a tractor to plough." "We are not living/surviving from selling our produce. We are living on grant...." "We are moving forward with a grant." "If you don't get the grant, you are just falling."	Not a beneficiary of the C-19 relief fund **[factor weak].** The unavailability of C-19 relief vouchers reduces the availability of input thus **diminishing farmer's resilience**. "I didn't receive it; I didn't know how is done."	She grew maize for self-consumption to cope with the impact of lockdown. **[factor strong]**. This increases food availability and reduces the cost of food in the household thus **increasing her resilience**. "…when I planted maize, I will eat it, ... take it to the Milling company, and go and get maize meal." "…is to feed myself, because there is no one who can come a give me the bag of maize meal." "When corn is ready, I will be eating it. "	Farmer dried beans and leafy vegetables in response to the impact of the lockdown **[factor strong]**. The ability of the farm to extend the shelf life of the crop for later use enhances her adaptive capacity during the shock and **increases resilience**. "I just go and cut some and come back and cook and dry it. I have buckets of leafy vegetables because they did not buy them." "4 buckets of dried beans…" "If someone is looking for dried leafy vegetables, I will sell them in the bucket."	No evidence supporting planting off-season **[factor weak]**. The inability to adopt this strategy reduces product demand and profit, thus **diminishing farmers' resilience**	No evidence supporting changing crop patterns [**factor weak**]. The inability to seek alternative crops weakens her adaptive capacity, thus **diminishes her resilience**.	No evidence supporting adopting this strategy. She does not have livestock. The damaged crops were buried for manure **[factor weak]**. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. "Burry everything. it was not bought .... we buried them."	She replanted some of the unsold seeds, this minimises input costs [**factor strong**], thus increasing her adaptive capacity. "If peanuts are not finished, … I will crack open the nuts and go and plant again. No one bought beans. I will take them and re-plant them... if no one comes, I will take the same seeds and plant them.	Not receiving support from social capital networks [**factor weak**]. This hinders the ability to cope with the impact of lockdown, thus **diminishing resilience**. "no one has helped me. The relatives come when they want to take stuff, but they don't give you support. .. relatives don't help you with anything."	**Less resilience** She was unable to access the market and generated no income throughout the assessment period. She coped with the impact of the shock from the elderly grant and additional income from her husband who is also a recipient of the elderly grant. She showed an adaptive capacity by growing crops for self-consumption, preserving, and keeping seeds from previous harvests to replant in the next cycle. This enables the farmer to sustain her livelihood and production. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.
Farmer 10	He accessed various markets **[factor strong].** He supplied corn to the local market. Then later supplied potatoes to various municipal markets. Accessing	The farmer used to deliver some of his produce to the local market. After the production of potatoes, the farmer moved	He generated income from existing businesses **[factor strong]**. Additional income enables the farmer to	Not a beneficiary of either child or elderly grant as he has older kids, and he is 52 years old [**factor weak]**.	Not a beneficiary of the C-19 relief fund [**factor weak**]. The unavailability of C-19 relief vouchers reduces the availability of	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption	No evidence supporting crop preservation. [**factor weak]**. The absence of preservation reduces the farmer's adaptive	Farmer uses an on-season planting strategy **[factor weak]**. The inability to adopt an off-season planting strategy reduces	He introduced a new crop because he received funding for a new crop, and the previous crop was severely affected by diseases	He did not have damaged crops because he managed to sell everything and made a profit. [**factor weak**]. The absence of	No evidence supporting making own seedlings to reduce input costs [**factor weak]**. Non-adoption of this strategy	He relied on mentorship to assist with potato production **[factor strong**]. This enhances the skill capacity of the farmer and	**More resilience** He accessed various market channels which enabled him to generate sufficient income to sustain his livelihood and production. He showed adaptability by hiring trucks to supply municipal markets, which

	these markets enables the farmer to generate income, sustain the livelihood and production and **enhance resilience**. "At the time [level 5] I only had maize. I didn't have a problem myself." "I didn't get any challenge with it because my products [potatoes] were sold in Pretoria, JHB, and Springs fresh produce markets including one in Mpumalanga."	away from doing his deliveries and hired a truck as he was supplying municipal markets [**factor strong**]. The ability to change transport enabled the farmer to send more products and reach more markets, thus **enhancing his resilience.** "I work more on the local market; I do those deliveries with my bakkie to Fruit and Vegetables stores." I didn't get any challenge with it because my products [potatoes] ...." The harvest was two weeks. They were selling out every day. Two trucks were going to all these places, so it took me three weeks to finish it, totally off."	sustain his livelihood and production and **enhance resilience**. "I had other businesses that I was running... retail business and other logistic businesses."	This factor **does not apply**	input thus **diminishing farmers' resilience**. "No, I didn't apply."	reduces food availability, thus **diminishing his resilience**. Nonetheless, the farmer made a profit through the assessment period and had other businesses to sustain his livelihood.	capacity and thus **diminishes his resilience**. However, he did not have surplus crops, as he managed to sell everything, hence this factor was not considered. "They [maize] were ready. I did not dry them because they were in demand." The factor **does not apply.**	product demand and profit and thus **diminishes farmers' resilience**. Although the potatoes were planted in seasons, there was high demand for potatoes which was contributed by limited potato producers in SA. This enables the business to be profitable thus **enhancing resilience**. "The one for potatoes. I am busy planning it so that by next planting season I will be in". They [potatoes] are planted normally in March; the last one was in July."	**[factor strong].** This was not driven by the C-19 crisis driven rather by business needs. Although this is the case, the ability to adapt the production system enables the business to make a profit and **enhance resilience**. "Currently, I was farming citrus fruits,... I want to remove and move into potatoes because the area I am working on is potato bed." "I am removing them [citrus]. ... they had a problem, a disease on the roots, and its maintenance is very much high." "I am deciding to move to potatoes which I will have to harvest twice a year."	this factor reduces adaptive capacity and thus **diminishes farmers' resilience.** "At the time I only had maize. I didn't have the problem myself, I sold everything". The factor **does not apply.**	reduces farmers' adaptive capacity and thus **diminishes his resilience**. However, he got funded for potato production, hence this strategy was not considered. "I got the funding which said which products you can produce. I liked potatoes before, but the problem is that the infrastructure is very expensive. So now that I have been funded with infrastructure."	thus **enhances resilience.** "Because of potatoes, we also have the mentorship through potato SA. ...when I started planting potatoes, they were there and visited me every week to check how is everything and that is why there are not many challenges. whoever plants potatoes on a reasonable scale, normally affiliates with Potato SA. Potato SA has a development project to develop the previously disadvantaged farmers."	enabled him to reach more markets and sell more products. Additionally, the farmer changed crop patterns to improve business profitability. Although this was not motivated by the lockdown impact, it contributed to farmers' resilience. He also relied on additional income from existing businesses to sustain livelihood and production. He connected with a mentor through the social capital network which enhanced his skills and knowledge capacity for producing a new crop. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, his overall resilience remained high.
Farmer 11	He accessed various markets [**factor strong**]. He supplied leafy vegetables to a newly formed market by OSV and supplied fruits and fruit tree seedlings to the local informal market. He generated sufficient income from the OSV market. Accessing these markets enables the farmer to generate	No evidence supporting altering the transport system to meet the changing market conditions [**factor weak**]. Non-adoption of the transport system prevented the farmer from reaching more customers and selling his produce thus	No evidence supporting generating additional income [**factor weak**]. The absence of additional income **diminishes farmers' resilience.**	Not a beneficiary of either child or elderly grant as he has older kids, and he is 52 years old [**factor weak]**. This factor **does not apply**	Not beneficiary of the C-19 relief fund [**factor weak**]. The unavailability of C-19 relief vouchers minimises the availability of input and thus **diminishes resilience**. "I didn't get that one [voucher]"	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes farmers' resilience**. Though the farmer made a	No evidence supporting crop preservation, despite having unsold crops [**factor weak]**. The absence of preservation reduces farmers' adaptive capacity and thus **diminishes resilience**. Instead of preservation, the farmer decided to	He plants crops during the on and off seasons. In level 5, he had mustards and spinach, which were off-season, leading to high demand, he made a lot of money despite market closures, thus enhancing his resilience [**factor strong**].	He introduced new crops because he received manure and seeds from the government [**factor strong**]. This was not C-19 crisis driven but business needs. Although this is the case, the ability to adapt the production system enables	In Level 3, a farmer faced challenges selling produce due to low demand during the season and the easing of lockdown restrictions. To adapt, the farmer trimmed the overgrown leaves and used them as animal feed [**factor strong**]. This cost-	No evidence supporting making own seedlings to reduce input costs. Instead, the farmer supplies tree seedlings as part of the business and typically buys seeds or obtains them from the government during planting seasons.	He relied on family members for financial support to sustain production [**factor strong**], thus **enhancing resilience.** "The money that I will want to borrow, there are kids, I will ask them. Even now, you heard I asked one of my kids to	**More resilience** The farmer accessed various market channels which enabled him to generate sufficient income to sustain his livelihood and production. He adopted an off-season planting strategy before and during the lockdown, resulting in increased demand and generating sufficient profit for the business, despite the market closure. The farmer demonstrated adaptive capacity by repurposing damaged crops into animal feed, effectively reducing input costs and losses. Additionally,

	income, sustain the livelihood and production and **enhance resilience**. “I used to sell all of it in one day then I closed it. I used to sell it every second Thursday. I sold both spinach and mustard on the same day, they both get finished.” “There were not only Muswanas’ people who were buying from me but also people from Dumela, Mavhambe to Malamulele. There were lots of people and cars here. That’s why I was able to sell everything in one day and get finished.” “During lockdown [level 5] I had money, I do not like to lie, but I did not have a problem during the lockdown."	**diminishing his resilience**. Nevertheless, the farmer managed to sell most of his produce during the hard lockdown and made sufficient income, hence this strategy was not adopted. "There were lots of people and cars here. That’s why I was able to sell everything in one day and get finished."				profit at the beginning of the lockdown, also relied on savings made during the lockdown to sustain his livelihood, hence this strategy was not adopted.	use excess crops for animal feed. The factor **does not apply.**	"The first ones I planted them in February [2020]. From March, people were getting spinach and mustards from here." “I used to sell all of it in one day then I closed it... I was able to sell everything in one day and get finished."	the business to make a profit and enhance **farmers’ resilience**. “Like now, the government gave me a lot of seeds. I have maize seeds and butternuts. I want to concentrate on these, end of July 2021 I will start planting maize, and butternuts.”	effective solution reduced input costs for animal feed, thereby **enhancing resilience.** "That time [level 5], I was benefiting. Once they started going to work [level 3], it made things go slow here as they were not buying anymore. I started reducing mustard, I cut it out and gave it to the animals. I have pigs, goats, and rabbits."	Additionally, certain crops grow easily from seeds [**factor weak**]. Non-adoption of this strategy reduces farmers’ adaptive capacity and thus **diminishes resilience**. " Like now, the government gave me a lot of seeds."	buy me chemicals "Thuta". He is my son, and he is at Gibela train. He works there, ... When I’m short of money I ask him..."	although the change in crop pattern was not solely driven by the COVID-19 crisis, it significantly contributed to the farmers’ resilience. Furthermore, the social capital network provided financial support to bolster the production effort. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, his overall resilience remained high.
Farmer 12	She accessed various markets [**factor strong**]. She supplied municipal markets and informal local markets. When her produce was not selling at the municipal market, she sought the alternative market in the local villages. Though the localised market did not yield as much income, she managed to sustain her livelihood and production and **enhance her resilience**. "During C-19, there was surplus, when the JHB market is not open for those things, we have to sell it [locally] ourselves and it is not easy. Because I am used to that, on Wednesday, I go and package and send, and on Sunday I do that. And if you go and find out that we were not even paid for the past 2 weeks [JHB market]. "I post them. For those that don’t go to	The farmer altered the delivery schedule to meet the new demand as the customers were few [**factor strong**]. The ability to change the delivery schedule enabled the farmer to reduce the transport cost, thus **enhancing her resilience**. “When lockdown came, we were having chickens. How do you deliver them? That was not so easy. It’s just that delivering is my problem” “I deliver myself. Once a week, on Fridays over this side, [Thohoyandou] and down there [Nwanedi] now and again. Sometimes when I was slaughtering [chickens] for people. Maybe I would take 2 days	The farmer, a retired principal, relied on pension funds to cope with the impact of the lockdown [**factor strong**]. Additional income enables the farmer to sustain her livelihood and production and **enhance resilience**. "I am surviving from the retirement; we are surviving from retirement.”	She is ineligible for an elderly grant as she is a retired principal [**factor weak**]. This factor **does not apply.**	Not beneficiary of the C-19 relief fund [**factor weak**]. The absence of a C-19 relief voucher minimises the input availability and thus **diminishes resilience**. “I was not approved. We did the application for C-19 relief assistance."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes resilience.** The Farmer relied on retirement money to sustain her livelihood; hence this strategy was not considered.	She grinds red chillies and turns them into spice and sells them in the local market [**factor strong**]. The ability of the farm to extend the shelf life of the crop and seek a market for then enhances her adaptive capacity, thus **increasing resilience.** “…what I did is if chillies are too red because, in the market, they prefer green. There is another old man who grinds them for me, then I put them on a small container of atchar and sell them for R15.” “Those who cooked food they want it, for their customers. Unlike is too red and throw it away.”	No evidence supporting planting off-season [**factor weak**]. Non-adoption of this strategy reduces product demand and profit, thus **diminishing farmers’ resilience**.	The farmer introduced new crops to improve business profit drawing on advice from extension officers and using government-provided manure [**factor strong**]. While this decision was driven by business needs rather than the crisis, the ability to adapt the production system allowed the business to generate profit, thus **enhancing farmers’ resilience.** “I have uprooted all okras, I replace them with patty pans, baby marrow, green beans, and Hubbard squash. I am harvesting baby marrow and patty pans.” “We have started to plant garlic, but the garlic is a long-term thing	No evidence supporting adopting this strategy, even though she has livestock [**factor weak**]. The absence of this factor reduces adaptive capacity and **diminishes resilience**.	The farmer made seedlings using seeds received from her network [**factor strong**]. Additionally, she bought some seeds, effectively reducing input costs, and thus **enhancing resilience**. "She is going to make [plant] the seeds for me, so I have the seedlings, I want to plant them. " " I got the seeds yesterday but even the portion that is left is small.... purchase the seeds, and they were couriered down there.	She relied on local communities to market her produce by sharing information [**factor strong**]. This enables a farmer to reach more customers and generate income thus enhancing resilience Also, some of her networks aided with seeds and skills, enabling her to sustain production. “Those who are not in my phone book that is the problem. But they will get from others the information. Because there are people where I am delivering to I don’t have their contacts. It is only then I got their contacts.” "There is another guy, chief of Mvumoni, he gave me seeds for	**More resilience** The farmer accessed various market channels which enabled her to generate income to sustain her livelihood and production. She relied on pension funds to cope with the impact of the shock. The farmer showed an adaptive capacity by altering the delivery schedule to meet the changing environment. She also makes her seedlings which reduces input costs. She accessed seeds and skills from her social capital network which increased skill capacity and sustained production. enhances her adaptive capacity during the shock. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, the overall resilience remained high.

	the market [municipal], I do the pre-pack and sell them myself." "…I will be selling to the people around here. So, it ends up giving people on credit, even though you were not intending to do that." "Some are still owing, but when they meet you, they say we forgot."	to deliver. When the order was too big during that time, I used to make it half /half. Not do a lot of them at once. For example, they ordered 35 chickens for this particular order, so I checked the route, this one is for Mutale, Thohoyandou, and others Niani. So, I will start first with the Niani people because they are close. Because when customers are far away because okras are not much or many, it becomes a loss. Because I need to travel to those places. I do have small bags that I am selling at R30 for 1.5kg. Imagine if there are only 2 people in Thohoyandou who want those bags, maybe 1 each. Should I come from down there is a game. That's why they must wait for me when I am coming on Fridays. It was a challenge."							because it takes 6 months to be harvested." "Business is improving because I was funded by the Department of Agriculture with manure. I am planting according to the guidance or advised by extension officers, ... we started planting in March [2021... started harvesting now in June [2021]."			chillies, they were calling me because they arrived while I already left to come here and told me they had brought 10kg of seeds. Another lady from Ha-Mukhoma will assist with preparing them for me because I told her I am a grade R learner. Whenever I am looking for information, I will tell you I don't know anything, I am a grade R learner.	
Farmer 13	He accessed various markets. He partnered with farmers supplying Foodflow, and started selling on the streets, then later supplied PnP and hawkers [**factor strong**]. Though the farmer did not make sufficient income at the beginning of the lockdown, the income generated assisted in sustaining the livelihood and production and **enhancing resilience**. "That's when I started to sell on the street. But when you sell on the street, people were not allowed to go on the street, … It affected me a lot."	No evidence supporting altering the transport system to meet the changing market conditions. [**Factor weak**]. The farmer struggled to sell most of his produce. The inability to adapt the transport system prevented the farmer from reaching more customers and selling his produce, thus **diminishing his resilience**.	The farmer's wife is the police, and he relied on her income and sold assets to cope with the impact of the lockdown [**factor strong**]. Additional income enables the farmer to sustain his livelihood and production and **enhance his resilience.** "Is just fortunate enough that my wife helps here and there. She is working at SAPS." **"**I have to sell some of my assets like I was having property stands in Lebowakgomo.	Not a beneficiary of a child grant because his wife works for SAPS, and he is too young for an elderly grant [**factor weak**]. This factor **does not apply.**	Not beneficiary of C-19 relief funds [**factor weak**]. The absence of the C-19 relief voucher minimises the availability of input for production and **diminishes resilience**. "I applied and I was approved and at a later stage, I was told there is no money anymore."	No evidence supporting growing crops for self-consumption [**factor weak**], and thus **diminishes resilience**. However, he relied on his wife to source the food for the household.	No evidence supporting crop preservation, despite having unsold crops [**factor weak**]. The absence of preservation reduces the farmers' adaptive capacity and thus **diminishes resilience**.	No evidence supporting planting off-season [**factor weak**]. The inability to adopt this strategy reduces product demand and profit and thus **diminishes farmers' resilience.**	No evidence supporting changing crops [**factor weak**]. The inability to seek alternative crops weakens his adaptive capacity and thus **diminishes his resilienc**e.	No evidence supporting adopting this strategy, he does not have livestock [**factor weak**]. The absence of this factor reduces adaptive capacity and **diminishes resilience**.	No evidence supporting making own seedlings to reduce input costs. He bought seedlings as normal during plant season even though he did not make a profit at the beginning of the lockdown [**factor weak**]. Non-adoption of this strategy reduces farmers' adaptive capacity, thus **diminishing resilience**. "20000 seedlings, ...they cost you R1. ... I spent R20000 on seedlings."	The farmer relied on his wife to provide food for the household, thereby increasing its availability of food. Two of his friends began sourcing some of the produce from his farm to supply Foodflow [**factor strong**]. Through a social capital network, the farmer was able to generate income, sustain his production and livelihood, and **enhance resilience**. "That's when Farmer 14 phoned me because I knew her from way	**Less resilience** The farmer accessed various market channels which enabled him to generate income. He relied on both assets and his wife's salary to cope with the impact of the shock. Additionally, he accessed the market via the social capital network which enabled him to sell his produce and generate income. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.

	"That's when Farmer 14 phoned me... she said we got this program that we supply people for C-19, ... some of the crops she was looking for, I was having, and they start coming in." "Because every week, she was coming and collect…. per week I was taking about 50 crates… it was a lot" "" "Level 3...That's when I started to supply PnP. I was giving them 300 bunches per week of mustards." They [hawkers] were picking up. "		they were 2 [stands]."									back in terms of, she was having some guys that worked at her backyards. Some of them I was giving training to. She came in and introduced me, she said we have this program that we supply people for C-19, and we need 1,2,3. Fortunately enough, some of the crops she was looking for, I was having, and they started coming in." "Is just fortunate enough that my wife helps here and there."	
Farmer 14	She accessed various markets [**factor strong**]. In level 5, she was connected to the newly formed market via an intermediary [Foodflow]. She also sourced produce from other farmers to supply this Foodflow [**factor strong**]. She also supplied street hawkers and PLK markets. Accessing a newly formed market and other markets enables the farmer to generate income, and sustain livelihood and production, this **enhances farmers' resilience**. "Foodflow was my customer as everything was closed. Foodflow became an angel for us, in terms of people not losing their jobs and not going hungry. ...our food did not go to waste. The farmers were able to sustain their jobs because they did not have anywhere to supply their food. Because of Foodflow, I was able to continue running the farm and sustain it. Foodflow	No evidence supporting altering the transport system to meet the changing market conditions [**factor weak**]. The inability to adapt the transport system prevented the farmer from reaching more customers and selling her produce, thus **diminishing her resilience.**	She has a Biodiesel company [**factor strong**]. Additional income enables the farmer to sustain her livelihood and production, thus **enhancing resilience.** Now [May 2020] we are [Biodiesel] affected by C-19. Since all the restaurants are closed and I get my used cooking oil from them, we are also closed. But something came out a week ago, there is this guy (RDA alumni) who makes Biodiesel from castor seeds. Now I am working in partnership with the guys' company. "	Not a beneficiary of either a child or elderly grant as she has no kids, and she is 28 years old [**factor weak**]. This factor **does not apply.**	Not beneficiary of C-19 relief funds [**factor weak**]. The absence of the C-19 relief voucher minimises the availability of input for production and **diminishes resilience**. " I didn't receive the C-19 relief funds maybe because I got NEFSAS."	No evidence supporting growing crops for self-consumption [**factor weak**], and thus **diminishes resilience**. However, she stays with family members who provided food for her, hence this strategy was **not adopted**.	No evidence supporting crop preservation, despite having unsold crops [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience.**	No evidence supporting planting off-season [**factor weak**]. The inability to adopt this strategy reduces product demand as well as profit and thus **diminishes farmers' resilience.**	She introduces a variety of crops to minimise the impact of relying on a single crop [**factor strong**]. The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience**. "For me, it was just time to harvest, I was just anxious because I had the field filled with butternuts, ..., I was afraid this was going to waste and is a lot of it. That's when I went the most of trying out other vegetables, spinach, tomatoes, your butternuts. A small portion of potatoes."	No evidence supporting adopting this strategy, she does not have livestock [**factor weak**]. The absence of this factor reduces adaptive capacity and **diminishes resilience**.	She implemented a greenhouse to make seedlings for herself and the community. Later the farmer moved completely from being a food producer to a seedling's supplier [**factor strong**]. This enables her to reduce input costs and generate income thus **enhancing her resilience.** "...because of seedlings is a problem of getting it. Sometimes it takes 2 weeks to wait for the seedlings you have ordered. For me, I don't want that challenge, I want to be straightforward, and I want to move swiftly. That's when I said I needed to build my greenhouse in the backyard. In the backyard, ... I am implementing a greenhouse structure to plant seedlings. It is for me and whoever wants to buy it."	The farmer was connected to a newly formed market by a friend who runs Ga-Mphahlele Homecoming. This enables her to generate income and sustain her livelihood and production. Also, she stayed with family members who provided food for the households [**factor strong**]. Also, had support from an agronomist to assist with seedling production, which enhanced her skill capacity. Accessibility of social capital enables the farmer to cope with the impact of lockdown, and thus **enhance resilience**. " I got a link to Foodflow through Founder 2 who runs the NGO called Ga-Mphahlele Homecoming. I come from the same village. Founder 2 called	**More resilience** The farmer accessed various market channels which enabled her to generate sufficient income. She had savings made during the lockdown and additional income from the Biodiesel business. The farmer showed an adaptive capacity by introducing more crops to minimise dependency on one crop. Also, a transition from farming to the seedling supplier. Also relied on social capital networks for market connection and food provision to cope with the impact of the shock. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, the overall resilience remained high.

	…came at the right time to rescue the business." "That particular time, because most of the farmers, we have similar crops, that's when we said we need to outsource and make a variety of other things…That's where we make our cash from." I did [start supplying hawkers in level 4], but it was on a small scale." If I am afraid is going to waste, that's when I considered going to fresh produce [PLK]."										"I am not in farming anymore. I am a seedlings supplier. The reason being you know after C-19, so many people ventured into farming space...I saw potential in the market. That's why I started the seedling supply business. I didn't [replant], I said I am ok, I put my savings together, my budget and I started with this project. I started taking the first batch [selling], ... first week of May [2021]. But what I can tell you is, I never lacked market."	me to find out if I am still doing farming or if I am now focusing on Biodiesel. I said that I am doing both but now since the lockdown, I am focusing on farming. She told me about Foodflow and asked me if I was interested and that's how I became part of Foodflow." "Since October [2020], what was I living on, I think is a grace of God, I have a family. The family was caring for me. I was never in lack and I don't have much responsibility that is there. Is only me. I was never in lack like oh my gosh I don't have this; I don't have toiletry I don't have that." ".... I got an agronomist to help me on the quality, to make me produce the right standard."	
Farmer 15	He accessed various markets [**factor strong**]. He supplied Boxer, Spar, and the local community. Accessing these markets enables the farmer to generate income, sustain the livelihood and production and **enhance resilience**. "…the business was sharp [ok] at the start because most of the people were at home and were supposed to eat. When the bakkie left the farm with the vegetables and made rounds around the village, the vegetables were brought." ".. we did deliver to the supermarkets." "When I started selling mustard, the first week I opened I	No evidence supporting altering the transport system to meet the changing market conditions [**factor weak**]. The inability to adapt the transport system prevented the farmer from reaching more customers and selling his produce thus **diminishing resilience**. However, the farmer managed to sell most of his products during the hard lockdown and made sufficient income, hence this strategy was not applied.	He relied on the taxi business for additional income, [**factor strong**]. This enables the farmer to sustain his livelihood and production, thus **enhancing resilience**. "There are kombis, there are 2… they help here and there."	Not a beneficiary of either child or elderly grant as he has older kids, and he is 52 years old [**factor weak**]. This factor **does not apply.**	Received C-19 relief funds [**factor strong**]. The C-19 relief voucher increases input availability and thus **enhances resilience**. "I got the relief funds from the government."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes resilience**. However, the farmer made a profit at the beginning of the lockdown and had other businesses he relied on to sustain his livelihood, hence the strategy was not adopted.	No evidence supporting crop preservation despite having unsold crops [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience**	Farmer uses the off-season planting strategy before and during lockdown [**factory strong**]. In level 5, he planted mustard and started selling in level 4, because there were no mustards in the market, it created high demand, as a result, the farmer made a profit despite the market closure, thus enhancing resilience. "Level 5, I had not started planting because it was the end of March [2020]. My cycle that I used in farming, is the off-season."	He changed crop patterns due to the lockdown and rain impact. He opted for the low-cost maintenance crops so he could sustain production, but at a reduced scale [**factor strong**]. The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience.** "If it is like this, you must plant stuff that is not expensive. When you start and want to pick up you start with simple stuff like maize, maize is	No evidence supporting adopting this strategy and he does not have livestock [**factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes resilience**.	No evidence supporting making own seedlings to reduce input costs. He bought seedlings and seeds as normal during plant season [**factor weak**]. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes resilience**. "..... I bought seeds for maize and okra because we plant them from seeds. I bought seedlings for tomatoes, mustards, and spinach because they take time if you do your own seedlings. sometimes they	Not receiving support from social capital networks [**factor weak**]. This hinders the ability to cope with the impact of lockdown and thus **diminishes resilience**.	**More resilience** The farmer accessed various market channels which enabled her to generate sufficient income. He adopted an off-season planting strategy before and during lockdown which created high demand and increased business profitability despite market closure. He also relied on the taxi business to lessen the shock impact. The farmer showed an adaptive capacity by introducing cost-effective crops which reduce input costs. He received the C-19 relief fund which assisted with sustaining production. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, the overall resilience remained high.

	made R18000 per week." 'I used to deliver 1000 bunches a day, ... I was able to make R5000 per day from mustards at that time because there was a huge demand."							"…my life cycle is opposite from the other." "…the business was sharp [ok] at the start ..." "At the beginning of the lockdown, most people didn't plant anything, it was an advantage for us." "When I started selling mustard, the first week I opened I made R18000 per week." So, there was high demand for the crops because people were staying at home and not working. There was a shortage of crops, it worked for me who bought it beforehand, the mustard went well, or (were selling fast).	not difficult and is cost-effective. is not expensive, it doesn't need a lot of things, you just plant and put manure, that's it. Okra is not expensive, doesn't need manure, doesn't need a lot of water." "When I go back I must start with the cheapest stuff and have a short life cycle and cost-effective. When I have picked up and sell and win I can jump to other products that are a little bit costly." In August 2021, I went back to the farm. there are maize, tomatoes, leafy vegetables [mustards and spinach] ...is about 3/4ha, tomatoes are 15000 is 1/2ha. Mustard and spinach is ½ ha, so if we add them together is almost 2ha"		die when you transplant them."		
Farmer 16	She accessed various markets [**factor strong**]. In level 5, she was connected to the newly formed market via an intermediary [Foodflow]. In level 3, she supplied Tshwane market, PLK market, and Spar. Accessing these markets enables the farmer to generate income sustain the livelihood and **enhance resilience**. "I had spinach, and I didn't know where to take that spinach as a lot of people were home and were not going to the shops. That's when Foodflow came in and relieved me. I had to take spinach to Foodflow." "So, every 2 weeks, we are going there. To Pretoria and some to Polokwane,	She mostly supplies the local market using her bakkie. In level 3, she hired a truck to supply cabbages to the Tshwane market as her bakkie was small for the quantities being delivered [**factor strong**]. The ability to change transport enabled the farmer to send more products and reach more markets, thus **enhancing resilience**. " I do drive my stuff. I was hiring a truck. So, every 2 weeks we are going there [Tshwane market]. Because I don't have my truck, the trailer was too small and the quantity that they wanted was	The farmer relied on her husband's income to sustain production and livelihood [**factor strong**], thus **enhancing resilience**. "My husband helped me where he can with capital. That's where I get all my capital."	Not a beneficiary of either child or elderly grant as her husband is employed and she is 30 years old [**factor weak**]. This factor **does not apply.**	Received C-19 relief funds [**factor is strong**]. C-19 relief vouchers increase the availability of input for production and thus **enhance resilience**. "This year we have this C-19 relief fund, ... This season, I won't be putting much on my production."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes resilience**. However, the farmer made a profit throughout the lockdown and her husband also provides for the household as he is employed, hence this strategy was not adopted.	No evidence supporting crop preservation [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience.** However, she managed to sell all her produce, hence this strategy was not considered.	Farmer mainly plants in seasons. In 2021, the farmer planted spinach off-season and thus created more demand as compared to cabbages planted during the season [**factor strong**]. Spinach increases income and thus **enhances resilience**. " Spinach is doing good because of off-season and cabbage was not doing good because it was in-season." "With the cabbages, it was a different story, everyone had cabbages but now [September 2021], it seems to be better even though spinach	No evidence supporting changing crop patterns [**factor weak**]. The inability to seek alternative crops weakens her adaptive capacity and thus **diminishes her resilience**. However, the farmer was not severely impacted by the adverse shock, hence this factor was not considered. " It [lockdown] didn't affect us that much because our plants didn't change or anything. It didn't affect my business in any way .." I don't know what to say because I was not affected. During C-19 I was not	No evidence supporting adopting this strategy and he does not have livestock [**factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes resilience**. However, the farmer did not have damaged crops, hence this strategy was not considered.	No evidence supporting making own seedlings to reduce the cost of input [**factor weak**]. The farmer bought seedlings and seeds as normal during plant season. Also, a certain type of crop grows easily from the seeds. Non-adoption of this strategy reduces farmers' adaptive capacity and thus **diminishes resilience**.	The farmer was connected to a newly formed market by her brother. This enables her to generate income and sustain her livelihood and production. Also, her husband provided food for the household [**factor strong**]. Accessibility of social capital enables the farmer to cope with the impact of lockdown, thus **enhancing resilience**. "I got the link from my brother; I do not know where he got it. I just registered myself on the link." "My husband is responsible. My husband helped me where he could with	**More resilience** The farmer accessed various market channels which enabled her to generate sufficient income. She adopted an off-season planting strategy before and during the lockdown which created high demand and increased business profitability despite market closure. The farmer showed an adaptive capacity by hiring a truck to supply the Tshwane market and adopting an off-season planting strategy. This enables her to supply more quantities, reach more customers, sell more products, and generate profit. She received the C-19 relief fund, and access to additional income, which alleviated the impact of lockdown. The social capital network linked her to Foodflow and made provision of food and funds. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, the overall resilience remained high.

	and some, it was local." "I was not supplying them before [lockdown]. Before I was supplying to Polokwane" "In level 1, supplied Lebowakgomo Spar, and the local people."	too much. So, we have to hire a truck. This was during the lockdown."						does make money, I think spinach is better as compared to the cabbages. "	affected you know... I was not affected actually honestly speaking."			capital. That's where I get all my capital.	
Farmer 17	She accessed a single market. Though she managed to move from one market channel to another, she kept operating in one market [**factor weak**]. Participation in a single market channel reduces redundancy and **diminishes farmers' resilience**. "I was selling [before lockdown] locally, putting in my bakkie and going around the streets." "I don't do local anymore. The issue with selling here at a local market is they buy on credit a lot and don't pay." "When I sent my stuff [municipal market], the agent will call me and say we sold everything and deposit the money to me. which means, I get money to buy more seeds to plant again. But locally, it affects me because they just take, take, and not pay. That's why I have changed."	She used to supply the local market and deliver her products to the customers. The farmer moved away from doing deliveries and hired a truck as now she supplies the JHB market [**factor strong**]. The ability to change transport enabled the farmer to send more products to the market, thus **enhancing resilience**. "I was selling locally, putting in my bakkie... is another person in Giyani who told me if you have products, you can send them to Giyani depot they will take them to JHB market. The truck comes on Mondays, Wednesdays, and Fridays." "I started selling on 20 July 2020. This is a truck slip we received when we posted our stuff. "I now	The farmer generated additional income by transporting school kids using her bakkie [**factor strong**]. Additional income enables her to sustain her livelihood and **enhances resilience**. "Month end of April [2020] people started to go back to school ... I also transport school kids after that I come back to the farm. In the morning, I take kids to school afterwards I come to the farm and work and in the afternoon, I go back to pick up the kids and back to the farm again."	She relied on a child social grant to sustain her livelihood and production [**factor strong**], thus **enhancing resilience.** The government also increased social grants by R500 to bring a relieved to the most vulnerable households. "I was just staying at home. I have SASSA." "I have one kid. Is R900 now because of COVID." "I was affected because of the money...I didn't sell anything, and the kids were supposed to go to school..."	Not a beneficiary of C-19 relief funds [**factor strong**]. The C-19 relief vouchers increase the availability of input for production and thus **enhance resilience**. "I got manure and chemicals from COVID-19." "Is R42000."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes resilience**. However, she is not a sole provider and stays at home with her parents, hence this strategy was not adopted. " There are mom and dad at home. They both support [buying food] at home."	No evidence supporting crop preservation [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience**.	No evidence supporting planting off-season [**factor weak**]. The inability to adopt this strategy reduces product demand and profit and thus **diminishes farmer's resilience.**	No evidence supporting changing crops [**factor weak**]. The inability to seek alternative crops weakens her adaptive capacity and thus **diminishes her resilience**.	Crops got damaged as she was unable to access the farm during level 5 lockdown restrictions. The damaged crops were uprooted and used as animal feed [**factor strong**]. This reduces input costs, thus **enhancing resilience**. "I uprooted it [tomato] and gave it to goats and cattle."	No evidence supporting making own seedlings to reduce input costs [**factor weak**]. Instead, the farmer borrowed money to buy seedlings for the next production The absence of this factor weakens the farmer's adaptive capacity and thus **diminishes her resilience**. "I borrowed money from one of my cousins. I went and bought seedlings ..."	She relied on family members for food and input to sustain livelihood and production, and local networks for market access [**factor strong**]. Accessibility of social capital enables the farmer to cope with the impact of lockdown, and thus **enhance resilience**. "There are mom and dad at home. They both support at home." "The bakkie is not mine, is my brother's. I used it, for school kids and the farm." "I borrowed money from one of my cousins. I went and bought seedlings for chillies and green peppers so that I can plant again." ".... is another person in Giyani who told me if you have products, you can send them to Giyani depot they	**Less resilience** She operated on a single market, which increases vulnerability against the shock. The farmer showed an adaptive capacity by using her bakkie to transport school kids and generate additional income using damaged crops for animal feed and reducing input costs. She drew on social capital and access to C-19 relief funds which enabled her to cope with the lockdown impact. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.

		take all my stuff to Giyani depot."										will take them to JHB market."	
Farmer 18	He accessed a single market, the JHB market [**factor weak**]. He made **less** income as his produce we not selling well in the market. Participation in a single market channel reduces redundancy and **diminishes farmer's resilience.** "The challenge was our products were not what local people could use like tomatoes, butternuts. We rely only on the market [municipal]. Chillies they don't buy locally you take it to the market [municipal] because we had planted a lot of it." "Because there was no money to maintain it when is a lot. There was no money that I was generating from way back to be able to resuscitate them fast. Because they were nothing, we were able to sell"	No evidence supporting altering the transport system to meet the changing market conditions [**Factor weak**]. He struggled to sell his produce. The inability to adapt to the transport system prevented the farmer from reaching more customers and selling his produce and thus **diminished his resilience**.	The farmer started a small business to increase income [**factor strong**]. Additional income enables the farmer to sustain his livelihood and **enhance resilience**. "What I am doing now [Oct 2021], I go and stock some tomatoes and sell, but selling here at home, I get some of the crates [tomatoes] and sell them so that I can be able to work."	Not a beneficiary of either a child or elderly grant because he is a retired teacher [**factor weak**]. This factor **does not apply.**	Not a beneficiary of the C-19 relief fund [**factor weak**]. The absence of the C-19 relief vouchers minimises the availability of input for production and thus **diminishes resilience**. "I did not apply. I must have a lease… I don't have a lease… a person just says because the yard I am using is big, you can erect your shack just there and stay there… without papers. you just pay. There is no paper."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes his resilience**.	No evidence supporting crop preservation [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience**.	No evidence supporting planting off-season [**factor weak**]. The inability to adopt this strategy reduces product demand and profit and thus **diminishes farmer's resilience**.	He changed crop patterns because of the impact lockdown which affected both production and income. He opted for the low-cost maintenance crops so he could sustain production, but at a reduced scale [**factor strong**]. The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience**. ".... the decision taken was you better reduce, so that you will be left with the crop that you will be able to manage ...like what we are doing now. We are going to a crop that doesn't require more maintenance. Onion (tube), does not have a lot of pest problems. It does not require manure regularly. Now onion, all it needs is water, but you can put some bags of manure if you have money. In our case, because we don't have money now, we just water them, whenever you find 1 bag of manure then you will put it in so that it can become bigger. Is better because it doesn't have a lot of maintenance and weeding also… in fact, we have just started planting now [Sept 2020]."	No evidence supporting growing crops for animal feed, and he does not have livestock. Instead, damaged ones were buried for manure [**factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**.	No evidence supporting making own seedlings to reduce the cost of input [**factor weak**]. The farmer bought both seeds and seedlings as normal during plant season, although he did not do well. The absence of this factor weakens the farmer's adaptive capacity and thus **diminishes resilience.**	He relied on family members to assist with crop maintenance [**factor strong**]. This reduced the cost of maintenance and thus **enhanced resilience**. "We have to go as a family as I said, I am working with my young brother, He will bring his kids and I will bring mine and we help each other to weed, spray pesticides, just to reduce the expense of labour. Because there was no money."	**Less resilience** He operated on a single market, which increased vulnerability against the shock. The farmer showed an adaptive capacity by changing crop patterns to low maintenance costs and started a new business to generate additional income. He relied on family members for labour which reduces input costs. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.
Farmer 19	No access to the market at all [**factor weak**]. The farmer **did not** generate any	No evidence supporting altering the transport system	She started a small business to increase her income. She also	She relied on child grant to sustain her livelihood and	Not a beneficiary of C-19 relief fund [**factor weak**]. The	She grew maize for self-consumption to cope with the	No evidence supporting crop preservation [**factor weak**],	No evidence supporting planting off-season [**factor**	She introduces maize for self-consumption, instead for	No evidence supporting growing crops for animal feed, and	No evidence supporting making own seedlings to	She relied on a family member for financial support to sustain	**Less resilience** She has no market access and generates little income. She showed

	income, thus diminishing resilience. "When lockdown started, there was okra…. there was a vegetable called mustard, and tomatoes somewhere there. Eish... I didn't sell anything, even R500 I didn't get." "I did sell for local people. But it is not the same, because here they buy for R10, R10. Those who came and knocked at the door looking for tomatoes for R10 were available. But most of them, I didn't have a market, so I didn't sell anything."	to meet the changing market conditions [**Factor weak**]. The inability to adapt the transport system minimises the farmer to reach more customers and sell her produce and thus **diminishes resilience.**	generated other income from delivering wood using bakkie and selling water for people around the village [**factor strong**]. Additional income enables the farmer to sustain her livelihood and production, thus **enhancing resilience**. "What I survive with now [Sept 2020], I have water at home. This village does not have water. What I survived with now is selling water to people. I sold 30 buckets for R100." "Someone comes and says I chopped wood in the bush, and I have R150." "…. started selling sweet potato in November [2020]" I am surviving from selling sweet potatoes... I even take sweet potato money and buy seedlings. Sweet potato business is going well…."	production [**factor strong**], thus **enhancing resilience**. The government also increased social grants by R500 to bring a relieved to the most vulnerable households. "I have 3 kids. I have to take grant money so that I can be able to buy seedlings so that I can be able to plant." "There is no other income I get except a grant, which is the one I am able to survive with." " I got that one, R500 increase. I got R1800 for 3 kids."	absence of the C-19 relief vouchers minimises the availability of input and thus **diminishes resilience**. "I am talking about it [C19 relief fund], they said it is not approved, for me to get it."	impact of the lockdown [**factor strong**]. This increases food availability and reduces the cost of food in the household thus **increasing resilience**. "I planted maize, there was maize, do you see maize you just plant, they don't have problems. I don't sell maize, when I planted maize, I wanted to make maize meal so that I can be able to eat at home." "I planted maize in November [2020] because I harvested around January and February [2021]" "I planted on 2ha. I managed to have enough harvest even now [24 Sep 2021] I am still eating maize meal from it." "Maize helps a lot, maize helps because since January [2021]. I haven't bought maize meals."	despite having unsold tomatoes. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience**.	**weak**]. Non-adoption of this strategy reduces product demand and profit, thus **diminishing farmer's resilience**.	business due to lockdown impact. [**factor strong**]. The ability to adapt the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience**. ": I planted maize.... do you see the maize you just plant them; they don't have problems., I wanted to make maize meal so that I can be able to eat at home."	she does not have livestock. [**factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**.	reduce input costs [**factor weak**]. Instead, the farmer loaned money to buy seedlings and seeds for the next production. The absence of this factor weakens farmer's adaptive capacity and thus **diminishes resilience**. "Then, the lockdown was extended, and I went and borrowed or made credit and bought tomatoes, seeds of tomatoes. "	her livelihood and production [**factor strong**]. Accessibility of social capital enables the farmer to cope with the impact of lockdown, and thus **enhance resilience**. "I got support from my sister. Sometimes she gave me, R500, and R1000 to buy something to eat."	an adaptive capacity by selling water to the villagers, delivering wood, and starting new a business to create additional income. She also adapted her production by introducing new crops and growing for self-consumption to cope with the lockdown impact. She also relied on a child grant and family for additional income. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.
Farmer 20	He accessed various markets, retail in JHB, and local markets in the village [**factor strong**]. He started farming in level 3 and selling in level 1 when movement was less stringent. This enabled income generation, sustaining livelihood and production, thus **enhancing resilience**. "Vegies went to different locations, .. went to the taxi rank, … to Lebowakgomo, and Sefhalawo. We didn't struggle at that time we were selling."	No evidence supporting altering the transport system to meet the changing market conditions [**Factor weak**]. The inability to adapt the transport system prevented the farmer from reaching more customers and selling his produce and thus **diminished his resilience**.	This farmer is a councillor at the local municipality [**factor strong**]. Additional income enables the farmer to sustain his livelihood and production and enhances this farmer's resilience. "I am a politician. I am a councillor in our municipality." "I am the only person who is employed."	Not a beneficiary of either child or elderly grant because he is a councillor [**factor weak**]. This factor **does not apply.**	Not a beneficiary because he is a councillor [**factor weak**]. The absence of the C-19 relief voucher minimises the input availability and thus **diminishes resilience**. "I can't even qualify to apply for government." "… because I am a public servant."	No evidence supporting growing crops for self-consumption [**factor weak**]. The inability to grow crops for self-consumption reduces food availability and thus **diminishes resilience**. However, the farmer works as a councillor and started farming in lockdown, hence this strategy was not considered.	No evidence supporting crop preservation [**factor weak**]. The absence of preservation reduces his adaptive capacity and thus **diminishes resilience**. However, he did not struggle to sell his crops as they were ready to harvest in level 1 when the movement restriction was less stringent and could market access, hence this strategy was not considered.	No evidence supporting planting off-season [**factor weak**]. Non-adoption of this strategy reduces product demand and profit and thus **diminishes farmer's resilience**	No evidence supporting changing crops [**factor weak**]. The inability to seek alternative crops weakens his adaptive capacity and thus **diminishes resilience**.	No evidence supporting growing crops for animal feed, and she does not have livestock. [**factor weak**]. The absence of this factor reduces adaptive capacity and thus **diminishes farmers' resilience**. He sold his crops in September 2020 when restrictions were less stringent. Therefore, there were no damaged crops.	No evidence supporting making own seedlings to reduce input costs. [**factor weak**]. The absence of this factor weakens farmer's adaptive capacity and thus **diminishes resilience**. .	He received capital from his comrades to start farming. Farming was started in response to the lockdown. Accessibility of social capital enables the farmer to cope with lockdown impact, and thus enhance resilience. "Just that we are good at fundraising. We are very good at that. We asked our comrade to assist. Yes [received funds], in the form of donations. We	**Less resilience** The farmer accessed various market channels which enabled him to generate income. He is a public servant and generates additional income. He tapped into social capital for funds to start farming to minimise the lockdown impact. He failed to sustain production as there were not enough funds to continue after one cycle. Despite the presence of these factors, they were not sufficient to offset weak factors, therefore the overall resilience remains low.

	"We got the call from them [JHB]. We supplied them..."											didn't have the capital of our own to start our own business. What we did we have requested R10000 from one of the guys that we know."	
Farmer 21	She accessed various markets [**factor strong**]. She supplied chickens and corn locally and supplied other livestock in the local market. Accessing these markets enables the farmer to generate income, sustain livelihood and production, and **enhance resilience**. "What I was able to sell during lockdown [level 5] was chicken, people were buying chicken only." ".. people were selling my corn. I realized that I had planted little maize as people from Malamulele were coming, and from Thohoyandou were also coming. It closed the gap. The money I got from selling corn is R26000. This corn bought me a machine, paid the workers, and electricity." "I have sheep [level 2 &1], now people are coming in slowly, 1 by 1. Like today, someone called and said was looking for 5 pigs."	No evidence supporting altering the transport system to meet the changing market conditions [**Factor weak].** The farmer struggled to sell her livestock. The inability to adapt the transport system prevented the farmer from reaching more customers and selling her produce and thus **diminished her resilience**.	The farmer generates additional income from the tuckshop, salary, and her husband's pension [**factor strong**]. Additional income enables the farmer to sustain her livelihood and production and **enhance resilience**. "I have a tuck shop by the farm, people come and take eggs and pay end of the month." "My husband is a pensioner." "I have been working for 3 years. I was here at the cash loan."	Not a beneficiary of an elderly grant although she is 60 years old because her husband is an ex-government employee **[factor weak]**. This factor **does not apply.** " I am turning 60 years from 15 June 2020. Is just that I don't qualify for a grant." "I don't qualify because of my husband. He was working. They are very strict with a grant. If a person was working and not earning less than R5000 does not qualify to get a grant. Because I am married, if I was not married."	A beneficiary of C-19 relief funds [**factor strong**]. The C-19 relief voucher increases the availability of input and thus enhances resilience. "When Didiza gave people C-19 relief, I was one of the people who received R45000. They gave us a voucher and I went to NTK to get the stuff." "cattle feed, vaccine and medicine."	No evidence supporting growing crops for self-consumption [**factor weak**], and thus **diminishes resilience**.	No evidence supporting crop preservation [**factor weak**]. The absence of preservation reduces the farmer's adaptive capacity and thus **diminishes resilience**. However, she did not struggle to sell corn, hence strategy was not considered.	No evidence supporting planting off-season [**factor weak**]. Non-adoption of this strategy reduces product demand and profit and thus diminishes farmer's resilience.	She introduces a new crop in response to the shortage of animal feed or lack of income due to market closure [**factor strong**]. The ability to adapt to the production system enables the farmer to cope with the impact of the shock and thus **enhance resilience**. "I just learned planting in March [2020]; … I was just taking a risk and seeing how it goes. My reason for planting maize was I wanted stalks because animal feed is difficult to find now."	She started growing maize during the lockdown in response to the shortage of animal feed [**factor strong**]. The farmer was able to reduce animal feed costs and also made income in the process thus enhancing her adaptive capacity. "I started planting just now [2020]. My reason for planting maize was I wanted stalks because animal feed is difficult to find now." … I sold corn, and after that, I got stalks and grind them and made cattle feed. That's what I realised that it helped me to cut a lot of expenses because the stalk didn't go to waste."	No evidence supporting making own seedlings to reduce input costs. [**factor weak**]. The absence of this factor weakens the farmer's adaptive capacity and thus **diminishes her resilience**.	She relied on her social capital network for skill and knowledge to produce maize since it was her first time growing it [**factor strong**]. This enables her to generate income and produce stalks for animal feed, thus **enhancing resilience**. "Like maize, I didn't know that I was supposed to spray them with chemicals. So, Maswanganyi helped a lot. That man knows that when they come out [germinate], we spray them, what to do we do when we plant. He supported me at the same time he was teaching his workers. If Maswanganyi was not there, it was not going to work."	**More resilience** The farmer accessed various market channels which enabled her to generate sufficient income. She also relied on a tuckshop, salary, and her husband's pension to cope with the lockdown impact. She showed an adaptive capacity by introducing new crops to respond to the animal feed shortage, this enabled her to generate income and reduce the cost of input. She received the C-19 relief fund which assisted with production. She relied on social capital for skills and knowledge transfer, which enabled her to sustain production. Despite the absence of other factors, either due to minimal impact or reliance on alternative factors, the overall resilience remained high.

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