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Utilizing the water-land-food security nexus to review the underperformance of smallholder farmers in the Eastern Cape, South Africa

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Supporting agriculture is crucial if food security and poverty alleviation are to be assured. In that regard two crucial aspects - water and land are central to supporting smallholder farmers. This is especially true for the Eastern Cape Province of South Africa with its high rates of poverty and food insecurity. However, attention is seldom given to the fundamental factors of farm production. Access to land for food production in the Eastern Cape is problematic, as is the water situation. It is among the driest provinces in the country, enduring extended drought conditions with resultant water scarcity challenges. This is compounded by poor adaptation strategies deployed by smallholder farmers. This study investigated the relationship between water, land and food security with respect to smallholder farmers in the Eastern Cape. It found that while both food security and incomes could be improved for these smallholder farmers if they had more access to land and water, these two factors alone are insufficient. These farmers also need access to agricultural extension services, markets, cost-effective transport and capital. Although the commercialization of these farmers is a way to improve rural livelihoods, the prevailing conditions in the province significantly inhibit this.

KEYWORDS

water-land-food security, smallholder farmers, climate change, adaptation, Eastern Cape, commercialization

1. Introduction

Promoting small scale localized agricultural production is essential to ensure food security and economic development in the rural regions of the developing world. This is especially true for the rural communities of Sub-Saharan Africa (SSA). However, this requires access to both land and water as they are indispensable factors of food production (Villamor et al., 2018; Rao et al., 2019). But, according to the World Economic Forum [WEF] (2022), the relationship between access to water and land as imperatives for food security for smallholder¹ SSA farmers

¹ Smallholder farmers are generally those involved in farming a small piece of land, cultivating food crops, sometimes with small varieties of cash crops. They usually practice mixed crop-livestock farming with some large ruminants around 3–5 managed by family labor primarily for subsistence (Lowder et al., 2016).

is given insufficient attention. For one, emphasis on proper stewardship of the land, water and other natural resources is lacking (Tantoh et al., 2022). Additionally, increased climate variability, temperature instabilities and unreliable rainfall are a serious threat to small scale African farmers (Engelbrecht, 2019). As a result, many rural dwellers have to supplement income with remittances, work in non-farm activities or rely on social support services.

Studies have shown that the historical roots of food insecurity in developing countries are deep (Kalibwani, 2005; Ngumbela, 2021). For example, the era of colonialism saw great emphasis on the production of cash crops, such as cotton, coffee, sugar cane, cocoa, and tobacco. These were usually sold to the 'mother' country, that is the colonial power, with the purpose of sustaining industries in these colonial countries. This was obviously to the detriment of local food production (Kalibwani, 2005). Furthermore, colonial infrastructure was geared toward the transportation and marketing of cash crops and raw materials (timber, minerals). This is one reason why most SSA have no grain silos. This contrasts with South Africa with over 400 grain silos, built to support local maize production, which was primarily for local consumption. Additionally, expats from the various 'mother countries', the United Kingdom, in particular, were encouraged to move to SSA and take up farming. To give these expats a competitive advantage, many small-scale African farmers were systematically undermined, facing many challenges such as being deprived of land, access to water and limitations in terms of bringing their food crops to market. Thus, small-scale SSA farmer contributions to agricultural growth was retarded and even post colonialism struggled to gain ground. As a result, the annual growth of agricultural advancement in the Southern Africa Development Community (SADC) is only 1.5% *per annum*, far too low to keep an ever-expanding population fed (Southern African Development Community [SADC], 2013). This situation is compounded by frequent natural disasters such as floods and droughts, insufficient investment in the sector, lack of political will, political instability and war, as well as value volatility of agricultural goods. Protectionist conduct by European countries regarding their own merchandize and markets further inhibits agricultural exports in the region (Southern African Development Community [SADC], 2013).

In recent years, extreme weather events, ranging from severe droughts (such as that in the Western and Eastern Cape) to major flooding (such as in Mozambique, Durban and Johannesburg) have presented additional challenges to food security, particularly among poor rural households, who often have limited capacity for adaptation (Wheeler and Kay, 2010; Simatele and Simatele, 2015). Many SSA countries are extremely vulnerable to changing climatic conditions due to their geographical location, low incomes, inadequate technological development, fragile institutional capability, prevalence of HIV/AIDS and vector-borne diseases, inadequate government mechanisms, rapid population growth, as well as their reliance on climate-sensitive renewable natural resources such as water, agriculture and energy (Anyadike, 2009; Eboh, 2009). That is, SSA countries are exposed to increasing desertification, deteriorating run-off in river basins and declining soil fertility. These factors compromise economic growth and national development. Each risk factor is elevated in remote rural areas, home to many female subsistence and smallholder farmers (Wheeler and Kay, 2010). As a result, increased food production is hampered, resulting in pervasive poverty, hunger, inequality and social instability (Ahmed and

Chamhuri, 2013; Wichelns, 2015). In such circumstances, sustainable livelihoods are but a pipe dream. But improving food production and alleviating poverty require pragmatic reforms within the agriculture sector such as the application of Climate Smart Agricultural² (CSA), Integrated Land Use System³ (ILUS) and farmer empowerment. However, several SSA countries have initiated projects to improve food security and reduce poverty, particularly in rural areas. This has been possible through agricultural policies, stressing on particular aspects and axes. The South African government, for example, has a fundamental role to play in rebuilding the economy by reducing disparities, increasing incomes and employment opportunities for the poor. This has been facilitated by the agricultural policy which is geared toward building an efficient and internationally competitive agricultural sector, supporting the emergence of diverse structures of production by increasing the numbers of profitable smallholder farming establishments and preserving agricultural natural resources for sustainability.⁴ Thus, land and agricultural policies through acts [The Animal Diseases Act of 1984 (Act No. 35 of 1984)], The Marketing of Agricultural Products Act, 1996 (Act No. 47 of 1996 etc.) are designed to accommodate diversity of food production and improve food security. These acts and changes in the sector are part of broader processes of rural development, which include land reform, investment in water supply and transport infrastructure, and improved social service delivery. In this regard, access to land and water by smallholder farmers is critical (Ayamga et al., 2022).

Several studies have been conducted on access and stewardship of land and water by smallholder farmers (Villamor et al., 2018; Rao et al., 2019), food insecurity (Kalibwani, 2005; Ngumbela, 2021); poverty, hunger, inequality and social instability (Ahmed and Chamhuri, 2013; Wichelns, 2015) climate variability and food security among smallholder farmers (Ebhuoma et al., 2020; Tantoh et al., 2022), marketing, commercialization and livelihoods of smallholder farmers (Ngumbela, 2021), adaptation to changing climatic conditions by smallholder farmers (Simatele and Simatele, 2015; Kom et al., 2020) among others. However, research on water-land-food security nexus and the underperformance of smallholder farmers is limited. This study, therefore, examines the persistence of poverty among vulnerable rural communities in the Eastern Cape Province of South Africa. Poverty is at extreme levels in the Eastern Cape with 70% living below the poverty line, 10 percent above the national average of 60% (Ngumbela, 2021). As a consequence, most households in the province are food insecure, this includes most smallholder farmers. Thus, one way of alleviating poverty and promoting food security is an increase in the agricultural productivity of these farmers, although this would have to be in conjunction with reducing food losses and waste (Climate Summit, 2014). A central question is how access to land and water by these farmers.

2 Climate-smart agriculture is an approach that helps to guide actions needed to transform and reorient agricultural systems to effectively support development and ensure food security in a changing climate.

3 This refers to combination of different types of land uses and integrates several management goals in the same space for sustainable outcomes.

4 <https://www.gov.za/documents/agricultural-policy-south-africa-discussion-document>

2. Water-land-food security nexus in a developing world context: a literature review

In recent years, there has been an increasing interest in the notion of the Water-Land-Food Security (WLF) nexus as a possible approach to attain sustainable rural livelihoods. Crucially, the [World Economic Forum \[WEF\] \(2022\)](#), views unsustainable livelihoods as a significant threat to the global economy. A threat made worse by the COVID-19 pandemic, its associated lockdown and the Russian-Ukrainian war. The WLF nexus is an important aspect of global peace and security nexus, fundamental to social and economic development. The Overseas Development Institute ([Overseas Development Institute \[ODI\] et al., 2012](#)) further acknowledge that challenges associated with the increasing world's population, growing urbanization, changes in consumption, land-use patterns and climate change impact severely in this WLF nexus ([Spire et al., 2014](#); [Tantoh et al., 2021](#)). The notion of the nexus, therefore, mirrors the different components of WLF and recognizes the roles of and relationship of these diverse resources for sustainability.

The nexus of WLF has been extensively documented ([Rasul and Sharma, 2016](#); [Dombrowsky and Hensengerth, 2018](#); [Villamor et al., 2018](#); [FAO, 2021](#)). Despite this, the applicability and sustainability of and WLF view is yet to be understood and assured ([Tantoh et al., 2021](#)). Importantly, many studies and interventions only focus on water or food to the detriment of land, despite it being a crucial factor of production. This is partly because civil unrest is often associated with food and water scarcity, Syria being one recent example. Agriculture also places pressure on freshwater resources, a significant problem for arid and semi-arid countries with expanding populations and competition for scarce water resources ([International Fund for Agricultural Development \[IFAD\], 2012](#)). Within this context, smallholder farmers often lack the financial, social and political capital to secure access to adequate water. However, in rural economies, food security and poverty alleviation also require access to land ([Rasul and Sharma, 2016](#); [Villamor et al., 2018](#); [Ayamga et al., 2022](#)). Thus, the Food and Agricultural Organization highlights land as the basis for food security. They are supported in this by the declarations of the 2021 United Nations Food Systems Summit ([FAO, 2021](#)). It is, therefore, imperative to acknowledge land, is a vital resource, on which 98% of the world's food is produced. Appropriate stewardship of land, especially soil health is therefore critical to improving food security, improving rural livelihoods and building environmental and community resilience. Effective and efficient land and soil management reinforces nutritious, varied diets and resource-efficient value chains.

2.1. Food security for poverty alleviation among smallholder farmers

The literature on smallholder farmers recognizes the contribution of the farming sector in developing countries to income generation and economic growth. It is also the main driver of rural development in many economies in SSA ([Engelbrecht, 2019](#)). Smallholder production, for example, is a key source of rural employment, livelihoods and wellbeing. Smallholder farm also contribute to local and national food security ([Nwanze, 2011](#); [Landesa, 2014](#)). Despite

this smallholder farms in SSA are generally small, usually under two hectares ([Rapsomanikis, 2015](#); [Lowder et al., 2016](#)). These smallholder farmers lead the agricultural sector in Africa, contributing 75% of agricultural, 50% of livestock production, despite these farmers being poor and food insecure themselves ([Lowder et al., 2016](#)). However, access to, and proprietorship of land by smallholder farmers is a challenge despite sufficient arable land in Africa ([Jayne et al., 2014](#); [Rapsomanikis, 2015](#)). Furthermore, there has been a steady reduction in farm sizes coupled with limited access to markets ([Jayne et al., 2014](#); [Rapsomanikis, 2015](#)). Hence, natural resource overexploitation and land degradation prevails, creating a vicious circle of food insecurity and poverty ([Khanal et al., 2021](#)).

Rapid urbanization and population growth in SSA have increased food demands ([Wichelns, 2015](#)). Thus, accessible, available, affordable, stable and use of food is critical to food security. Importantly, the availability of quality and nutritious food could be limited by production systems, distribution channels, exchange and marketing mechanisms. The ability to get the required amount of food to be used appropriately to meet nutritional needs is, therefore, fundamental to food security. Additionally, food insecurity can be long-term or temporary ([Healthypeople.gov, 2021](#)). However, climate crisis places national food security across SSA in jeopardy. Food insecurity is also affected by race/ethnicity, disability, and employment. When there is limited or no money, the risk for food insecurity increases ([Healthypeople.gov, 2021](#)). Thus, poor residents of lower-income countries are particularly vulnerable, given their limited ability to modify production and consumption activities ([Ebhouma et al., 2019](#); [Kom et al., 2020](#)). But land use intensification has led to the expansion of agriculture into fragile ecosystems systems, degrading natural resources. In view of the multiple demands of land and water resources, it is important to take planning and management decisions to the lowest possible level to empower all the stakeholders ([Musavengane et al., 2019](#)). In this regard, strong partnerships between resource users, the private sector and the government are required to achieve more effective and efficient water and land management approaches ([Dombrowsky and Hensengerth, 2018](#)). Additionally, integrating natural resource management with climate change adaptation will help reduce risks and increase the resilience of vulnerable households.

2.2. Smallholder farmers in the Eastern Cape-South Africa: opportunities and challenges

The arrival of the Dutch East India Company in 1592 launched a period of conflict, urbanization and colonialism in South Africa. Ultimately people of color ended up with limited access to land, water and agricultural support compared to white farmers ([Ngumbela, 2021](#)). This inequality was a major concern of the African National Congress (ANC) government that came to power in 1994. The result was the launch of a land reform program, ostensibly to reverse this injustice. But most land reform projects launched by the ANC have achieved, at best, limited effectiveness with some complete failures. Thus, the needs of smallholder black farmers are still mostly unmet ([Altman et al., 2009](#)). While the land tenure and administration situation in the former homelands is precarious, the land tenure system in South Africa is inconsistent ([Eastern Cape Socio-Economic](#)

Consultative Council [ECSECC], 2010). Even though individuals are seldom placed under the threat of actual eviction, for example, their tenure can hardly be described as secure. This is because the value of the land rights is low and the extent of the rights is limited, especially as they cannot be traded. Furthermore, the State capacity is inadequate, and the land reform is complex and time-consuming (Cousin, 2005). Despite this, small-scale farmers are not non-productive and can be very profitable if the government lowers transactional costs and reduce the barriers facing smallholder farmers comprising; access to land, credit insurance, information and market (von Loeper et al., 2016).

On the one hand, smallholder farmers in South African are relatively unproductive, producing, at best, just a quarter of commercial farm output (Hendriks, 2014). Similar studies in India revealed that smallholder farmers usually have low incomes mainly due to low harvest prices, high cost of inputs and small operational holding size (Reddy et al., 2019). It is possible that smallholder farmers in the developing world generally face the same challenges as far as productivity is concerned. On the other hand, however, smallholder farmers are a major source of employment and livelihoods, supporting around three million people (Biénabe et al., 2011). Statistics South Africa (2017) noted that in the Eastern Cape 28 percent of households reported being involved in agriculture. While some of these households are associated with commercial farms (mostly white or corporate-owned) the rest (around half a million) are small scale farmers, located mostly in former South African 'homelands' of the Transkei and Ciskei (Aliber and Hall, 2012). In the Eastern Cape, for example, about five million hectares of land are under communal land ownership, cultivated by smallholder farmers on farms often under two hectares in size (Nyondo and Nkwinti, 2003). This region practices two main types of cropping systems: (1) home gardens - fenced plots of land between 0.1–0.5 ha close to the residential site and (2) outfields - situated on the outskirts of the villages and ranging in size from one to five hectares.

Technology use is extremely limited, in part due to inadequate technical know-how (Landesa, 2014). Additionally, around 17 percent of these households consist of unschooled people who have, at best, inadequate farming skills. Furthermore, the region suffers from inadequate agricultural infrastructure, extensive soil degradation and erosion, and poor economic conditions. As a result, production from these farms usually only feeds the household. What limited excess output there is, is primarily sold in local markets (von Loeper et al., 2016). These rural communities have also been badly affected by extreme weather events. Pereira (2017) notes the region has endured the worst drought in a century, making surface water an extremely scarce resource. The drought has aggravated poverty as many smallholder farmers struggle to cope in adverse environmental conditions. They often do not receive vital information timeously, lack insurance to recover from losses and social support networks cannot cope with multiple concurrent demands (Ebhuoma et al., 2020). Long dry spells often result in complete crop failure as most smallholder farmers cannot afford to irrigate or lack access to sufficient water to irrigate (Tantoh et al., 2022). Studies show that farmer distress is a widely recognized problem in the developing world and has multiple causes ranging from climate variability to price volatility and the low risk-bearing ability of farmers (Reddy et al., 2021). Thus, tracking farmers' distress in a localized context is a prerequisite for timely action to provide sustainable livelihood options. Although the

challenges are multiple, it has been argued that empowering smallholder farmers and including them in the mainstream agricultural economy will help improve food security. Thus, smallholder agriculture has been identified as a vehicle for rural poverty reduction and development in the Eastern Cape (Department of Agriculture, Forestry and Fisheries [DAFF], 2014; Ngumbela, 2021). Empowerment can be in the form of capacitating them with basic farming skills, marketing of farm produce, facilitating access to credit facilities and ensuring access to appropriate weather information and even processing of farm produce (Ebhuoma et al., 2020).

3. Materials and methodology

3.1. Description of study site

The Eastern Cape province came into being in 1994 by the fusion of the former Bantustans of the Transkei and Ciskei with portions of the Eastern Cape (see Figure 1). It is one of the largest provinces by size and has a population of around 6.5 million. The province comprises mountain ranges (the southern Drakensberg), rippling hills, sandy beaches and patches of temperate forests, creating a varied climate. In the western half, winter is frosty, with occasional snow on the mountains, while summers are relatively dry. In contrast, winters in the eastern part is not as cold with wet, relatively hot, summers. The eastern coastal areas experience a Mediterranean climate with and a sub-tropical one with high rainfall and humidity during summer along its western coastline. The northern part is beyond the escarpment and is semi-arid. Summers are very hot, winters are cold with occasional heavy snowfalls on the mountains. These different climatic conditions strongly affect agricultural production, with water challenges significantly hindering agricultural productivity.

Population wise the province is dominated by Xhosa people who traditionally focused on cattle herding. Commercial farmers, most of whom are white people, focus on wool (mohair, angora) fruit, dairy and grain production. Value add is low, however, with the agricultural sector only contributing 2 % to the economy of the province (Department of Agriculture, Forestry and Fisheries [DAFF], 2014). Thus, the Eastern Cape is predominantly a rural economy with low productivity rates, despite the smallholder farm sector being one of

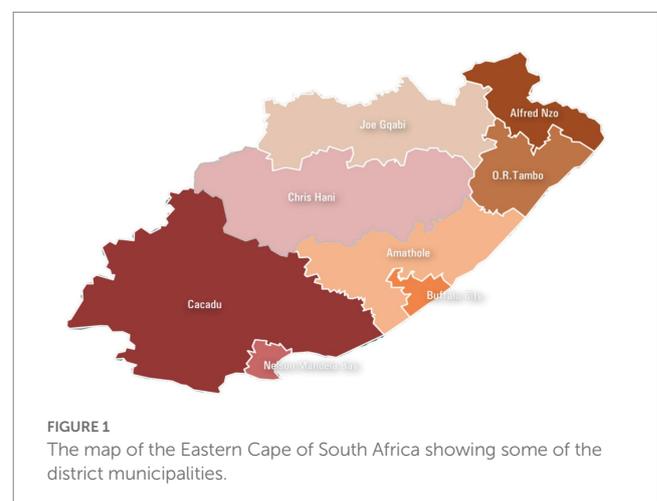


FIGURE 1
The map of the Eastern Cape of South Africa showing some of the district municipalities.

the largest in South Africa (Community Survey, 2016). High poverty rates mean many households rely on social grants, such as the old age grant and child support grant (Chakona and Shackleton, 2019; Statistics South Africa, 2019; Mujuru and Obi, 2020). Although social grants have a positive effect, they need to be combined with access to essential services and the creation of employment opportunities to be effective in the long run.

3.2. Data collection

As food insecurity in rural areas cannot be separated from access to land and water, this systematic review examined academic literature where the nexus of water-land-food security was investigated with respect to smallholder farmers in the Eastern Cape Province. A four-stage process was used to gather appropriate academic literature. Firstly, keywords such as 'water-land-food security', 'smallholder agriculture', 'poverty alleviation', 'commercialization of agricultural products', and 'food value chain' were inserted in the search engine of internet databases of Google Scholar, PubMed, Science Direct, and Scopus (see Figure 2). Literature emanating from South Africa itself was given priority. This phase identified 721 possible articles and working papers. The second stage consisted of scrutinizing the documents to determine if they adhered to the key themes of the study. As a result, 415 articles were rejected. Then the abstracts were further screened, leaving 185 articles. Lastly, scrutiny of the texts found an additional 14 as irrelevant, 15 were duplicates and 18 were without full texts. Thus, these were excluded. In summary, a total of 08 qualitative syntheses, 52 quantitative (meta-analysis), 02 reports from Statistics South Africa, 01 dissertation and 13 reports from ODI, IFAD and FAO were explored. These 74 texts form the basis of this study.

4. Analysis and discussion

4.1. Agricultural overview

The Eastern Cape has a parallel agricultural system: a commercial agricultural system owned mostly by white farmers and corporations and a smallholder household farming sector mostly in Black African hands (Mmbengwa et al., 2015). There are also vast areas of unused land. Despite this, the literature presented empirical evidence that smallholder farmers or household farms have been identified as vehicles of employment opportunities, by the ANC government, in part because smallholder farming is viewed as labor-intensive (Zantsi et al., 2019). That is, although individual smallholder farm requires less labor per farm, as a collective, they have many more employment opportunities than commercial farms (Mmbengwa et al., 2015). Most smallholder farmers in the Eastern Cape focus on the home gardens, which receive more inputs than the outfields. Mandiringana et al. (2005) emphasized that most outfields have been steadily abandoned over the past 60 years. Additionally, the size of farms in the Eastern Cape vary significantly. The size of farms is directly related to the different administrative regimes in the province. One regime is the former Cape Provincial Administration (CPA) while the second pertains to the former homelands (Eastern Cape Socio-Economic Consultative Council [ECSECC], 2010). The CPA farms are medium

to large, and mostly owned by private individuals or commercial operators. The former homeland areas fall under a type of communal tenure system. A major challenge of communal tenure is the lack of cadastral clarity. This dualistic nature and division between commercial, large-scale farming and the struggling smallholder sector is a direct result of historical patterns of dispossession (Neves et al., 2009). The communal tenure system lacks economic assets, agricultural support services, market access and appropriate infrastructure. Thus, post 1994 projects initiated to support farmers on communal land to acquire more land have been ineffective (Altman et al., 2009). Thus, there is a lack of agricultural led entrepreneurial activity with the agribusiness sector in the Eastern Cape underdeveloped (Global Entrepreneurship Monitor [GEM], 2011; Kibirige and Obi, 2015).

4.2. The water-land-food security nexus

The review revealed an over-dependence by smallholder farmers on rain-fed agriculture. This is problematic, as the province is plagued by variable and unreliable rainfall, making water shortages both common and acute (Community Survey, 2016). Several studies have documented the susceptibility of the continent in general and South Africa in particular to climate crisis (Rasul and Sharma, 2016; Ebhuoma et al., 2020; Rankoana, 2020; World Economic Forum [WEF], 2022). This strengthens the idea of the Intergovernmental Panel on Climate Change [IPCC] (2019), emphasizing that climate crisis is possible to have wide-ranging effects on the social order, the environment and food security thereof. Extreme weather-related events, for example, have always had adverse effects on both rural and urban productivity although the most affected are the rural poor (Kom et al., 2020; Ngwenya and Simatele, 2020). Furthermore, climate-induced weather events have contributed to increased water and food insecurities in many parts of South Africa (Unganai, 2009). This heavy dependence on climate-sensitive economic sectors such as agriculture makes the component of food security in the Eastern Cape and South Africa more vulnerable to any changes in climate (See Figure 3).

Food insecurity is among the factors hindering developments, particularly in the developing world. It is a fundamental human need, necessary for the wellbeing and welfare of living beings. Hence, accessibility, availability, stability and utilization are critical to food security (see Figure 3). The ability to get regular amounts of nutritious food to be used properly to meet nutritional needs is, therefore, fundamental to food security. At the same time many of these rain-fed crops are at their maximum temperature tolerance (Rankoana, 2020). Thus, climatic risks, especially increased drought conditions, and heat waves, as was the case in the years 2013, 2015, 2016, and 2019, compromise agricultural production (Gandure et al., 2013; Loewe, 2020). This coupled with inadequate access to technology and resources results in low output (Hendriks, 2014; Tantoh et al., 2022). In the same lens, the climate crisis will have severe consequences on the rural poor who are highly dependent on agricultural productivity to improve rural livelihoods in the phase of soaring unemployment and poverty levels (56%) (Singh, 2019). These effects pose a huge threat to food security and rural livelihoods, compromising the wellbeing of smallholder farmers (see Figure 4). Resolving this condition requires considerable policy interventions and private

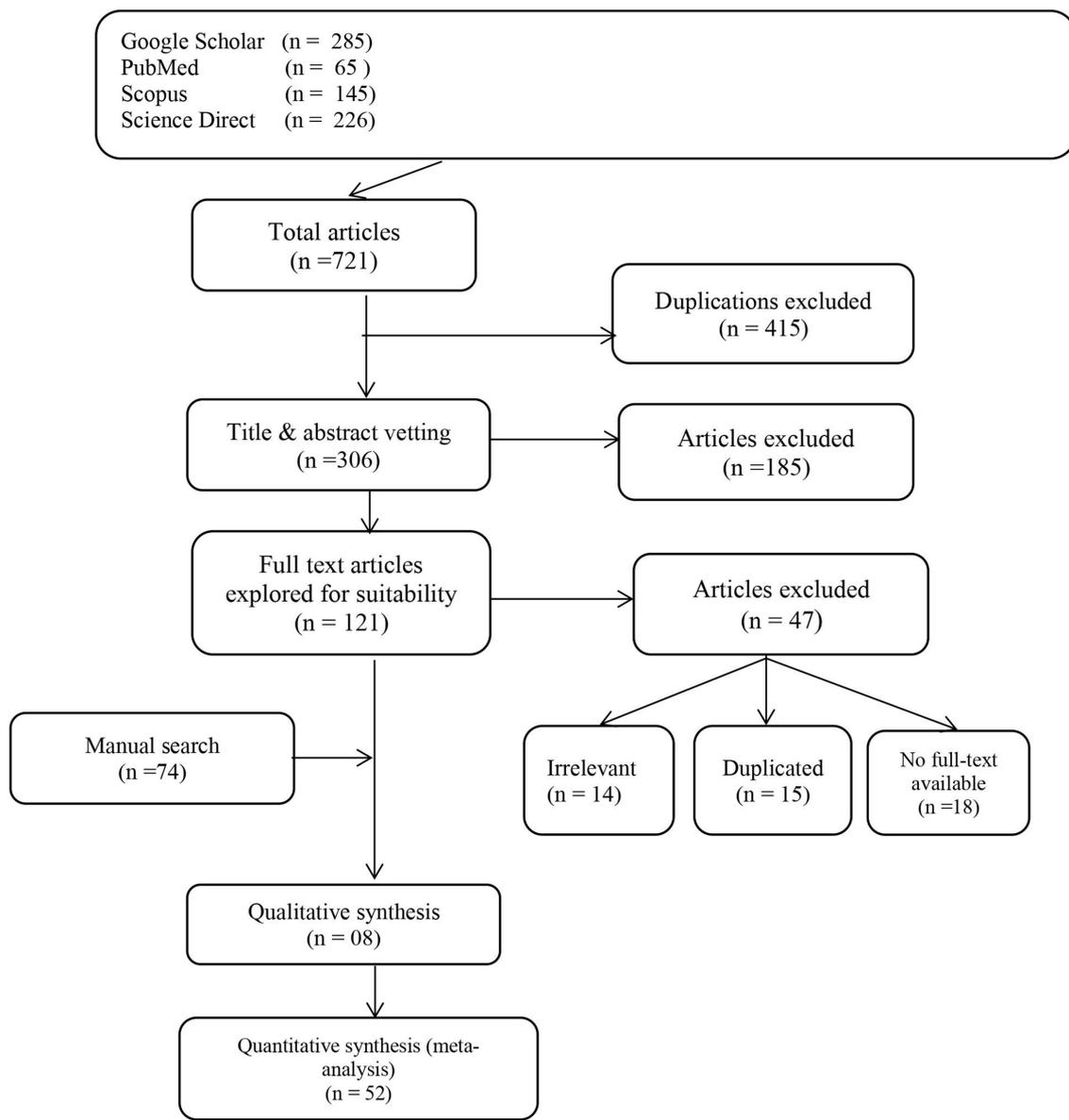


FIGURE 2
Flow diagram illustrating the diverse phases of screening relevant literature for the study (Fieldwork, 2022).

sector investment (Food and Agriculture Organization of The United Nations [FAO], 2015). However, the challenge of agricultural sustainability has become more intense in recent years with climate change, water scarcity, degradation of ecosystem services and biodiversity, the sharp rise in the cost of food, agricultural input and energy as well as financial crisis hitting hard on poor communities.

Noteworthy is also the fact that land is one of the fundamental factors of production and unfortunately, is a bone of contention in South Africa. Thus, a major challenge of the WLF nexus in the context of South Africa is inequalities in the access and possession of the land. The ideal has been to reverse these inequalities through land reforms and support programs for black emerging farmers. However, the government’s focus on emerging commercial farmers has given little attention to subsistence farming and smallholder farmers (Altman et al., 2009). Consequently, smallholder farmers still produce a quarter

of what commercial farmers produce. It is, however, not logical to resolve food security issues by focusing on improving the output of commercial farmers but by limiting transactional costs, easing access to land and credit insurance among smallholder farmers (von Loeper et al., 2016; Ayamga et al., 2022).

4.3. Policy versus practice

Several studies touted the potential for agriculture to significantly contribute to economic growth in the form of food production, transformation of raw materials, as a market for producers of other goods and services, as a source of foreign exchange and as a producer of savings surplus (Pienaar and Traub, 2015; Ngumbela et al., 2020). For example, Mujuru and Obi (2020) argue that better agricultural

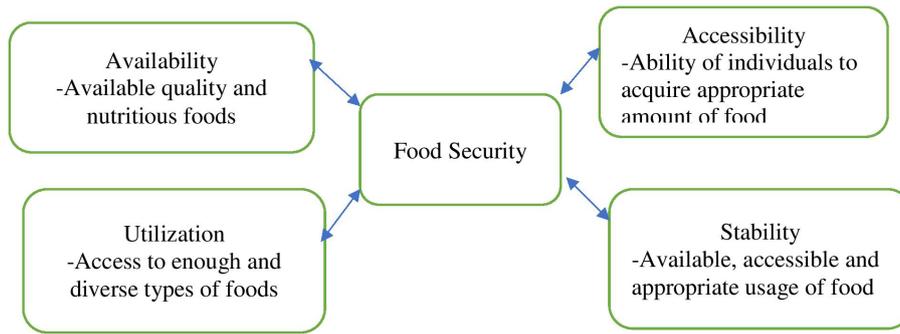


FIGURE 3 Components of food security. Adapted from [Healthypeople.gov](https://www.healthypeople.gov) (2021).

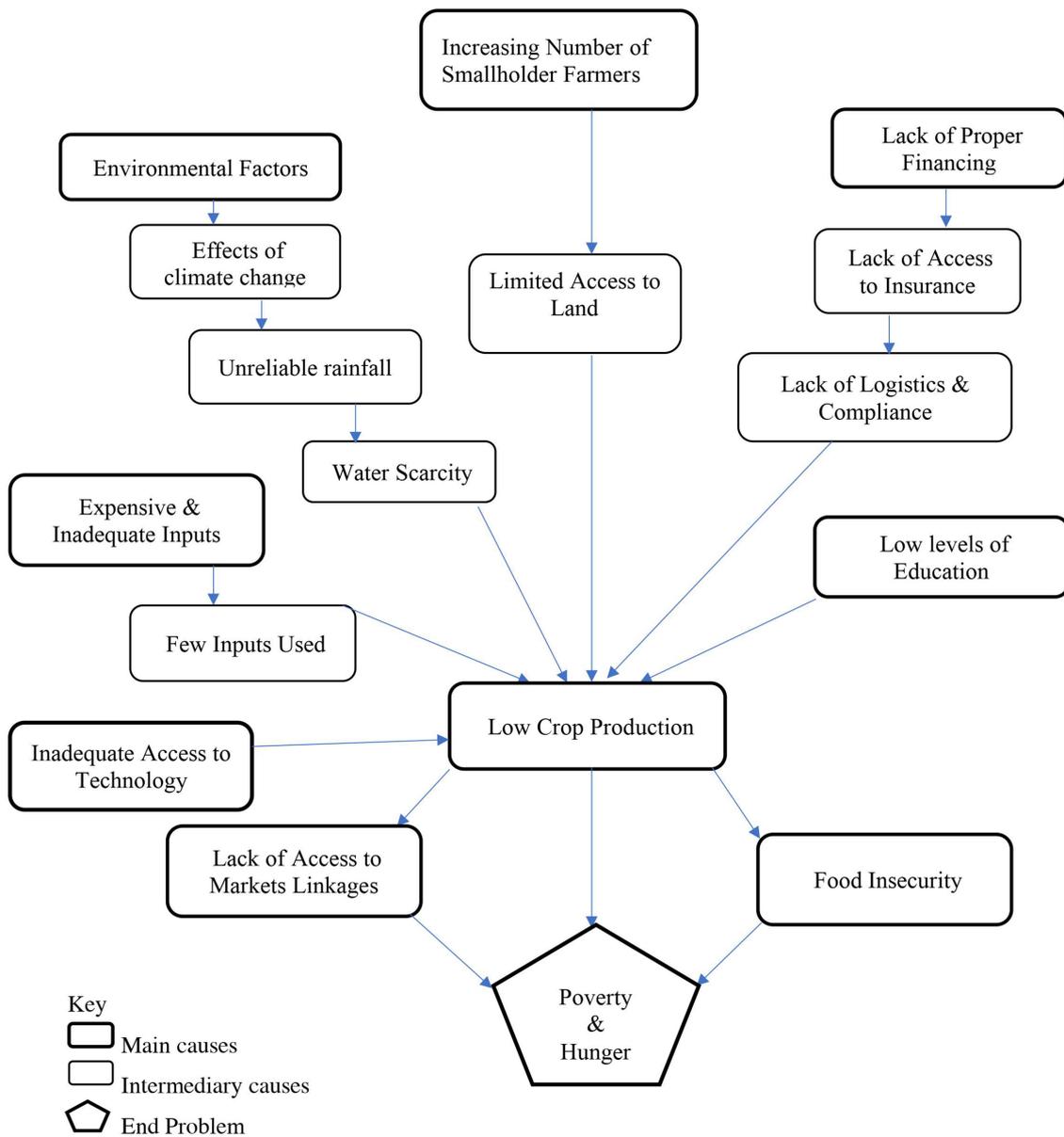


FIGURE 4 Challenging facing smallholder farmers in the Eastern Cape (Authors, 2022).

productivity would decrease unemployment and reduce poverty. That said, improved education opportunities and better healthcare services are a must for this province (Ngumbela, 2021).

Thus, on the one hand, policy makers focus a lot of energy on smallholder farmers. For example, the South African National Development Plan (NDP) lauds smallholder farmers as the champions of rural development, able to improve rural livelihoods and wellbeing, particularly in former Bantustans (NPC, 2011). Furthermore, the South African National Department of Agriculture, Forestry and Fisheries claims to be promoting smallholder farmers in the Eastern Cape through increased budgetary allocations (Department of Agriculture, Forestry and Fisheries [DAFF], 2014). In the same vein, the national treasury has allocated huge financial resources to boost the entrepreneurial activity of smallholder farmers through grants to purchase land under the land reform program, farm input subsidies, small-scale irrigation schemes (GEM, 2011). Scholars such as Rapsomanikis (2015) encourage such a focus, maintaining smallholder farmers are business establishments, balancing risks and profits, striving to raise capital from diverse sources and investing in productive assets. It is also claimed that they are also able farmers, knowing what to plant, what inputs are needed, when and how to cultivate, what and how much to sell and what quantity to store (Ebhouma et al., 2019; Ebhouma et al., 2020). It is also argued that assisting these farmers to employ the rural poor will also increase rural living standards (Rapsomanikis, 2015; Ngumbela, 2021).

Despite this, there are several constraints to hinder the development of smallholder farmers. Firstly, Pienaar and Traub (2015) maintain that any plan needs to focus on attaining impact and scale. Thus, the success of rural development requires rising smallholder productivity to increase the volume of, and reduce the price of, staple food. Commercialization can increase farm incomes, and through the multiplier effect lead to wider pro-poor growth in the rural economy. However, there are many constraints to commercialization that prevent this process from occurring. In addition, smallholder farmers are caught in subsistence agriculture with limited outputs and disengaged from markets. Consequently, the commercialization of the food supply chain is undertaken by bigger establishments with increasing presence of national supermarket chains which further marginalize smallholder farmers. Rural residents now buy from the supermarkets, not directly from the farmers (Figure 4). Worse is that these supermarkets seldom support farmers by purchasing produce from them (Rapsomanikis, 2015). Although some argued that transport constraints and distance to markets compel most smallholder farmers to sell their produce at the farm gate (Mutero et al., 2016). Furthermore, droughts and floods have been disastrous in both urban and rural communities (Amoah and Simatele, 2021). Such weather incidents have greatly contributed to food and water insecurities in the Eastern Cape (Nwanze, 2011; von Loeper et al., 2016; Ngumbela, 2021). In the same vein, smallholder farmers are relatively uninformed about the weather, and the agricultural market (Mutero et al., 2016). The study by Morton (2007) found that small farm sizes, inadequate technology and finance, lack of information and other non-climate stressors increase the vulnerabilities of smallholder farmers. Similarly, basic farming tools such as hoes, spades, and wheelbarrows are not enough to improve productivity and compete with commercial farmers.

So, while some advances have been made in terms of ratifying treaties and protocols promoting smallholder farmers. These include

(1) The African Union Flagship projects and Continental Framework Schemes; (2) The Program for Infrastructure Development in Africa (PIDA); (3) The African Mining Vision (AMV); (4) The Maputo Declaration of 2003 and (5) Agenda 2063 (Abdalla, 2007; Ngumbela, 2021). But it seems that these treaties and protocols alone are ineffective in terms of supporting the smallholder sub-sector. One possible explanation for this is that most smallholder farmers still do not have access to sufficient land, technical know-how and vital information. Additionally, they have low adaptive capacity to extreme weather events (Ebhouma et al., 2020; Tantoh et al., 2022). Thus, farm yields remain low and transport costs inhibit profits (Mutero et al., 2016).

4.4. Commercialization

The entrepreneurial environment is essential for economic growth and rural development. A potential avenue is commercialization, where smallholder farmers adopt specialized production of products to sell (Aceleanu, 2016). Uhunamure et al. (2021) argue commercialization can improve household food security. For example, the South African government allocated huge financial resources to facilitate the establishment of self-owned or joint ventures businesses to boost entrepreneurial activity, particularly among smallholder farmers (GEM, 2011). Similarly, low incomes, low harvest prices, high cost of inputs and small operational holding size prevent smallholder farmers from breaking the cycle of poverty (Reddy et al., 2019). However, smallholder farmers in some developing countries are provided with small-scale irrigation schemes, farm input subsidies, farm implements, credit facilities and cash grants to even acquire land under land reform programs to encourage and boost their outputs (Ramaila et al., 2011). Other instruments to improve rural food security include expanding possibilities for employment, implementing community and public works plans, improving education and offering vocational training and promoting access to land (Abdalla, 2007; Chikazunga and Paradza, 2013; Pienaar and Traub, 2015; Ebhouma et al., 2019; Amoah and Simatele, 2021; Ngumbela, 2021). In contrast, the low entrepreneurial spirit among smallholder farmers, lagging behind many countries is a major hindrance (GEM, 2011). For example, only 1.7% of businesses started in South Africa do survive after a period beyond three years and six months, and the Total early-stage Entrepreneurial Activity (TEA) rate was reported at 9.1% (GEM, 2011). In addition, even smallholder farmers with surplus production remain trapped in poverty due to a lack of access to markets (Magingxa et al., 2009). More to that, some field extension agents are ill-informed about local markets and do not often provide the necessary training and assistance so that smallholder farmers can gain access to information about markets. This can be averted if the government influence the private sector to ease access to markets using existing value-chain infrastructure. Another possibility for smallholder farmers to access markets is through “quality food” and “high-value food” production (Biénabe et al., 2011). For example, high-value crops and organic crops could preferably be produced by smallholder farmers although certification organizations driven by the dominant retail sector in South Africa are tough and esteem large-scale producers with the capacity to conform to such schemes (Biénabe et al., 2011). Furthermore, public investment in farm infrastructure could be increased, direct benefit transfer schemes for purchase of inputs

strengthened, institutional credit delivery mechanisms improved and safety nets in rural areas widened (Reddy et al., 2019).

5. Conclusion

Currently agriculture in the Eastern Cape is characterized by inequality in terms of the distribution of economic assets, support services, market access, infrastructure, and income. This means little has changed since colonial times. Reducing this inequality is necessary if smallholder farmers of the Eastern Cape are to escape the trap of structural poverty. Part of this involves improving rural food security and promoting rural development. This means supporting small scale farmers. This study argued that focusing on the nexus of water-land-food security is an important way to support smallholder farmers of the Eastern Cape. The study found that while these farmers do have access to land, food security and poverty is still prevalent. In terms of land, the challenges are that most farms are too small while community land is under-utilized. Thus, although much attention has been paid in terms of policies regarding land reform in South Africa, serious issues with respect to communal land can no longer be neglected. Another challenge is poor access to adequate volumes of water. Extended drought conditions have also weakened the capacity of smallholder farmers to adapt, which was never a strength to begin with. Relying on rain fed agriculture is not going to improve farming conditions, let alone support commercialization. Thus, water issues need to be addressed with the building of more dams, irrigation schemes and boreholes – although none will help unless the land is better managed to improve infiltration, reduce evapotranspiration and farmers learn how to manage their water demands down. Appropriate, hardy, drought resistant crops and animals are essential. Additionally, the knowledge and skills base of smallholder farmers must be improved and they need can access capital, markets, agricultural extension services and cost-effective transportation.

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Author contributions

HT: conceptualization, visualization, design of research instruments, and writing—original draft. TM: writing—review and editing and supervision. All authors have read and agreed to the published version of the manuscript.

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