

## **Agricultural Shocks and Constraints Encountered by Independent Smallholder Irrigators in Msinga Local Municipality, KwaZulu-Natal Province of South Africa**

Dube, S.V.<sup>1</sup> and Caister, K.<sup>2</sup>

**Corresponding Author:** S.V. Dube. Correspondence Email: [s'nethemba.dube@ul.ac.za](mailto:s'nethemba.dube@ul.ac.za)

### ***ABSTRACT***

*Smallholder farmers' market participation is an effective vehicle for securing better incomes, reducing poverty, and enhancing household food security, especially in rural areas. However, smallholders face various challenges that prevent them from benefiting from the opportunities in agricultural output markets. This article aimed to identify the agricultural-related shocks and constraints that independent smallholder irrigators in the Msinga local municipality faced and recommend several techniques to help tackle these challenges, improving their livelihoods. The 101 survey participants were selected using snowball sampling, while the four participants in the Focus Group Discussion were purposively selected. The findings suggest that the primary issues facing Msinga irrigators were drought, inadequate access to production inputs and the infestation of pests and diseases. As a result, crop failure affecting nine out of ten irrigators was unavoidable among these smallholders. If smallholder farmers can access comprehensive agricultural support services, they may be able to tackle these issues and boost farm production and market participation. Creating an enabling environment to improve irrigation water access can help mitigate drought difficulties. Including independent irrigators in the government's existing extension support services could provide irrigators with assistance from agricultural advisors who are knowledgeable in pest and disease awareness and control.*

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<sup>1</sup> Senior lecturer, The Centre for Rural Community Empowerment, Department of Agricultural Economics and Animal Production, University of Limpopo, Private Bag x1106, Sovenga 0727. Email: [s'nethemba.dube@ul.ac.za](mailto:s'nethemba.dube@ul.ac.za), ORCID: 0000-0001-8517-7208

<sup>2</sup> Senior lecturer, The discipline of Agricultural Extension and Rural Resource Management, School of Agricultural, Earth and Environmental Sciences, University of KwaZulu-Natal, Private Bag X01, Pietermaritzburg, 3209, South Africa. Email: [Caister@ukzn.ac.za](mailto:Caister@ukzn.ac.za). ORCID: 0000-0002-8874-632X

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## 1. INTRODUCTION

In 2016, the number of agricultural households in South Africa was 2.3 million, with over two-thirds residing in KwaZulu-Natal, the Eastern Cape, and Limpopo (Statistics South Africa, 2016). According to the 2016 South African national community survey, KwaZulu-Natal recorded the country's highest number of agricultural households (23.0%) (Statistics South Africa, 2016). Within KwaZulu-Natal, slightly over two-fifths (44.0 %) practised agriculture as a secondary source of income, while two-fifths (40.8%) practised agriculture as a primary source of income. In the study area, Msinga Local Municipality, agriculture is still primarily used for subsistence (Dearlove, 2007; Sinyolo *et al.*, 2014) due to unfavourable climatic conditions and poor soil quality (Msinga Local Municipality, 2020).

Hence, most farm produce is for domestic consumption rather than the output market. Generally, smallholders' market participation enables them to combat rural poverty and food insecurity (Jagwe *et al.*, 2010; Zanella *et al.*, 2012). Producing for the market requires the use of resources such as land, water, on-farm and off-farm infrastructure, labour force, capital, and effective resource management (Baloyi, 2010). Meanwhile, rural smallholder farmers' ability to benefit from opportunities in agricultural markets is hindered by a lack of access to these resources, particularly in terms of the quality and quantity of these assets. As a result, they cannot meet the high-quality standards set by fresh produce marketplaces, retailers, and food processors (Bienabe *et al.*, 2004). Therefore, smallholders' poor participation in the crop market leads to low incomes, exposing them to food insecurity and a vicious cycle of poverty. Smallholders face several additional challenges in addition to a lack of access to essential resources, and these resources are vital for them to address or overcome these difficulties. The external environment in which people live presents these challenges, referred to as the vulnerability context within the Sustainable Livelihood Framework (DFID, 1999; Devereux, 2001). Shocks, trends, and seasonality are all part of the external environment, which affects the asset base (Erenstein, Hellin & Chandna, 2007). Human, livestock, or crop health shocks; natural disasters such as floods or earthquakes; economic

shocks; conflicts, including national or foreign wars; and agricultural challenges, such as pests and diseases, are examples of shocks. Demographic trends, resource trends, trends in governance at national and international levels of economics, politics, and technology, decreasing farm sizes, and growing pest and disease levels are all thought to have a detrimental impact on livelihoods and are examples of trends (DFID, 1999; Chambers & Conway, 1991; Erenstein, Hellin & Chandna, 2000). Seasonality can be observed in pricing, goods, job opportunities, and the impact of weather patterns on agricultural production, livestock nutrition, and disease (DFID, 1999; Erenstein, Hellin, & Chandna, 2000).

In South Africa, agricultural extension is a potential tool for combating food insecurity and poverty. However, this has focused chiefly on smallholder irrigated schemes for decades, giving limited to no attention to the other smallholder categories, including independent irrigators, home or backyard gardeners and community gardens. South African independent irrigators lack an institutional home to administer agricultural extension and advisory services. As elsewhere in Africa, South African independent irrigators have not received government or formal institutional support (De Lange, 1994; Crosby *et al.*, 2000). Vaughan (1997) concluded that there was limited to nonexistent support for independent irrigators. In the former Transkei, factors of production, assistance, and farmer support, as well as appropriate and sufficient land, capital, inputs, and labour, technical advice on irrigation systems, and information on crop water requirements and scheduling, were all inadequate (Vaughan, 1997). In a livelihood study of independent irrigators in Limpopo, only 38.8% reported receiving some production advice, while 28.6% received irrigation advice (Denison *et al.*, 2016). Similar to the Greater Tzaneen Local Municipality, only 27.6% had received some production advice, and 24.1% received irrigation training. Grant assistance was nonexistent in both studies (Denison *et al.*, 2016). The main question now is how smallholders can be supported to overcome these challenges and become market-driven. However, before one can respond to this and offer potential solutions, it is essential to assess the difficulties and limitations that independent irrigators face. Therefore, this paper aimed to identify the farming shocks and constraints encountered by independent smallholder irrigators in the Msinga Local Municipality. Policymakers are advised to consider various strategies when designing bottom-up intervention approaches to address the challenges faced by independent irrigators.

## **2. MATERIALS AND METHODS**

### **2.1. Study Area Description**

Msinga, a local municipality in South Africa's KwaZulu-Natal province, served as the research site. It measures 2,500 km<sup>2</sup> and has a population of 184,494 (Statistics South Africa, 2016). In most portions of the region, the climate is subtropical. Msinga receives an average rainfall of 600 mm, ranging from 400 mm to 900 mm yearly (Mkhabela, 2005; Sinyolo *et al.*, 2018). Msinga temperatures are scorching, reaching 45 °C (Mthembu, 2014). Msinga is one of the province's poorest municipalities, having significant unemployment and poverty rates. Agriculture is critical to the livelihoods of Msinga inhabitants, although most remain impoverished. Statistics South Africa (2016) indicate that 55% of the 38,372 Msinga households practised agriculture in 2016.

However, agriculture in the area is highly subsistent and subject to the limited capacity of the land due to low soil quality, climatic conditions, and overstocking (Msinga Local Municipality, 2020).

### **2.2. Study Population and Selection**

Survey participants included independent smallholder irrigators operating within the boundaries of Msinga's Local Municipality. The study participants were chosen using a snowball sampling technique. In the initial survey round, the researcher and field assistants were guided to other respondents with similar characteristics by agricultural advisors from the local office of the Department of Agriculture, resulting in 101 respondents. Of the 101 survey respondents, 41 were invited to participate in four Focus Group Discussions (FGDs). The grouping characteristics were the method of extracting irrigation water from the source and the location of the irrigators. This was more convenient in terms of cost and practicality. Additionally, the research aims to help irrigators feel more comfortable, as they share similar experiences. The irrigator's willingness to reflect and share their experiences prompted inclusion, as well as their availability on the phone and for the planned date of the scheduled FGD.

### **2.3. Data Collection and Analysis**

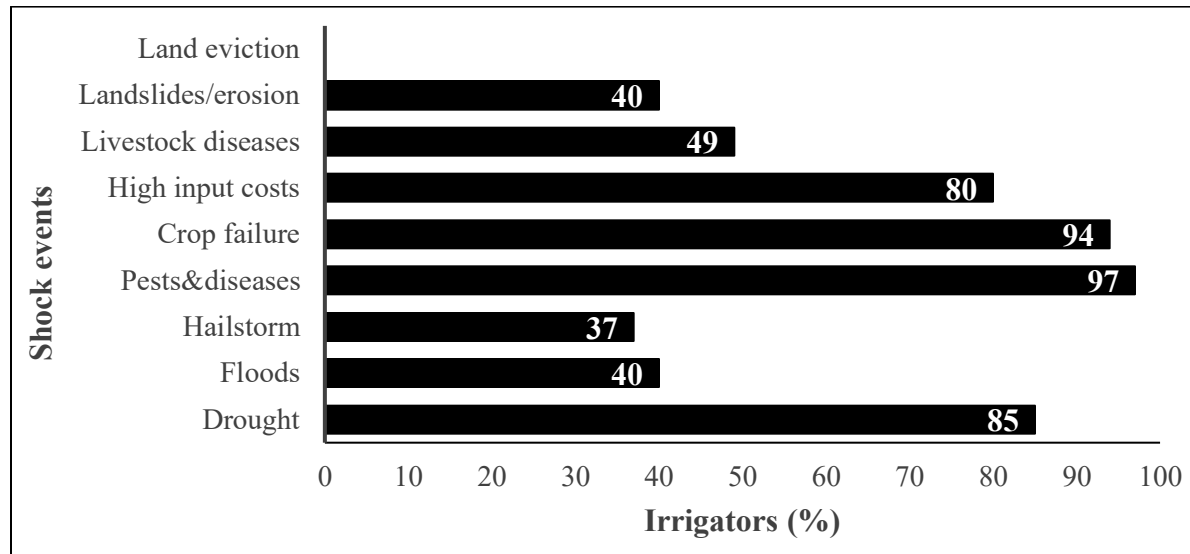
Survey data were collected between November and December 2019 using a standardised questionnaire. The questionnaire gathered data on the household's shocks experienced in their

irrigation during the last two years and other challenges and constraints in their irrigated enterprise. The face-to-face interviews with the respondents were conducted in isiZulu and documented on the interview schedule. After the survey data had been coded, it was entered into Microsoft Excel and the Statistical Package for the Social Sciences (SPSS) v27. The data was then examined using descriptive statistics using SPSS. The four groupings, designed to facilitate manageable discussions, were held at Mashunka and Paraffin villages between July 29 and 30, 2020. In-depth interaction included four focus groups, each with nine to twelve participants selected from the survey. Interview transcripts and voice recordings collected during the focus group interaction were subjected to Thematic Content Analysis. This information began with themes, and codes for variables of interest were grouped under these themes. Codes identified responses from the discussions. The coded responses were collated from all four groups.

### **3. RESULTS AND DISCUSSION**

#### **3.1. Shocks Faced by Independent Irrigators**

Independent irrigators in Msinga faced various external shocks that hindered their agricultural production. The relative distribution of independent smallholder irrigators facing several shock events is shown in Figure 1. The common shock to agricultural production irrigators experienced two years before 2019 (data collection period) in Msinga was the problematic access to production inputs, the infestation of pests and diseases and droughts, resulting in crop failure. Irrigators in Msinga reported high prices for agricultural inputs as one of their significant shocks since they cannot afford to purchase them. Figure 1 shows that 80% of the 101 survey respondents in this study have experienced difficulties accessing production inputs, particularly seedlings. Their inadequate financial stability exacerbated this problem. In Msinga, 96% of the respondent group received income from the state through disability grants, child support, foster care, and old-age pensions.



**FIGURE 1: Relative Distribution of Irrigators That Experienced Shocks**

This is typical of Msinga, as Zaca (2018) found that in Tugela Ferry, smallholder households claimed 92% of their income from the state social grant. In South Africa, the government has primarily assisted irrigation schemes and projects to enhance smallholder agricultural productivity through inputs, mechanisation, and other forms of support (Mudhara, 2010; Sinyolo, Mudhara, & Wale, 2014; Denison *et al.*, 2016; Wale & Chipfupa, 2018). In their study, Wale and Chipfupa (2018) argued that smallholder “scheme” farmers in Ndumo-B indicated that although they receive support from the government regarding seeds and fertilisers, this support is inappropriate since they are never consulted on what they need. Farmers report receiving inputs they have already purchased, while others indicate that the inputs they are given have a limited shelf life with approaching expiry dates (Wale & Chipfupa, 2018). Also, they cannot use them before the expiry date due to seasonality issues. The survey observations show that this kind of support was a rare to nonexistent gesture to the Msinga “independent” irrigators, as none have received such support in recent years. The 20.8% who had contact with the Msinga local office agricultural advisor indicated that they only received some agricultural advisory services. The focus of agricultural extension support on smallholder irrigation schemes, while ignoring independent smallholder irrigators, is not just a South African issue, but a global phenomenon. For example, according to Giordano *et al.* (2012), in Asia, independent irrigators do not receive institutional support and have

no financial support, as irrigation Departments tend to oversee large-scale irrigation schemes, while agricultural Departments are mainly concerned with rain-fed farming. Namara *et al.* (2011) reported that independent irrigators in Ghana received inadequate public support. According to Giordano and De Fraiture (2014), just 10% of male irrigators received visits from extension officers, while only 1% of their female counterparts did. In Tanzania, farmers claimed that they had never received any extension support or seen an agricultural extension worker during their farming years (Giordano & De Fraiture, 2014). The FGD participants confirmed the survey data on limited support for independent irrigators. The second and fourth focus groups reported having previously met with an agriculture advisor or extension officer. They were given hand hoes on both occasions, and FGD three was given spinach seeds. However, they could not recall the year because it happened many years ago.

Concerning the input access challenge, the distance to the input market fuelled independent irrigators' difficulty accessing inputs. Input purchases are made in small shops in Tugela Ferry (e.g. Mike's Agric). Some farmers indicated that they purchased in Grey Town, approximately 47.7 km from the Tugela Ferry town. At least in Grey Town, there are various shops, including CPS (seedlings), TWK, and farmers' Agri care. Again, the limited financial base poses a travel limit to accessing these various shops for production inputs. Travelling to Grey Town requires two taxis: one from the village to Tugela Ferry and another from Tugela Ferry to Grey Town. Pests and diseases have been reported by almost all independent irrigators in Msinga (97%) as one of the biggest shocks they have previously encountered in their farming operations. Most of the time, these outbreaks result in crop failure. The primary issue was a lack of knowledge about precautions, such as which agrochemicals to use. Additionally, agrochemicals are very expensive, and their limited financial resources made footing the bill challenging. According to these irrigators, when they bought the inexpensive ones from Tugela Ferry town, they were ineffective because they permanently damaged the produce, which could not be sold.

Droughts are another common problem for irrigators, which have been detrimental to their production. Over eight out of ten (85%) irrigators reported that droughts have affected them. The drought in the area significantly impacted their crops, and irrigators ultimately received no return

on their investment. The Northern region of KwaZulu-Natal, including Msinga, usually experiences dry conditions. Droughts strike Msinga regularly, with the most recent officially reported drought occurring from 2015 to 2016 (Vetter, Goodall, & Alcock, 2020). Formally recognised or not, villages in Msinga continue to be affected by drought, and the effects are severe. In 2015-2016, cattle farmers in the study area lost 43% of their herd, while goat farmers lost 29%. Cattle numbers remained low three years after the drought, whereas goat numbers recovered (Vetter, Goodall & Alcock, 2020). Larger herds had lower mortality rates, implying that herd owners had better resources to support their herds.

Droughts have, without a doubt, had complex socio-economic implications for residents of Msinga communities, generating vulnerability in these communities' livelihoods (Rumeki & Umubyeyi, 2019). Independent irrigators have lost crops due to drought, and their livelihoods have suffered as a result. Irrigators sourcing water from springs, which comprised over half of the respondent group, were significantly affected, as their water source frequently dries out. Aside from the drought, independent irrigators who participated in the focus groups (FGDs one and four) expressed concerns about irrigation water. These two groups were non-pumpers. Non-pumpers are irrigators who do not use pumps; they extract irrigation water in buckets or cans. These irrigators stated that it was difficult to carry water on their heads from the source to the irrigation land, especially since they were old. According to Howley, Donoghue and Heanue (2012) and Ramoroka (2011), age and gender influence labour quality, particularly in physical activities, where older people and females are less capable of performing physical activities than young people and males. This finding suggests that age affected irrigation activity since it limited their physical capability to irrigate their independent land. Also, due to groundwater/spring water scarcity, participants from FDG described how they must take turns irrigating and alternate days so everyone can access water. These patterns indicate intense competition for accessing this water source. As a result, irrigators occasionally use water intended for domestic use, which they purchase from vendors. Since the river is seldom dry, the researcher enquired why irrigators do not use a petrol pump. Participants stated that they could not afford a pump due to financial constraints. One of the participants in the second FGD describes her failure to keep the pump running. She stated that she used to have one, but it broke and could not be repaired, so she now

relies on buckets to extract irrigation water. Irrigators were requested to rate the adequacy of their water sources during the period when they planted. Most (48.5%) of the irrigators rated their water adequacy as 'rarely enough' or 'never enough' (8.9%). Less than half of the sampled irrigators in Msinga rated water adequacy as mostly enough (29.7%) and consistently enough (12.9%). These findings indicate a substantial need to consider water access to improve the production of independently irrigated land and assist them in dealing with the dry season.

### 3.2. Independent Irrigator's Farming Constraints

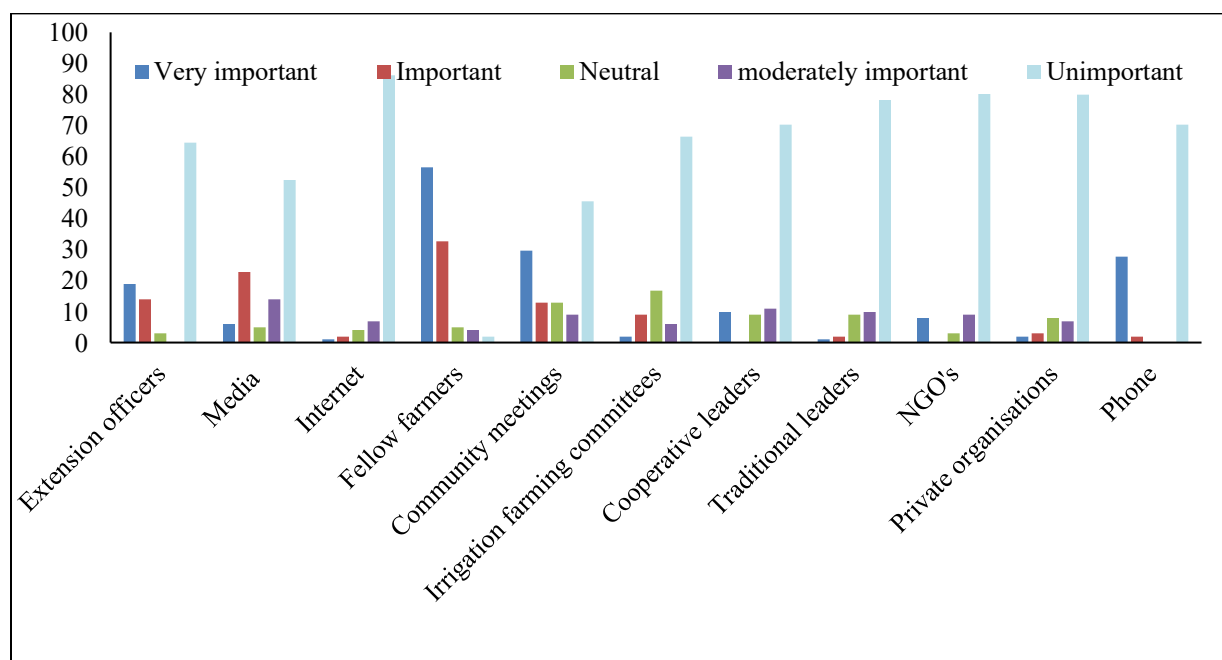
Irrigators face a variety of other challenges and constraints in their farming operations. Table 1 presents the respondents' relative distribution (%) of constraints, using a five-point Likert scale ranking. In this paper, Table 1 supports the initial findings (Figure 1), indicating that high input prices were a barrier to irrigator production. According to the survey data, independent irrigators see a lack of capital (74%) as a significant limitation, followed by a lack of inputs due to high prices (71%) and a lack of support services (84%). In South Africa, smallholder agricultural advisors or extension officers assist farmers (Denison *et al.*, 2016; Wale & Chipfupa, 2018), highlighting the need for additional support in the study area. This assistance tends to focus on group projects, such as irrigation schemes and cooperatives (Sinyolo, Mudhara & Wale, 2014). Due to this bias, independent irrigation farmers are often overlooked. Irrigators pointed out that new pests and diseases are one of the most severe shocks to their farming operations.

**TABLE 1: Relative Frequency Distribution (%) of Constraints Faced by Irrigators (N=101)**

	Never	Rarely	Sometimes	Most of the time	Always
	<b>Irrigators (%)</b>				
Lack of capital	3	1	23	54	20
Insufficient land	38	21	23	19	0
Lack of access to inputs	8	14	41	36	2
High increase in input prices	4	6	19	67	4

Production below normal	4	4	53	39	1
Declining output market prices	8	26	55	11	0
Land tenure is not secure	92	6	2	0	0
Local and political conflict	89	10	1	0	0
Lack of support services	8	3	6	47	37
High pump and maintenance cost	81	1	5	13	0
Water availability	8	7	54	25	6

There is a limited understanding of how to manage them, and agricultural advisors may be the best people to help irrigators control them. However, there is little or no interaction between the two. There appear to be two components that underlie all these shocks and constraints: a lack of cash and agricultural extension services. Regarding agrarian extension officers as people responsible for implementing agricultural extension services, most (64%) independent irrigators rated agricultural extension officers (or advisers) as an unimportant source of information when rating information sources (Figure 2).



**FIGURE 2: Importance of Sources of Information Among Msinga Independent Irrigators**

Limited independent irrigators had either interacted with or received support, which explains this rating. Irrigators also regard fellow counterparts (56%) as essential sources of knowledge. There are lots of reasons why farmer-to-farmer transmission is sound. There is legitimacy, familiar language, and contextualisation of information into the spreader's experience, as in 'I tried it this way'. Creative thinking and problem-solving emerge from discussions among individuals who have equal power in the conversation.

### 3.3. Produce Output Markets

The output market distribution of Msinga independent smallholder irrigators is shown in Figure 3. Smallholder farmers typically participate in lower-value markets, such as farmgate and local markets, due to the high transaction costs associated with reaching high-value food markets (World Bank, 2007). In Msinga, independent irrigators face a similar predicament, with market access as a significant barrier. Over half of the Msinga irrigators (58.4%) had some of their produce sold. Most independent irrigators in the studied area sell their produce to local community consumers off-farm (52%), local consumers at the farm gate (39%), and street traders (39%) in bakkies. Most independent irrigators in the studied area sell their produce to local community consumers off-farm (52%), local consumers at the farm gate (39%), and street traders (39%) in bakkies.

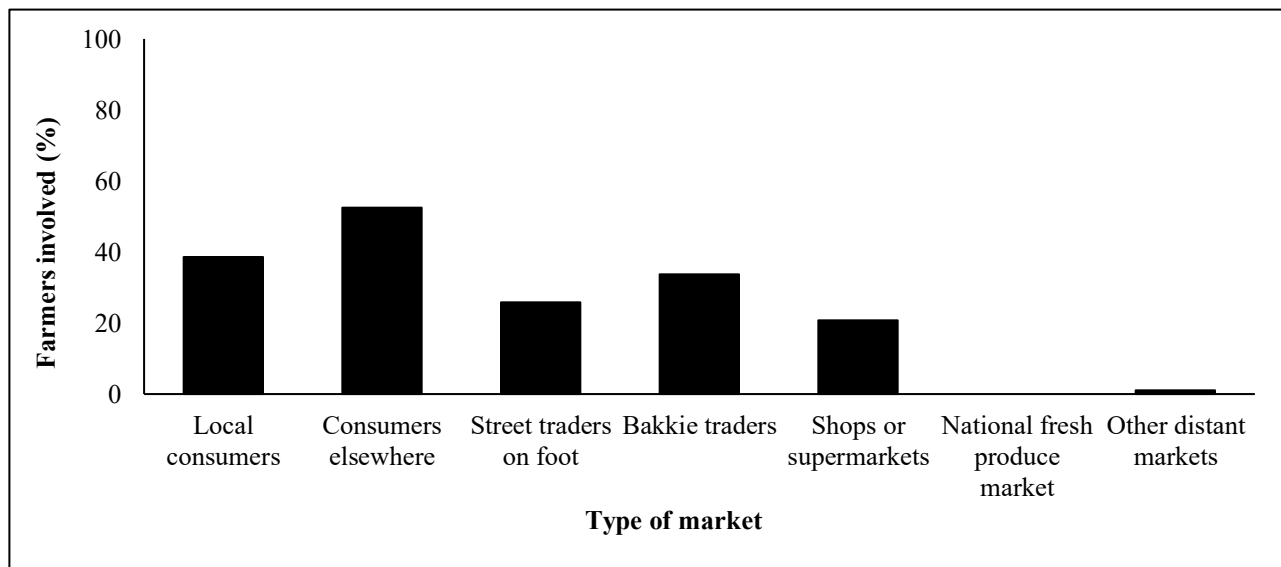


FIGURE 3: Relative Frequency Distribution for Independent Irrigators' Output Markets

It was challenging to sell to any formal market (1%) due to the high quality and quantity required in these product markets. Additionally, other growers in the area, including smallholders from the irrigation project and commercial producers, compete fiercely (Cousins, 2012). Irrigators also confirmed the high competition among producers in FGD two, indicating that at some point, they return home with produce that was not sold and, once it is spoiled, feed it to livestock.

#### **4. CONCLUSIONS AND RECOMMENDATIONS**

The objective of this paper was to identify the agricultural shocks and constraints faced by independent irrigators in the Msinga local municipality, as well as to explore intervention strategies that could help them overcome these obstacles. The findings revealed that a significant challenge was access to inputs, exacerbated by a lack of financial capital. Irrigators faced pests and diseases, and a lack of funds and knowledge about dealing with them resulted in crop loss. Access to water was also a significant issue for these irrigators. Irrigators in the area lacked adequate irrigation infrastructure, so they mainly used buckets, which limited their ability to perform at their best due to the physical requirement of carrying a bucket from the source to the household. The lack of this infrastructure also stems from the shortage of capital necessary to purchase or procure the required equipment. Drought was another concern for irrigators, particularly those relying on spring water. Droughts in Msinga caused water sources to dry up, limiting productivity, and some irrigators chose not to plant. The South African government and other stakeholders could prioritise providing appropriate systems, services, and support to independent irrigators from the existing farmer support services they already provide to group projects, including irrigation schemes and cooperatives. This could include innovating with supportive services rather than production supplies and shifting to appropriate technology rather than glamorous, unsuitable technology (like big tractors). Increase the extension-to-farmer ratio to shift the emphasis from cooperative production to cooperative supplies, and market and inputs from suppliers. This involves ensuring that farmers have access to resources while also maintaining the necessary connections for them to utilise these resources. This includes establishing supply and value chains to link the micro and macro levels, taking advantage of market-oriented production. Generally, we examine the micro and macro context links for transformation, including value chains, supply chains, scaled financing, and affordable (even if

initially subsidised) incentives that result in transformation. The fallacy is that the public/government extension thinks farmers must be helped to produce. Suppose farmers have an opportunity to make a change. In that case, they will adapt their traditional knowledge to commercially relevant knowledge, and if the knowledge and incentive are there, they can access it. However, when the focus is on handing out seeds, lime, and fencing poles, farmers view this as “getting something for free,” rather than as incentives for production.

The study recommends that the government collaborate with other stakeholders on water harvesting and savings techniques to address drought and water access issues. In other countries, a pump is one of the initiatives adopted to assist independent irrigators with water access issues. However, among Msinga irrigators who participated in this study, support in the form of petrol or diesel pumps does not appear to be sustainable. There are numerous financial responsibilities associated with owning a petrol or diesel pump, and most irrigators in these areas lack adequate financial capabilities to purchase, operate, and maintain these pumps. Another option to reduce running costs is the use of solar pumps. Solar pumps could be a low-cost alternative for supplying irrigation water. Especially when combined with a storage tank that fills up during sunny days, ensuring constant drip irrigation during production. Solar irrigation eliminates the hassles associated with intermittent electricity access or the expense of fuel and labour for water delivery. However, maintenance is still an issue. The applicability of solar pumps on a larger scale requires rigorous research to test whether they can work with less resourceful irrigators, such as those in Msinga.

The findings presented here shed new light on the challenges independent smallholder irrigators face in South Africa. They also contribute an emic perspective to the discussion around resource-constrained independent irrigating. This paper provides the groundwork for future research into issues faced by these overlooked irrigators. More information on these constraints from a larger sample would help us establish a higher level of accuracy on this subject. This information can help identify entry points and develop targeted interventions to remove the constraints that independent irrigators face, thereby improving their participation in formal markets and positively impacting their livelihoods.

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