

Impact of Land Ownership in Enhancing Agricultural Productivity in Rural Areas of Eastern Cape Province

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ABSTRACT

Land is a principal and calamitous factor in agricultural production and the growth of livelihood prospects in Sub-Saharan Africa. Land ownership is an indispensable resource for agrarian efficiency in the pastoral regions of South Africa. It leads to sustainable and feasible farming. However, the mainstream rural dwellers struggle to access and obtain land ownership, thus leading to low agricultural productivity. Therefore, the study seeks to investigate the effect of land tenure in enhancing agrarian efficiency in rural areas of Eastern Cape Province. The study used a cross-sectional research approach and a multi-stage sampling procedure. A semi-structured questionnaire was used to collect data from 250 smallholder farmers. The analysis tools used were descriptive statistics, Logit regression, and Propensity Score Matching. Farmers were landowners, with 70% and 60% having small-sized farms, which they utilise for agricultural production. About 17% of the farmers did not utilise the land they own because of a lack of funds, water availability and farming equipment. The farmers' age, gender, years spent in school, members of farm organisations, access to extension services, household income, and hired permanent labour were socio-economic and institutional factors influencing land ownership. PSM results revealed that fully owned small-sized farms achieved high agricultural production than rented large-sized farms. The study concludes that full land ownership impacts agricultural productivity more than rented land. Hence, productivity is high. Therefore, the study recommends

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that the South African government and land reform policy must fast-track land redistribution among rural dwellers and farmers to enhance agricultural productivity.

Keywords: Agricultural Productivity, Farmers, Food Security, Land Ownership.

1. INTRODUCTION

The land is a principal and dire factor in agricultural production and the growth of livelihood prospects in Sub-Saharan Africa. Secure access and ownership to land shake production and productivity in all sectors of agricultural production. Without equitable and secure land ownership, agrarian growth, and economic development of most farmers in Sub-Saharan Africa, it will be difficult to achieve food security. Enhancing farming production has the potential to upturn agriculture revenue and ease deficiency in rural regions. Still, agricultural productivity is undermined by inadequate factors such as a lack of land ownership or access, a lack of access to farm equipment, and low financial support. This situation reduces agricultural development and makes it impossible to increase agricultural productivity and enhance food security at the household level. Apart from a few instances, increasing cultivation area alone to meet the growing food requirements needed for the fast-rising population growth is no longer adequate (Challa, 2013). Thus, it is necessary to prioritise land ownership among farmers and households in the agricultural sector to enhance agricultural productivity. Akinyemi and Mushunje (2019) detailed that land ownership is one important resource to increase agricultural production, food reserve, improve food security and poverty alleviation in Sub-Saharan Africa, especially in rural areas where there are restrictions to ownership and access to productive land.

Given our ancient history, land ownership and access by farmers are playing an imperative role in the societal, party-political, and pecuniary lifetime of the utmost African states. Deininger *et al.* (2017) and Besley and Ghatak (2010) stated that having a secure land tenure or ownership is one of the crucial ways towards sustainable development for productivity-enhancing investment, land management, and eventually improving access to credit markets and financial institutions through using land as a security. Singirankabo and Ersten (2020) reported that having secured land tenure by farmers has been frequently prioritised by the government and policymakers as the approach to protect and advance productivity in agriculture. Secured land ownership or tenure system is

imperative for farming households to be feasible, productive and sustainable to attain food reserve through the eradication of malnutrition and scarcity enhancement as considered in the UN Sustainable Development Goals (SDGs) (Musungwini, 2018).

Despite past efforts made by the South African government in redistributing land, increasing the tenure system and supporting farming households, agricultural productivity from farming households and smallholder farmers remains low. Lack of land ownership by farmers and farming households is the main challenge limiting agriculturalists' access and rights to land-dwelling and admission to funds obligatory for enriched land-living practices (Koirala *et al.*, 2016). Disappointments in the land restructuring procedure also contribute to the decline in agrarian productivity in South Africa, as many households' and farmers' beneficiaries and land areas reassigned to rural inhabitants remain bleakly low. Akinola and Adeyemo (2013) specified that having insecure land factual or the absence of land tenure also confines the agriculturalists' access to funding essential for better-quality terrestrial farming that performs for enhanced productivity. Lack of funding by farmers forces changes in farming techniques, adversely affecting productivity, and resulting in poor yield, eventually affecting farmers' household food security status and income generation (Bamire and Fabiyi, 2002).

There is a necessity to understand and get practical validation of the possessions of land-living privileges or ownership of agricultural productivities. FAO (2002) contended that land ownership is essential when increasing agricultural productivity since it collects other assets, such as water and bank loans. It is essential to note that land tenure and access to land-living imply private possession and the right to use the land-dwelling. Additionally, it is important to comprehend the contribution of land-living ownership to agrarian productivity. Therefore, this study intends to investigate the factors influencing land ownership and the effect of land ownership on agricultural productivity in rural areas of Nyandeni Local Municipality.

2. LITERATURE REVIEW

2.1. Overview of South African Land Reform

South Africa is like many other African countries, where the disparity in land ownership and landlessness is still unacceptable (Byamugisha, 2014). In every historical era in the progress of

humanity, land has been a means of livelihood, self-possession, and identity. Most African countries, especially South Africa, are wrestling with this sentimental problem of land inequity and inequality. South Africa still faces imbalances in land ownership due to apartheid discrimination that resulted in land being taken away from Black people (Mabuza, 2019). As a result, several legislations were used to dispose of Black people of their land, the most significant one being the 1913 Native Land Act. This led most black people to relinquish their land and resulted in agricultural land being held by white people. Consequently, Black people were left crowded in marginal and unproductive land areas by the apartheid regimes. These marginal and unproductive areas resulted in high poverty, poor living conditions, low capita income, and a high illiteracy rate, as was prevented for black people (Mabuza, 2019).

In 1994, South Africa tasted democracy, yet there are still imbalances in land ownership. After the new government's election in 1994, land reform programmes were introduced. According to the Department of Rural Development and Land Reform (2017), land reform aims to correct past inequalities while improving the status of its beneficiaries. O'Laughlin *et al.* (2013) and Aliber (2011) specified that Agrarian reform efforts in South Africa since 1994 have used a go-getting market-led method to resolve the highly skewed land distribution issue by encouraging smallholder farmers into commercial agriculture. This strategy mainly addressed rural poverty, food security and unemployment in rural areas. This has involved a tri-component strategy involving land restitution (predicated on the 1994 Restitution of Land Rights Act), land tenure reform (based on the Land Tenure Rights Act of 1991) and land redistribution (grounded in the Provision of Land and Assistance Act of 1993). As a result, the South African government has introduced financial and non-financial support to land reform beneficiaries through different departments in several programmes to fast-track their aims in redressing high poverty rates and food insecurity. Despite introducing several land reform programmes, about 70 - 90% of land reform projects failed, and beneficiaries could not produce marketable products (Cronje, 2015).

2.2. Types of Land Reform Programmes in South Africa

Land reform focuses on restitution, land tenure and land redistribution.

- ✓ **Restitution** is the compensation of those forcefully removed from their land through monetary terms, which has not succeeded and led to the redistribution policy with secure

land tenure. Restitution is prepared regarding the Restitution of Land Rights Act, No. 22 of 1994, as amended.

- ✓ **Land tenure** is the system of recognising people's right to own the land and therefore control the land, currently restricting tenure security for the previously disadvantaged in urban and rural areas. Tenure Reform is done in terms of the Extension of Security of Tenure Act, No 62 of 1997.
- ✓ **Redistribution** transferring white-owned commercial farmland to African users. Redistribution is steered in the Provision of Land Assistance Act, No 126 of 1993. According to Hall (2004), the redistribution programme addresses the divide between 87% of the land, dominated by white commercial farming and 13%, constituting the former homelands. This land reform advocates addressing the land disparities and transferring agricultural land to the potential black beneficiaries. This promoted land ownership and small-scale agriculture for subsistence purposes, contributing immensely to alleviating poverty, creating employment, and reducing food security among remote dwellers.

2.3. Importance of Land Ownership/Tenure Rights

The land is observed as a basis of income, livelihood, food security, cultural identity, and shelter for all citizens (Mofora, 2014; FAO, 2006). According to FAO (2004), land distribution in South Africa can assist in breaking the cycle of food insecurity. Land reform could achieve multiple benefits, and fundamental to all is the socio-economic upliftment of the targeted people (Rugege, 2004). It offers material possessions for livelihoods, food and health, security against environmental tremors and future suspicions and inspires many social and cultural systems. Hence, access to land and its resources are the core of improving prospects and choices, particularly for those who depend more directly on land.

In South Africa today, land reform, especially the land restitution programme, has supported most poor rural communities to access land for agriculture. Many land reform recipients are using the land for farming. However, this is an essential part of balancing access to agricultural resources and facilitating sustainable land-based livelihood strategies, but the contribution to farming by landowners is not rising. The government of the Republic of South Africa has since prioritised food security (Kepe & Tessaro, 2012) since 1994, while land reform is viewed as a means to

improve livelihood, reduce poverty and promote food security by those who own the land. Land ownership is a significant factor in sustainably handling the environment for development in South Africa, but many trials must be dazed. The country has sufficient land and resources to produce enough food to feed its people, yet one in three people is starving. Enhancing agricultural productivity, the main economic activity in most parts of the country and the continent is the key to addressing extreme poverty and hunger (Singirankabo *et al.*, 2022; Daudu *et al.*, 2022).

Having land ownership seeks to promote secure land rights. It suggests that farmers already producing with no registered tenure arrangement have higher chances of success than those produced by renting land. Land ownership plays a significant role in agriculture, and the economy also depends on land availability, land use rights and opportunities. Holding land tenure as a farmer has the potential to increase farm returns and yields, which will contribute immensely to farmers' livelihoods and agricultural contributions to the country's economy.

3. MATERIAL AND METHODOLOGY

3.1. Description of the Study Area

The study was conducted in the Eastern Cape Province (ECP) of South Africa. Eastern Cape Province has become the nation's second biggest province, covering 168 966 km², taking up 14% of the total South African landmass. The province was established in the Xhosa homelands of Transkei and Ciskei in 1994. ECP is the country's most impoverished area and the third largest province, with a population of 6.6 million and about 12.5% of the national population (Stats SA, 2013). Of the 6.6 million people in the province, 60% live in rural areas, with a high poverty rate (Mdoda & Obi, 2019; Hlomendlini, 2015). About 2.5 million residents are unemployed, compelling many of the population to rely on diverse government grants. The province has fertile land and pastoral areas that permit rural dwellers to derive livelihoods through practising agriculture, tourism, and formal employment. The study was conducted in three districts of the Eastern Cape Province: OR Tambo, Amatole, and Chris Hani District Municipalities, which have many smallholder farmers and farming households practising agriculture for a living.

Eastern Cape is the only one of South Africa's nine provinces with all seven biomes or ecological zones within its boundaries. This gives it a tremendous variety of climates, allowing for various

activities. The area presents an agrarian background (practising crop, vegetable, citrus and livestock farming), interspersed with a small number of agro-industrial and eco-tourism infrastructures. As a result, rural households in the province derive their livelihoods through farming. They are practising agriculture for a living, especially for home consumption, to improve food security. Farmers and farming households in ECP have access to land ownership, as the majority are landowners, while others rent the land to practise farming.

3.2. Sampling Procedure and Sample Size

The study used a cross-sectional research design where the data were collected at one given time. The study used a multi-stage sampling procedure to select the respondents who participated. The principal part was choosing the district municipality in the Eastern Cape Province based on their active participation in agricultural production. Afterwards, three district municipalities were selected: Chris Hani, OR Tambo and Amatole. The second stage was the selection of two local municipalities involved in active farming. In the third and final stage, towns and villages were chosen from the purposively selected districts and 18 villages (six villages per district) were selected based on the number of active smallholder farmers and farming households in these villages. Respondents were selected randomly from the list of farmers from the targeted villages, and the list was obtained from the Department of Agriculture. About 84 smallholder farmers and farming households were selected from each village. The study sample size was 250 smallholder farmers from three district municipalities in the Eastern Cape Province. The selected farmers were practising both crop and vegetable farming on their land.

3.3. Data Collection

Primary data for this study were collected through face-to-face meetings. Following that, the researchers considered a semi-structured survey based on assessing the collected works. The semi-structured questionnaire was first pre-tested and was overseen by the interviewees, with the help of highly skilled enumerators who speak the local languages (IsiXhosa) glibly. The final version of the questionnaire was later administered to the farmers' heads, and in the absence of the head, the oldest member of the farm was chosen. The information on the semi-structured questionnaire includes farmers' demographic features, asset endowments, access to land and land ownership, use

of land owned for agricultural productivity, challenges faced in owning the land and utilising the land for agriculture, factors influencing land ownership by farmers and the effect of land tenure on agrarian efficiency in rustic zones of Nyandeni Local Municipality.

3.4. Data Analysis

This section explores three types of analytical frameworks. Firstly, descriptive statistics such as frequencies, percentages, and means were calculated to summarise the farmers' profiles and characteristics in the study area. The second tool is the Logistic regression model, which was used in determining issues manipulating the land ownership by farmers. Lastly, PSM was used to establish the effect of land ownership on agricultural productivity in Nyandeni Local Municipality.

3.4.1. Descriptive Statistics

Descriptive statistics were generated using Microsoft Excel. Data were transferred to SPSS and STATA 15 for descriptive statistics such as mean, median, standard deviation (St. Dev.), frequencies, percentages, and coefficient of variation (CV). These were used to describe the surveyed respondent groups.

3.4.2. Logistic Regression

This study adopted the Logit model to measure factors influencing land ownership by smallholder farmers in NLM. The word "logit" denotes the log-likelihoods, which stipulates the likelihood of declining interest in 1 of 2 groups on the detailed elastic of concentration (Wooldridge, 2009). Mdoda *et al.* (2019) and Chauke *et al.* (2013) specified that the logistic regression dimension might be used to evaluate a model's likelihood relationship for autonomous variables. The logit model was used for this study because of the dichotomous nature of the dependent variable, meaning landowners and land renters characterise the defendants. The regression scrutiny comprises two distinct substitutes. This study customs a binary logistic model given that the reliance on the variable is binary: 0 when a farmer did not own land and 1 when owning the land. This paper's two choices are "landowners" and "not landowners". A twofold regression was established to explain $Y=1$ for a state anywhere the farmer owned the land used in the farm and $Y=0$ for states wherever the farmer did not own the land used in the farm, based on the assumption that X is a

trajectory of eloquent variables and p is the likelihood that $Y=1$, dualistic probabilistic associations as quantified by Wooldridge (2009). This can be measured as trails:

$$p(Y = 1) = \frac{e^{\beta x}}{1+e^{\beta x}} \dots\dots\dots 1$$

$$p(Y = 0) = 1 - \frac{e^{\beta x}}{1+e^{\beta x}} = \frac{1}{1+e^{\beta x}} \dots\dots\dots 2$$

Where

Calculation (2) is the lesser answer level: the prospect that smallholder farmers owned the land used on their farm. This will be the likelihood to be demonstrated through the logistic technique by settlement. Together, the calculations demonstrate the consequence of the logit alteration of the likelihood's proportions, which can otherwise be symbolised as:

$$\log it [\theta(x)] = \log \left[\frac{\theta(x)}{1-\theta(x)} \right] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots \dots \dots + \beta_n X_n \dots\dots\dots 3$$

Besides, thus authorising its estimate as a direct regression for which the ensuing descriptions relate:

Θ = logit alteration of the likelihoods fraction = the interrupt span of the model

β = explanatory variables exhibited and

X_i = forecaster variables.

The previous processes were possible within the STATA. In relative to Calculation (3), the examination created the odds relations, exhausting the maximum probability technique. The logistic deterioration in this study can be stated as follows:

$$Y_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 \dots + U_n \dots\dots\dots 4$$

Where

Y_i (land ownership) = the reliant on variable distinct as landowners = 1 and 0 otherwise

α = constant and capture of the equation

β = slope of the discrete predictor (or instructive) variables demonstrated

X_i = predictor variables.

U_n = alteration error term.

TABLE 1: Description of Variables Used in the Study

Depiction	Units	Sign
Land owned by farmers	Ha	
Land rented by farmers	ZAR/ha	
Description	Measurement	Expected sign
Gender of the farmer	1= Male, 0 = Otherwise	+
Age of the farmer	Actual years	-
Marital status of the farmer	1= Married, 0 = Otherwise	+
Family size of the farmer	Actual number	+
Years spent in school by the farmer	1= Actual years spent in school, 0 = Otherwise	+
Household source of income by the farmer	Actual amount	+
Farming years by the farmer	Actual years of farming	+
Hired permanent labour	1= Yes, 0 = Otherwise	-
Access to extension agents by the farmer	1= Access to extension agents, 0 = Otherwise	+
Access to financial funding by the farmer	1= Access to finance, 0 = Otherwise	-
Member of farm organisation	1= Member of farm organisation, 0 = Otherwise	+
Household monthly income	Actual amount	+
Occupation	1 = Full time farmer, 0 = Otherwise	+

3.4.3. *Propensity Score Matching*

Propensity Score Matching (PSM) was used to measure the effect of land ownership on agricultural productivity in Nyandeni Local Municipality. A propensity is a semi-parametric method that stretches consistent land ownership assumed by the Logit model. The model is specified as the restrictive likelihood that the smallholder has land ownership, given pre-embracing features. The real impression after equivalent is catching a group who are not landowners but renting land and are comparable to ones who are landowners in all applicable pre-treatment attributes. Thus, the first thing to do in soliciting the model is to guesstimate the anticipated likelihood that the farmer is the landowner, otherwise referred to as the propensity score. The propensity score matching method poises the detected covariance distribution through landowners and land renters based upon observables. The propensity scores assessed by the logit model were applied to match farmers who rent the land to those that are owning the land. The PSM model is exemplified as follows:

$$p(Z) = \Pr \{D = 1|Z\} = E \{D|Z\} \dots \dots \dots 1$$

Where $D = \{0, 1\}$ represents an indicator of land ownership while Z represents the vector of pre-ownership qualities, thus, the restrictive supply of Z , provided by $p(Z)$, is parallel in both landowners and renting land groupings.

As soon as the propensity score is calculated, the average treatment effect (ATE) of the population, the average treatment effect on the treatment (ATT), as well as the average treatment effect on untreated farmers (ATU) will be figured out. The difference between the projected results after landowners and renting the land is known as the population's average treatment effect (ATE).

The population's average treatment effect (ATE) can be expressed as:

$$\tau_{ATE} = E(\tau) = E[Y(1) - Y(0)] \dots \dots \dots 2$$

The curiosity now is to determine the effect of the treatment on the treated (ATT) farm productivity. Likewise, as described by Caliendo and Kopeinig (2008), we are attracted to the regular act effects of land ownership on the untreated (ATU) farmers to understand the hypothetical influence of land ownership on the non-landowners, provided they had unequivocally practised farming. The ATT is the distinction among the predictable result for farmers who

participated in the treatment, either with or without treatment. The average treatment effect on the treated (ATT) may be projected, as shown in the subsequent equivalence, once the propensity score is calculated:

$$\begin{aligned} \tau_{ATT} &= E (Y_{1i} - Y_{0i} | D_i = 1) = E [E \{ (Y_{1i} - Y_{0i} | D_i = 1), p (Z_i) \}] \dots\dots\dots 3 \\ &= E [E \{ Y_{1i} | D_i = 1, p (Z_i) \} - E \{ Y_{0i} | D_0 = 0, p (Z_i) \} | D_i = 1 \end{aligned}$$

Where Y_1 and Y_0 are the values generated from the outcome variable of interest for the landowners and those who do not own land but rather rent the land, respectively, while i refers to the farmers.

The essential assessment problem ascends because just unique of the likely effects is experiential for apiece i . The unnoticed effect is referred to as the counterfactual effect: what impact the partakers (preserved components) would have had provided they did not partake. Therefore, assessing the action consequence τ_{ATT} of the individual is not viable except in cases where the counterfactual effect problem is outwitted. It will be hard to observe how they would have accomplished if they had not rented the land for farming peradventure, but we perceive a corresponding impact for the group without treatment. Therefore, the untreated values' effect (ones who do not own land) aids the development of a counterfactual for the group that is treated, and the ATT is estimated (Kebebe, 2015). In this case, the ATT refers to the average influence of land ownership (meaning: improved yields) on smallholder productivity.

4. RESULTS AND DISCUSSION

4.1. Demographic Features of Farmers

The study results revealed that 70% of farmers in the Eastern Cape Province were fully landowners, while the remaining 30% were renting the land. The study results exposed that most of the agriculturalists in the Eastern Cape were female farmers, with a proportion of 80%, while the remaining proportion of 20% was male. These results agree with Singirankabo *et al.* (2022), who reported that most households are headed by females as males migrate to look for industrial jobs in cities and leave females to take care of households and farming activities. The average age of smallholder farmers was 48 years, with a family extent of five individuals in households. These results were in line with Sikundla *et al.* (2018), who advanced that farming is practised by middle age, and this will have considerate effects on the sustainability of farming. Smallholder farmers

spent 13 years in school, which implies that farmers had secondary education and thus assisted them in acquiring information and innovative farming techniques. The study results further revealed that farmers had 12 years of farming experience, symbolising that farmers have a vast knowledge of farming and farming needs. Most farmers were married (80%), and this played a role in saving farmers through family labour. Farmers stated that farming is their primary occupation.

Most farmers (80%) agreed that agriculture was their primary source of livelihood, and they claimed that social security grants received were used as credit for farm operations. The study revealed that about 80% of farmers had access to extension personnel, and 78% were members of farm organisations. This played an important role in disseminating agricultural information, providing training, and assisting farmers in applying for land reform programmes. Being a member of a farm organisation and having access to extension services were very beneficial to farmers, as they assisted farmers with new agricultural information, training, and agronomic practices, which improved their farm yields and farm profit, respectively. These results were in line with Mdoda and Obi (2019), who shared that belonging to an agricultural organisation and having access to agricultural services is important in improving agricultural productivity and farm returns. The study further displayed that farming contributed largely to household income, as farmers' household income was R7620.00 monthly. This amount of household income was enough to sustain the household, as they could purchase household food, farm inputs, and pay hired labour. The farmers' average farm size for this study was five hectares. The study results revealed that smallholder farmers (about 83%) were landowners in the study area, and they used the land for practising agriculture to improve household food security and generate income. The farmers who did not own land but were renting the land for farming were paying R300.00 per annum.

4.2. Distribution of Land Ownership Among Farmers for Agricultural Productivity and Reasons for Not Utilising Land Ownership

The distribution of land ownership is one of the imperative and obligatory resources in agricultural production and is customary. Most farmers inherited the land from their forefathers, which is one of the key customary gifts to their children. Table 1 displays the breakdown of distributed land ownership into two groups of farmers. Farmers were grouped into a small farm (which was 0.5 Ha

- 2.5 Ha) and a midsize farm (2.6 Ha - 5 Ha). The study results revealed that most farmers in the Eastern Cape Province were small farmers, with 60%, compared to their counterparts, with 23%. This means that farming in the province is mainly practised under a small land size of 0.5 to 2.5 Ha. The main reason for such distributed land ownership among farmers was primarily using land for agriculture. The study results revealed that about 83% of farmers were utilising their land access through land ownership and land renting for practising agricultural productivity. Farmers strictly use their land to cultivate crops for home consumption and income generation to enhance their livelihoods and improve food security.

The remaining 17% did not use and have access to land ownership for agriculture. A lack of finances, water, agricultural equipment and fencing constrained farmers. Strikingly, these reasons agree with Akinyemi and Mushunje (2019) that a lack of credit, water availability due to drought severity which the country has been experiencing, and farming equipment were cited as the leading challenges that farmers in Nyandeni Local Municipality were facing. These challenges forced farmers not to fully utilise their land, either for farming or renting it out to other farmers for utilisation.

TABLE 2: Distribution of Land Ownership Among Farmers for Agricultural Purposes

	Small farm		Midsize farm	
	0.5 Ha – 2.5 Ha		2.6 Ha – 5 Ha	
Variables	Frequency	Percentage. %	Frequency	Percentage. %
Farmers	70	60	30	23
Challenges for not utilising land ownership for agricultural productivity				
Challenges	Frequency	Percentage %		
Lack of credit	120	52		
Lack of water availability	80	28		

Lack of agricultural equipment	50	20		
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4.3. Types of Crops Grown by Farmers

Farming is the main occupation of many farmers in the Eastern Cape Province, with 90%. Farming is imperative in ECP, for they derive their livelihoods from it as they are not employed elsewhere. Farmers mainly farm for home consumption, and they sell surpluses to generate income to add to the social securities provided by the government to sustain their households and farms. The results revealed that maize is the most grown crop in the study area, with 50.6%, and they grow yellow maize, which they consume and feed their livestock. Cabbages (15.6%) and potatoes (12.5%) were other crops mainly grown by farmers. The least grown crops were onions and peppers, with 6.2%. They produce these crops strictly for home consumption and surplus for income generation, as their main objective is to enhance household food security in the Eastern Cape Province.

TABLE 3: Crops Grown by Different Farmers

Crop grown	Frequency	Percentage %
Maize	90	50.6
Cabbage	78	15.6
Spinach	75	13.4
Potatoes	60	12.5
Beetroot	45	10.2
Onions	40	9.3
Peppers	30	6.2

4.4. Factors Influencing Land-Living Tenure for Agrarian Efficiency in Rural Areas

The study used a Logit regression to measure factors influencing land ownership by farmers in rural areas in ECP. The principal one is the pseudo-R squared, and the second is the Likelihood ratio Chi-square, which is a valuation of how well the model ordered defendants appropriately built on assessed likelihoods. The Likelihood Ratio Chi-square of -136.87, with a p-value of 0.00,

expresses that our archetypal is statistically considerable. The Pseudo R² is 0.64 (64%), which recommends a good fit of the model to estimate explanatory variables on the dependent variable (land ownership). Table 4 represents the factors influencing land ownership in rural areas by farmers.

TABLE 4: Factors Influencing Land-Living Tenure by Agriculturalists in Rural Areas

Variables	Coefficient	P>z
Gender	-0.04	0.04**
Age	0.01	0.00***
Years spent in school	0.01	0.00***
Member of farm organisation	0.00	0.00***
Access to extension services	0.07	0.04**
Household income	-0.05	0.03**
Hired permanent labour	-0.04	0.01**
Number of observers = 150	Log-likelihood ratio = -136.87	
Prob>Chi-square = 0.00	Pseudo R ² = 0.64	

Note: **, * 5% (p < 0.05) and 1% (p < 0.001 ***), correspondingly.**

The coefficient of gender and land ownership were negative and statistically substantial at 5%. An increase in gender reduces land ownership among farmers. Thus, men did not have full land ownership as women. This implies that the increase in females as the household head reduces farmers' land ownership for agricultural practices. This is because of customary reasons where land is not given to women farmers, as they perceive women as people who must control the household chores and operations and not be farmers. This factor is one of the main reasons agricultural practices are in decline in many rural areas, as women are not viewed as people who can practise farming and excel. These results contradict Daudu *et al.* (2022), who reported that households headed by men have more opportunities to access or own land than those led by women.

The age of the household had a positive coefficient on land ownership and was statistically noteworthy at 1%. This infers that a component upsurge of the additional year in farmers' age will increase land ownership, eventually increasing agricultural productivity. This advocates that the more grown-up the agriculturalist, the more sophisticated the probability of land-living tenure. These results agree with Akinyemi and Mushunje (2019) that an increase in the age of the farmers increases the chances of owning the land and ultimately using the land for agriculture. The older farmers have more land ownership than younger farmers, and older farmers stay on the land they own, unlike younger farmers who migrate to cities for well-advanced employment away from agriculture.

Years spent in school were found to have a positive coefficient with land ownership and were statistically substantial at a 1% level. This proposes that an additional year in school will increase farmers' land ownership. This implies that educated farmers have greater chances of owning land than uneducated due to the ability to understand land policies and reform for land redistribution. Educated farmers will enhance agricultural productivity through land ownership because the farmers can analyse agricultural information and use modern innovative technology to increase production. These results were in line with Daudu *et al.* (2022), who shared that the more educated household heads are, the more likely they are to access and possess farming land.

Membership in farm organisations and land ownership were negative and statistically substantial at 1%. An increase in membership in farm organisations increases the chances of owning land. This suggests that farmers who become farm organisation members have a greater chance of owning land in rural areas. Farm organisations play a significant role in farming. In rural areas, Chiefs listen to them in deciding on land. These results were in line with Daudu *et al.* (2022) and Onumadu and Osahon (2014), who stated that belonging to a group gives farmers easier access to farm inputs and the welfare and development of their members. Access to extension services positively correlated with land ownership and was statistically significant at a 5% level. This suggests that having access to extension personnel increases the chances of owning land, as they provide farmers and households with all the necessary information about land and farming. Access to extension personnel raises productivity, as farmers can access agricultural information and techniques that help improve agricultural productivity.

Household income was found to have a negative coefficient and was statistically substantial at a 5% level. This implies that an increase in household income reduces the chances of farmers owning and utilising land. When household income increases, land ownership decreases. This is because having a high household income will result in farmers investing in non-farm activities, as they believe it will generate more money than investing in the farm. Farmers with high household incomes in rural areas invest in non-farm activities rather than farming, as they assume farming is too demanding yet not profitable. Hiring permanent labour was significant at a 5% level and had a negative coefficient with land ownership. This suggests that hiring permanent labour reduces the chances of owning land. This means the more a farmer hires permanent labour on the farm, the lower the chances of the farmer owning the land for agriculture. This implies that farmers spent most of their time and resources searching for income to pay the permanent labour rather than investing in land ownership. These results agree with Pochanasomboon *et al.* (2020), who advanced that hiring permanent labour had an effect and reduced the probability of land ownership by farming households and farmers.

4.5. The Impact of Land Ownership on Enhancing Agrarian Output in Rustic Regions

TABLE 5: Average Treatment Effects (ATTs) While Using the PSM Method

Matching method			
The outcome was agricultural productivity (yield kilogram/hectare)			
Kernel Matching Method			
Treatment:	ATT	Stand Err	t-test
landownership			
Small farm	189.4	0.09	0.02**
Midsize farm	167.1	0.06	0.00***
Treatment: rented	ATT	Stand Err	t-test
land ownership			
Small farm	70.82	0.67	0.00***
Midsize farm	-50.92	0.74	0.05**

Nearest Neighbours Matching Method			
Treatment: land ownership	ATT	Stand Err	t-test
Small farm	179.3	0.965	0.035**
Midsize farm	156.4	0.657	0.003**
Treatment: rented land ownership	ATT	Stand Err	t-test
Small farm	70.36	0.54	0.00***
Midsize farm	-62.67	0.85	0.02**

Note: *, **and * are significant at 1% and 5%, respectively.**

This paper aimed to estimate the effect of land ownership on agricultural productivity in rural areas in Nyandeni Local Municipality. The nearest neighbour and Kernel corresponding approaches were used to assess the impact of land ownership involvement on agricultural productivity. Table 5 displays outcomes from the PSM model that were assessed for evaluation deviations with the action consequence model results. Two identical examiners, the nearest neighbour and the Kernel-constructed corresponding algorithms, were active as robustness checks. The corresponding consequences specify that land ownership by farmers has a substantial constructive effect on agricultural productivity. Land ownership was divided into small and large farms to display their effect on agrarian output. The study found out that most agriculturalists own small farms compared to large ones and that small farms are more productive than large ones. This study used the PSM method to guesstimate ATTs for apiece possible consequence transversely for two kinds of farmsteads, as presented in Table 5. Despite the fact of seeing the latent consequence of the agricultural productivity (yield result Kg per Ha), results indicate that the measured ATTs for the action variable of land tenure were optimistic and statistically significant at 1% and 5% congruently across all the corresponding methods and the entire categories of the farmhouse. The small-size farmsteads accomplished the established agricultural productivity of having land tenure, with an increase in agricultural productivity by 189.4 kg/hectare by 5%. Land possession enhances large-sized agricultural productivity by 156.4 kg/hectare by 1%. These results agree with

Pochanasomboon *et al.* (2020), who noted that land ownership contributes positively to agricultural productivity, as it improves productivity and yields higher in owned land than in rented land. Akram *et al.* (2019) also agreed with the findings that land ownership positively influences agricultural productivity, and potential benefits are lost due to unsecured land by farmers. This might be because rented farms are less efficient than the other type of tenants (landowners) since they only receive a portion of the yield after investing a certain level of effort.

The effect of rented land ownership on agricultural productivity was found to only increase the agricultural productivity of small-sized farms by 70 kg/hectare, while large farms were experiencing a decline in agricultural productivity. This decline from large size is because of payment to the landlord in the form of produce or cash, which reduces productivity rapidly. These results aligned with Pochanasomboon *et al.* (2020) that small-sized farmers are more productive than midsize-sized farmers, as small-sized farmers enhance agricultural productivity.

5. CONCLUSION

This study investigated the impact of land-living tenure on agrarian efficiency in rural areas of Eastern Cape Province. The study results revealed that women practise farming in the Eastern Cape Province with an average age of 48 years and a family size of five people in a household. Farming is their primary occupation, and relies on social securities provided by the government to add to whatever farming provides for a living. Most of these farmers have secondary education, which enables them to acquire and analyse farming information and innovative techniques. The results further reveal that most farmers are landowners who own small farms, with an average farm size of 0.5 to 2.5 Ha. They are practising crop and vegetable farming, strictly for home consumption, with the excess surplus sold to generate income. Results further show that 17% of farmers do not own land; instead, they rent the land to practise farming and are not utilising the land for agricultural use owing to a lack of funding, water availability and no farming equipment. Socioeconomic factors are impeding land ownership by farmers for agriculture to enhance food security. Propensity Score Matching revealed that farmers with small-sized land ownership have greater productivity than large-sized farmers. The results showed that landowners have an effect and enhance agricultural productivity rather than renting the land for agriculture. Therefore, the study recommends that land reform policy must speed up distributing land to rightful owners to

assist smallholder farmers in securing land rights, thus enhancing agricultural productivity. The study further recommends that land reform policies be gender-sensitive and consider youth in the distribution of land ownership. Government and NGOs must support the startup landowners in pursuing farming practices to combat restrictions. The study also recommends that the government provide and introduce mentorship programmes that will assist newly granted landowners in farming to minimise renting land.

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7. CONFLICT OF INTEREST

The authors declare no conflict of interest for this study.

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