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Analyzing factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village

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ABSTRACT

Land plays a crucial role in ensuring food production and supporting rural livelihoods in South Africa. However, in Ga-Mphahlele Village, a significant portion of land owned by rural households remains underutilized, leading to reduced food production. This study aimed to analyze factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village, Limpopo Province. Primary data were collected from 75 rural landowners using structured questionnaires and face-to-face interviews. Descriptive statistics were used to describe socio-economic characteristics and land utilization patterns, while a binary logistic regression model was applied to determine factors influencing land utilization for food production. The results showed that only 41% of respondents actively utilized their land for food production, while 59% did not. The average age of respondents was approximately 60 years, reflecting an aging farming population. Age, employment status, marital status, access to agricultural extension services, soil fertility, and type of farming equipment were found to influence land utilization significantly. Access to extension services was highly significant, highlighting the importance of institutional support in promoting land utilization. The study concludes that strengthening extension services, improving soil fertility management, supporting vulnerable households, and facilitating access to modern farming equipment can significantly increase and enhance land utilization for food production among rural landowners. These findings provide evidence-based insights for policymakers to design targeted interventions aimed at strengthening rural food production and livelihoods.

Keywords: extension services, food production, land utilization, rural livelihoods, soil fertility

1. Introduction

Land is one of the most important resources for food production in South Africa, particularly in rural areas such as Ga-Mphahlele Village [1]. Agriculture plays a critical role in livelihoods, food security, income generation, and employment [2]. Rural farmers who utilize their land for food production experience improved food security and increased income [3]. Despite the importance of land, a significant proportion of rural land in South Africa remains underutilized, limiting agricultural productivity and rural development [4].

Land ownership has the potential to improve livelihoods through increased agricultural production, yet failures in land reform and weak institutional support continue to hinder productive land use [2], [5]. Although land reform programs have been implemented for over two decades, land utilization remains low among rural landowners due to insecure tenure, limited access to extension services, inadequate farming equipment, and financial constraints [6], [7]. Policy implementation challenges, including weak coordination and limited support for smallholder farmers, further discourage productive land use [8].

Ga-Mphahlele Village in Limpopo Province is predominantly rural, with households largely dependent on agriculture for livelihoods. However, despite the availability of land, agricultural productivity and land utilization remain low, contributing to persistent food insecurity and limited economic opportunities in the area [9]. Previous studies have identified socio-economic, environmental, and institutional factors as key determinants of land utilization. However, these studies often provide generalized findings and do not sufficiently capture how these factors interact specifically within rural communities such as Ga-Mphahlele, particularly among landowners.

Previous studies have identified various socio-economic factors (such as age, education level, employment status and household size), environmental factors (including soil fertility and water availability) and institutional factors (such as access to extension services, credit facilities and farming equipment) as determinants of land utilization. However, the influence of these factors varies across locations due to differences in socio-economic conditions, environmental characteristics and institutional support systems. Consequently, findings from other regions may not fully explain land utilization patterns in Ga-Mphahlele Village. Therefore, this study examines the specific socio-economic, environmental, and institutional factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village. Understanding these factors is important for developing targeted interventions and policies aimed at improving land utilization, increasing food production, and enhancing rural livelihoods in the area.

The research is guided by the following questions: (i) to what extent do rural landowners utilize their land for food production, and (ii) which socio-economic factors, including age, education level, household size, and employment status; environmental factors including soil fertility and water availability; and institutional factors including access to credit, extension services, and farming equipment significantly influence land utilization decisions. The novelty of this study lies in its localized empirical analysis, which provides context-specific evidence to inform policy and development interventions aimed at enhancing land utilization and rural food production.

2. Materials and Methods

2.1. Study area

The study was conducted in Ga-Mphahlele Village, located in the Lepelle-Nkumpi Municipality of the Capricorn District, Limpopo Province, South Africa. The village has an estimated population of 10,000 people, and most rural areas in Limpopo, such as Ga-Mphahlele, depend on agriculture for their livelihoods. Many households in these areas also rely on land for farming purposes [10].

2.2. Data collection

Primary data were collected in 2025 from 75 rural landowners using structured questionnaires through face-to-face interviews. Purposive sampling was employed to select respondents who owned land, as the study focused specifically on land utilization decisions. The sampling process involved identifying households with land ownership in Ga-Mphahlele Village, with the assistance of local leaders and community members, and selecting respondents who were responsible for land utilization decisions. The sample size was determined using Slovin's formula:

$$N = \frac{N}{1 + Ne^2} \quad (1)$$

$$N = \frac{10000}{1 + 10000(0,08^2)} = 154$$

Where n represents the sample size, N = population size and e = margin of error. A sample size of 154 landowners was initially estimated using Slovin's formula; however, due to time and resource constraints, 75 landowners were ultimately surveyed.

2.3. Data analysis

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to describe socio-economic characteristics and patterns of land utilization. To identify factors influencing land utilization for food production, a binary logistic regression model was employed. The dependent variable was land utilization for food production, coded as 1 if the landowner utilized land for food production and 0 otherwise. Independent variables were classified according to their nature: socio-economic factors included

age, gender, education level, employment status, marital status, household size, farming experience, and remittances; environmental factors comprised soil fertility, availability of water, land size and distance to land; and institutional factors consisted of access to extension services, access to agricultural financing, and type of farming equipment. These variables were analyzed to assess their influence on land utilization decisions among rural landowners in Ga-Mphahlele Village. The binary logistic regression model was formulated as [11]:

$$\ln \left(\frac{P_i}{1-P_i} \right) = B_0 + B_1AGE + B_2GND + B_3EDU + B_4EMS + B_5MRS + B_6AES + B_7HSS + B_8AAF + B_9DLS + B_{10}AFE + B_{11}FME + B_{12}AVW + B_{13}LND + B_{14}SFT + B_{15}TFE + B_{16}RMT \quad (2)$$

The independent variables included 16 factors classified according to their nature. Were X_1 = Age (Years), X_2 = Gender (Dummy), X_3 = Education (categorical), X_4 = Employment status (Categorical), X_5 = Marital status (Categorical), X_6 = Access to extension service (Dummy), X_7 =Household size (Numeric), X_8 = Access to agricultural financing, X_9 = Distance to land space (Kilometres), X_{10} Access to farming equipment (Dummy), X_{11} = Farming experience (Categorical), X_{12} Availability of water (Dummy), X_{13} Land size (Hectares), X_{14} = Soil fertility (Dummy), X_{15} = Type of farming equipment (Categorical), X_{16} = Remittances (Dummy).

3. Results and Discussion

This section presents and discusses the empirical findings of the study based on data collected from rural landowners in Ga-Mphahlele Village. The results are structured in line with the study objectives, beginning with descriptive and socio-economic characteristics of respondents, followed by an assessment of land utilization for food production and an analysis of factors influencing land use decisions. Table 1 shows the results of the socio-economic characteristics of the landowners.

3.1. Descriptive results

The descriptive results revealed that the average age of respondents was approximately 60 years, indicating an aging population of landowners. The mean household size was about five members, while land sizes were relatively uniform, averaging around 1.4 hectares. There was substantial variation in the distance between respondents' homes and their land, suggesting differing levels of physical access to farming plots.

Table 1. Descriptive statistics results

Variables	N	Minimum	Maximum	Mean	Standard deviation
Age	75	38	85	59.92	10.94
Household size	75	2	9	5.33	1.70
Distance to land space	75	1.1	900.0	108.94	248.58
Land size	75	1.2	2.2	1.39	0.19

3.2. The socio-economic characteristics of respondents

This section presents the socio-economic characteristics of the respondents included in the study. Variables such as gender, education level, employment status, marital status, remittances, and farming experience were analyzed to provide an overview of the respondents and to better understand their potential influence on land utilization for food production. The distribution of these characteristics is presented in Table 2. The results in Table 2 indicate that most respondents were male (59%), suggesting that land ownership and utilization in the study area are largely male-dominated. In terms of education, most respondents had at least secondary (28%) or tertiary education (29%), while a smaller proportion had no formal education (24%) or only primary education (19%). This implies that a reasonable level of education exists among respondents, which may influence their decision-making regarding land use.

Furthermore, a large proportion of respondents were unemployed (52%), with fewer being employed (29%) or self-employed (19%), indicating the limited employment opportunities available in the area and strong reliance on agriculture for livelihoods. Most respondents were married (58%), followed by widowed respondents (33%), while only 9% were single, and a significant number received remittances (59%), while 41 were not receiving remittances, suggesting the importance of household structure and external financial support. Additionally, regarding farming experience, 35% of respondents had between 6 and 15 years of

farming experience, while 24% had more than 15 years of experience, suggesting that most respondents possessed considerable farming knowledge and experience. Overall, these socio-economic characteristics are likely to play an important role in influencing land utilization decisions for food production.

Table 2. Socio-economic characteristics of respondents

Variable	Category	Percentage (%)
Gender	Male	59
	Female	41
Education level	No formal education	24
	Primary education	19
	Secondary education	28
	Tertiary education	29
Employment status	Employed	29
	Unemployed	52
	Self-employed	19
Marital status	Married	58
	Single	9
	Widowed	33
Remittances	Yes	59
	No	41
Farming experience	Less than 2 years	24
	2-5 years	17
	6-15 years	35
	More than 15 years	24

3.3. Land utilization for food production

The results indicate that only 41% of respondents actively utilized their land for food production, while 59% did not engage in farming activities. This finding suggests that a substantial proportion of agricultural land remains underutilized in Ga-Mphahlele Village. The low level of land utilization may be attributed to several socio-economic, environmental, and institutional constraints faced by rural landowners.

Socio-economic challenges such as unemployment status and dependence on remittances may reduce the ability of landowners to purchase agricultural inputs and invest in farming activities. Environmental factors, including poor soil fertility and limited availability of water for irrigation, may further discourage land cultivation and reduce agricultural productivity. Institutional constraints such as inadequate access to extension services, limited access to agricultural financing, and lack of farming equipment may also hinder farmers' ability to effectively utilize their land for food production.

These findings suggest that land underutilization in the study area is not solely a result of individual choices but is influenced by a combination of socio-economic, environmental and institutional factors. Therefore, improving access to agricultural support services, financing opportunities, water resources, and farming equipment may increase land utilization and contribute to improved food production and rural livelihoods in Ga-Mphahlele Village.

3.4. Factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village

A binary logistic regression model was estimated to identify the factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village. The model assessed the effects of selected socio-economic, environmental, and institutional variables on the likelihood of land being utilized for food production. The results of the analysis are presented in Table 3.

The findings of this study have important implications for agricultural development, food security among rural landowners and agricultural policy in Ga-Mphahlele village and similar communities. The binary logistic regression results revealed that variables such as age, employment status, marital status, access to extension services, soil fertility and type of farming equipment significantly influence land utilization for food production. This suggests that both socio-economic and agricultural factors play a critical role in determining the effective utilization of land for food production in rural communities.

The significance of access to extension services indicates the need for government departments and agricultural stakeholders to strengthen agricultural support programmes in rural areas. Improved access to extension officers, agricultural information and technical guidance may assist rural landowners in adopting improved farming practices, effective land utilization and increasing agricultural productivity. The findings further highlight the importance of soil fertility in influencing land utilization. This implies that programmes aimed at improving soil management practices, such as soil testing, fertilization and sustainable land management, may enhance agricultural productivity and encourage greater utilization of arable land for food production.

In addition, the significance of the type of farming equipment suggests that access to appropriate farming tools and machinery may positively influence agricultural activities among rural landowners. Policymakers and rural development agencies should therefore consider improving access to farming equipment through subsidies, cooperative schemes or financial support programmes to promote efficient land use and increased food production. Overall, the study contributes to the existing body of knowledge on rural agricultural development and may assist policymakers in designing targeted interventions aimed at improving land utilization, rural livelihoods, and household food security. Furthermore, the findings may serve as a foundation for future research on factors affecting land utilization in rural South African communities.

Table 3. Results for the binary logistic regression model

Variables	B	S.E.	Wald	df	Sig.
AGE	0.14	0.07	3.77	1	0.05***
EMS	1.87	0.79	5.55	1	0.02**
MRS	-2.53	1.22	4.31	1	0.04**
HSS	0.27	0.27	1.05	1	0.31
AES	5.45	1.72	10.02	1	0.00*
AAF	-2.32	2.02	1.33	1	0.25
SFT	2.76	1.29	4.57	1	0.03**
DLS	-0.00	0.00	2.17	1	0.14
FME	-0.87	0.69	1.62	1	0.20
TFE	-0.97	0.43	5.12	1	0.02**

Table 3 presents the results of the binary logistic regression model employed to determine the factors influencing land utilization for food production among rural landowners in Ga-Mphahlele village. The model examined the relationship between the dependent variable and selected socio-economic and institutional factors, including age, employment status, marital status, household size, access to extension services, access to agricultural finance, soil fertility, distance to land space, farming experience and type of farming equipment. The results indicate the variables that significantly influence land utilization based on their coefficient estimates and significance levels.

Table 4. Model summary

Model Summary	Value
Cox and Snell R-Square	0.59
Nagelkerke R Square	0.79
-2 Log Likelihood	35.49

The results of the binary logistic regression model indicate strong explanatory power, as reflected by the Nagelkerke R-squared value of 0.790, suggesting that approximately 79% of the variation in land utilization decisions is explained by the selected variables.

3.4.1. Age

The age of rural landowners had a positive coefficient of 0.142 and was significant at the 10% level ($p = 0.052$), suggesting that older landowners are more likely to utilize land for food production due to accumulated farming experience. This is consistent with Rankoana [12], who emphasized that socio-economic characteristics such as age influence land use, as younger people migrate to urban areas while older individuals remain in rural areas to farm.

3.4.2. Employment status

The rural landowner's employment status showed a positive coefficient of 1.869 and was significant at the 5% level ($p = 0.019$). This indicates that households with employed members are more likely to utilize their land for food production. Stable income from employment enables households to afford farming inputs, which promotes active land use. This contradicts the findings of Thamaga-Chitja and Morojele [13], who noted that salaried households may sometimes reduce farming activity due to off-farm work commitments, even though they have the financial capacity to farm.

3.4.3. Marital status

The variable marital status of landowners had a negative coefficient of -2.529 and was significant at the 5% level ($p = 0.038$). This indicates that certain marital arrangements may increase the risk of low food production, possibly due to resource limitations or reduced labour availability in single-headed households. This indicates that being unmarried (e.g., single or widowed) may reduce the likelihood of land utilization for food production, possibly due to limited labour and resources compared to married households. This corroborates the findings of a study by Masuku *et al.* [14], which found that women in single-headed households face restricted access to productive resources due to patriarchal systems.

3.4.4. Household size

Household size had a positive coefficient of 0.274 but was not statistically significant ($p = 0.306$). This suggests that an increase in household size may increase the likelihood of land utilization due to the availability of family labour; however, the effect is not strong enough to significantly influence land use decisions in the study area. However, it conforms with Thamaga-Chitja and Morojele [13], who reported that larger households are more likely to cultivate food crops due to greater labour availability, which suggests a positive effect on land utilization.

3.4.5. Access to agricultural extension services

Access to extension services showed a strong positive coefficient of 5.452 and was highly significant at the 1% level ($p = 0.002$). This shows that access to extension support greatly improves food production by providing technical knowledge, training, and modern practices. The finding corresponds with Uhunamure *et al.* [15], who demonstrated that access to extension, irrigation, and equipment significantly improved productivity among smallholder farmers and Akinyemi and Mushunje [2] similarly noted that the lack of extension services prevents rural landowners from effectively using their land.

3.4.6. Access to agricultural financing

Access to agricultural financing had a negative coefficient of -2.324 and was not statistically significant ($p = 0.250$). This suggests that access to finance may reduce the likelihood of land utilization, although the effect is not statistically significant. This result contradicts theoretical expectations. A possible explanation is that financial resources in the study area may be used for non-agricultural purposes or that available credit is insufficient to support effective farming. However, this contradicts with Akinyemi and Mushunje [2], who highlighted that lack of funding limits productive land use, implying that access to financing should increase land utilization and Shackleton [16] also found that access to financial resources supports farming practices, supporting a positive relationship.

3.4.7. Soil fertility

Soil fertility had a positive coefficient of 2.764 and was significant at the 5% level ($p = 0.032$). This indicates that fertile soils improve land utilization for food production by enabling higher yields and reducing reliance on external fertilizers. This is consistent with Shackleton [16], who emphasized that soil quality underpins productivity in rural South Africa.

3.4.8. Distance to land space

Distance to land had a negative coefficient of -0.003 and was not statistically significant ($p = 0.141$). This suggests that as the distance between the household and the land increases, the likelihood of land utilization decreases due to higher transport costs and reduced monitoring of farming activities [17]. However, the effect is not statistically significant. But this conforms with Hlatshwayo *et al.* [18], who noted that long distances to land or markets reduce productive farming, implying a negative effect on land utilization.

3.4.9. Farming experience

Farming experience had a negative coefficient of -0.874 and was not statistically significant ($p = 0.203$). This finding contradicts theoretical expectations, as farming experience is generally expected to increase land utilization. A possible explanation is that more experienced farmers may be older and face physical limitations or may diversify into other livelihood activities, reducing their engagement in farming. This deviates from Rankoana [12], emphasizing that more experienced farmers are more likely to engage in productive farming, implying a positive effect.

3.4.10. The type of farming equipment

The type of farming equipment had a negative coefficient of -0.973 and was significant at the 5% level ($p = 0.024$). This indicates that landowners with limited or outdated equipment are more likely to experience low food production. The implication is that access to modern tools enables efficient land use, better yields, and reduced labour burden. The negative coefficient indicates that a lack of access to modern farming equipment reduces the likelihood of land utilization for food production. The finding aligns with Gwacela *et al.* [17], who reported that lack of equipment was a recurring issue in Limpopo, and similarly, Uhunamure *et al.* [15] confirmed that equipment access improved farming productivity.

4. Conclusion

The study revealed crucial insights into the factors influencing land utilization for food production among rural landowners in Ga-Mphahlele Village. The findings indicate that land underutilization remains a significant challenge, with 41% of landowners actively utilizing their land for food production, which is less than half of the landowners. Age, employment status, access to extension services, soil fertility, marital status, and type of farming equipment were identified as significant determinants of land utilization for food production. The findings have implications for policy interventions aimed at enhancing land utilization for food production among rural landowners in Ga-Mphahlele village. The study therefore recommends promoting sustainable land utilization in Ga-Mphahlele Village by enhancing intergenerational knowledge transfer, supporting rural employment, and assisting vulnerable single-headed households. Strengthening agricultural extension services, improving soil fertility management, and providing access to modern farming equipment are also key. Furthermore, integrated policies addressing technical support, resources, and infrastructure will ensure productive and sustainable food production in rural areas. Future research could examine how land utilization patterns evolve over time and in response to interventions such as extension services, mechanization, or climate-smart practices.

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