



Mpala, Ke Botlhokwa

AGRICULTURAL LAND OWNERSHIP, ACCESS, AND USE: POLICY IMPLICATIONS FOR BOTSWANA

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Introduction



AGRICULTURE

- Key driver of the economy and a priority sector (Vision 2036, NTS)
- Provides linkages to other sectors of the economy
- Despite several land reform policies and programmes implemented over the years, the sector's contribution to GDP has been low (1.9%) and growth (1.2%) over the past decade (2014-2023)
- **Land** plays a key role as a factor of production and critical for productivity (Mbulawa, 2017)



PURPOSE OF THE STUDY

- Assess current patterns of agricultural land ownership, access, and use, using the 2022 Population and Housing Census data.
- Propose policy recommendations based on the findings of the study.

Methodology

DATA

- 2022 Population and Housing Census
- Sample size: 695,703
- Analysis using STATA 19

MODEL

- Logistic Regression
- Dichotomous (binary) variables

MULTIPLE LOGISTIC REGRESSION ANALYSIS

- **Dependent variable:** Agricultural land ownership
- **Independent variables:** Age, marital status, Gender, Highest education, Employment, Land tenure, Agric. practice

MULTI-COLLINEARITY TEST

- Correlation matrix for binary independent variables
- All values below 0.7, hence no multicollinearity

Methodology

Model specification (Wooldridge , 2009)

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

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

Odds ratio in binary response

$$\frac{p(Y=1)}{1-p(Y=1)} = \frac{\frac{1}{1+e^{-\beta i}}}{\frac{e^{-\beta i}}{1+e^{-\beta i}}} = \frac{1}{e^{-\beta i}} = e^{\beta i} \dots\dots\dots(3)$$

Multiple logistic regression

$$Y_i = \beta_0 + \beta_1 age + \beta_2 gender + \beta_3 marital_status + \beta_4 education + \beta_5 employment + \beta_6 land_tenure + \beta_7 agric_practice + \varepsilon_i$$

Findings and Discussions

21.8%

Agricultural land ownership

- legal right to use, transfer, lease, or sell the land

35.4%

Agricultural land access

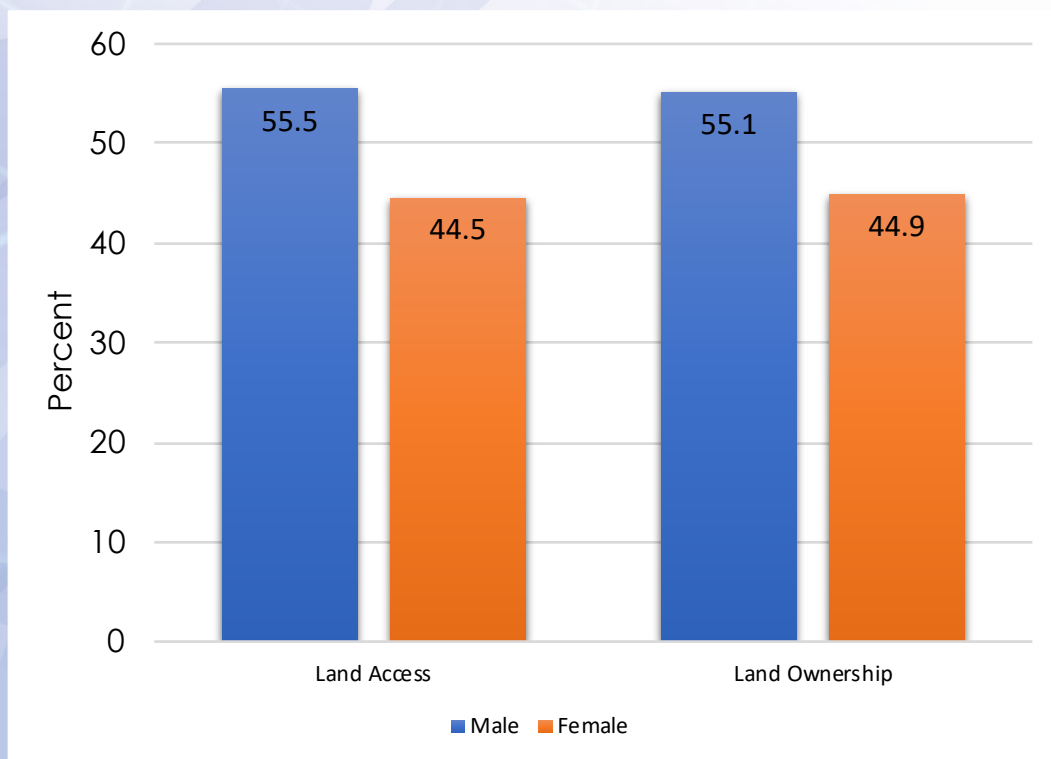
- leasing, renting, sharecropping, communal arrangements, or informal agreements

Findings and Discussions

	Land Access	Land Ownership
Livestock Ownership	164, 294	104, 696
Crop Ownership	138, 142	73, 473
TOTAL	302, 436	178, 169
Total Utilisation (Livestock & Crop)	43.5 %	25.6 %

Findings and Discussions

- Land Ownership and Access by Gender



- Gender imbalance is evident in agricultural land ownership and access.
- A higher percentage of males own and have access agricultural land compared to their female counterparts

Findings and Discussions

• Logistic Regression Output (Land Ownership)

Variable	Odds Ratio	Std. Error	P> z
Age	1.06676	0.00333	0.000***
Marital status	1.97488	0.01602	0.000***
Gender	1.09482	0.00844	0.000***
Highest education	1.25756	0.01171	0.000***
Employment	1.01663	0.00839	0.046**
Land tenure	8.22712	0.06012	0.000***
Agric. practice	2.10841	0.05862	0.000***
Cons.	0.00299	0.00066	0.000***
Number of obs.	695,479		
LR chi2 (7)	233945.20		
Prob>chi2	0.00		
Pseudo R2	0.32		

- Older individuals are more likely to own land, the odds increase by about 6.7%
- Being married double the odds of owning agricultural land
- Male individuals have approx., 9.5 % higher odds of owning agricultural land compared to females
- Higher education increase the odds of owning land by about 25.8%
- Being employed increases the odds of owning land slightly by 1.7%
- The most common land tenure is Tribal system, and this increase the odds of owning land greatly
- Engaging in livestock production (=1), compared to other practices, more than doubles the odds of owning land

Findings and Discussions

Land Utilisation

Logistic Regression Output (Livestock Ownership)

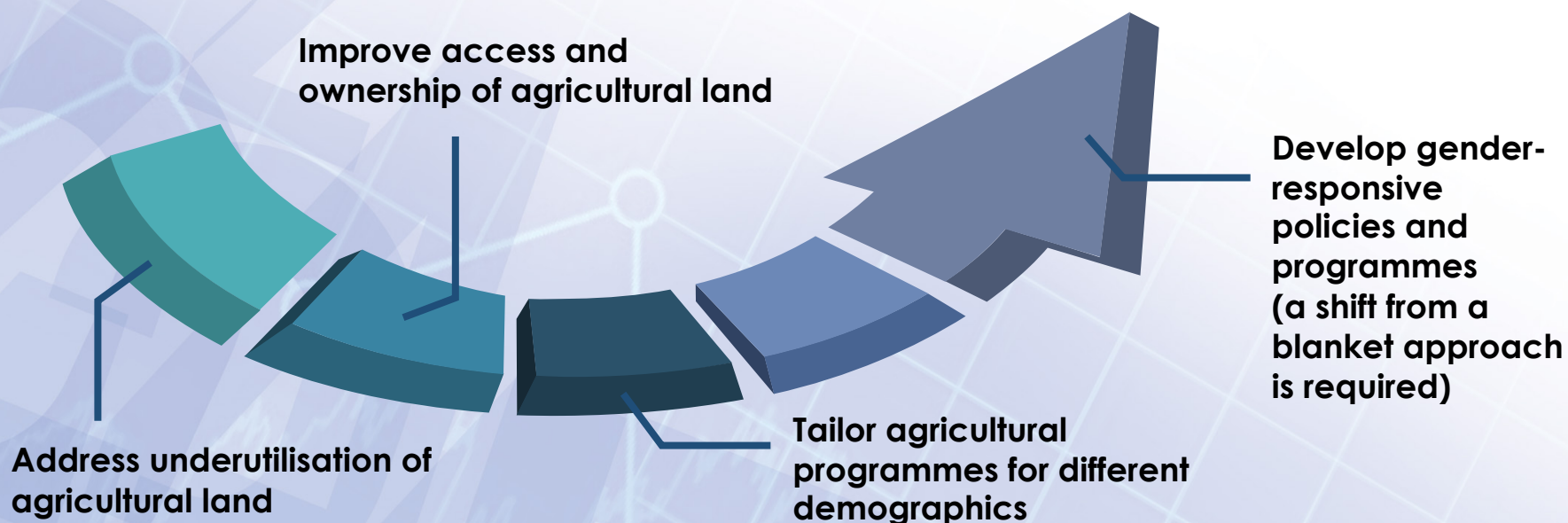
Variable	Odds Ratio	Std. Error	P> z
Age	1.01902	0.00157	0.000***
Marital status	2.13498	0.10068	0.000***
Gender	1.56992	0.06938	0.000***
Highest education	1.26651	0.06099	0.000***
Land tenure	0.88111	0.04902	0.023**
Agric. practice	3.34792	0.20143	0.000***
Cons.	0.90237	0.10101	0.359
Number of obs.	23,464		
LR chi2 (6)	1651.58		
Prob>chi2	0.00		
Pseudo R2	0.08		

Logistic Regression Output (Crop Ownership)

Variable	Odds Ratio	Std. Error	P> z
Age	1.00422	0.00156	0.007***
Marital status	1.44335	0.06305	0.000***
Gender	0.83999	0.03867	0.000***
Highest education	0.89527	0.04198	0.018**
Land tenure	1.12445	0.05983	0.027**
Agric. practice	0.15341	0.06145	0.000***
Cons.	6.92791	0.78729	0.000***
Number of obs.	23,464		
LR chi2 (6)	26877.72		
Prob>chi2	0.00		
Pseudo R2	0.13		

- Age is a more determining factor for livestock ownership than for crop production
- Marriage remain a key predictor for both livestock and crop production
- The odds of owning livestock when educated are higher, but decreases for crop production
- Males are more likely to own livestock, while women are more likely to engage in crop production
- Education increases the likelihood of owning land, but not a critical factor for crop production

Policy Implications and Recommendations



Conclusion

- Agricultural land ownership and access play a pivotal role in Botswana's economic development, contributing to food security, poverty alleviation, and income generation.
- Despite past land policy reforms and agriculture-focused programmes, the sector's contribution to GDP has been relatively small and on a declining trend over the past decade (2014 – 2023)
- There is therefore a need for targeted policies to address the disparities that exist in agricultural land ownership and use, as well as to capitalise on the needs and strengths of different demographics
- Research beyond this study is needed to investigate the major causes of underutilisation of agricultural land in Botswana, as this impacts the sector's output and contribution to economic growth.