Agricultural finance and extension services for smallholder maize farmers practising CA in Lesotho- Determinants of adopters and non-adopters access to finance and extension services.

Brian Muroyiwa[1] and Letlotlo Martin Mathaha[2]

Department of Agricultural Economics and Extension, National University of Lesotho, P.O. Roma 180, Lesotho.

* Corresponding Author: Email: **b.muroyiwa@nul.ls**

INTRODUCTION

Agriculture remains the most reliable source of survival in the rural areas of the developing countries. The World Bank (2017) reported that the agricultural sector provides jobs for over 1.3 billion farmers in rural areas most of which are smallholder farmers. Poverty seems to be mostly common in Sub-Saharan Africa (SSA) among the most affected regions globally (Tsige et al., 2020). Smallholder farmers are referred to as resource-poor and are characterised with the use of basic technologies in agricultural production. Most of these farmers rely mainly on rain-fed agriculture, which is susceptible to climate change. Lesotho is not an exception since the majority of the population are in the rural areas and they also depend on agriculture for food, employment and income. Maize is the country's staple food, therefore this makes maize an important cereal crop that most smallholder farmers usually produce on their plots (Daemane et al., 2022), and it is the most commonly produced cereal crop. The major factors that affect agricultural performance in Lesotho include among other things; low investment due to inadequate access to agricultural finance, use of traditional production methods than improved technologies, limited access to extension services and climate change (African Development Bank Group, 2013). Extension services are an important part of rural and agricultural development too, but in most African countries, they lack resources and in most cases the farmer to extension officer ratio is very high. Small scale farmers often lack extension services which also hinder the adoption and implementation of CA among smallholder farmers. Mojaki et al. (2019), indicated that lack of resources of extension services in Lesotho makes it difficult to reach all farmers across large areas are isolated. An effective extension agent is estimated to reach only 10% of farming population and this hinders the dissemination of information on new technologies. The ratio of extension staff to farmers in Lesotho is at 1:750, while the recommended one is 1:200-300 (Ministry of Agriculture, 2002).

OBJECTIVES

The objective of this study is to explore and compare the determinants of adopters and non-adopters of CA access to finance and extension services. The study will also describe the challenges faced by smallholder maize farmers practicing CA in accessing finance and extension services and the potential solutions to bridge this gap.

MATERIAL AND METHODS

Cross-sectional data was obtained from a sample of 807 farmers in seven districts of Lesotho namely: Quthing, Mohales' Hoek, Mafeteng, Maseru, Berea, Leribe and Butha-Buthe. The data was collected by means of structural interviews using KOBO tool in a baseline survey conducted in 2022. The interviewed farmers were selected from the two largest agro-ecological zones in Lesotho – the Lowlands (both Northern and Southern) and the Highlands regions. The study area included three districts in the Southern part of Lesotho that included Quthing, Mohales Hoek and Mafeteng; Maseru which is central, and Berea, Leribe and Butha-Buthe in the Northern part of the country respectively.

Data was analysed using bivariate model which is a joint model for two binary outcomes and these outcomes can be correlated with correlation (p), (Katchova 2013). This model was used to analyse the determinants of both adopters and non-adopters of Conversation Agriculture access to finance and extension services. The structural form of the bivariate Probit model can be expressed as follows:

$$y_i^* = x_i\beta_i + \mu_i$$

For this study Y_1^* represents smallholder farmer's access to finance and Y_2^* represents smallholder farmer's access to extension services.

$$Y_{i1}^* = \alpha_1 Y_{i2}^* + x_{i1}\beta_1 + \varepsilon_{i1}\,;\, y_{i1} = 1$$

$$if\ y_{i1}^* > 0\,; = 0, otherwise$$

Where:

Y_1 is a binary variable indicating whether farmers have access to extension services or not.

Y_2 is a binary variable indicating whether farmers have access to finance or not.

X_1 Represents independent variables that are hypothesised to influence access to finance or extension services

B_i Represents coefficients of the independent variables.

The two binary outcomes are expected to be observed as shown by the equation below:

$$y_1 = \begin{cases} 1 & if\ y^* > 0 \\ 0 & otherwise \end{cases}$$

$$y_2 = \begin{cases} 1 & if\ y^* > 0 \\ 0 & otherwise \end{cases}$$

RESULTS AND DISCUSSION

Table 1 shows that the variables household Income, and the use of social networks influence access to credit among CA adopters. While gender, occupation, farmer group membership, source of credit and source of extension service influence access to extension services among CA adopters. Other variables included in the model where insignificant. Table 2 shows that regarding access to credit gender, household size, household income, farming experience, land ownership and source of extension services influence access to credit.

Acknowledgements

RESULTS AND DISCUSSION

Table 1 : Parameter Estimates of the bivariate Probit Regression for Adopters

Response variable(s)	Explanatory Variables	Model Parameter	Coefficient	Std. Err.	Z	P>|z|
Credit Access-Adopters	Constant	β_0	-0.5829	0.8546	-0.68	0.495
	Gender	β_1	0.0127	0.2434	0.05	0.958
	Occupation	β_2	-0.3027	0.3016	-1.00	0.315
	Household Income	β_3	-0.2944*	0.1614	-1.82	0.068
	Farmer group membership	β_4	0.2441	0.2130	1.15	0.252
	Source of Credit	β_5	-0.3752	0.2942	-1.11	0.266
	Use of social networks	β_6	0.3752*	0.2038	1.84	0.066
	Source of extension service.	β_7	0.0883	0.0825	1.07	0.285
Response variable(s)	**Explanatory Variables**	**Model Parameter**	**Coefficient**	**Std. Err.**	**Z**	**P>|z|**
Extension Access-Adopters	Constant	β_0	-0.2852	0.6386	-0.45	0.655
	Gender	β_1	-0.3837**	0.1899	-2.02	0.043
	Occupation	β_6	0.5021**	0.2513	2.00	0.046
	Household Income	β_7	0.0362	0.1096	0.33	0.741
	Farmer group membership	β_{11}	0.5391***	0.1838	2.93	0.003
	Source of Credit	β_{15}	-0.1838***	0.0580	-3.17	0.002
	Use of social networks	β_{16}	-0.0592	0.1622	-0.36	0.715
	Source of extension service	β_{17}	-0.2111***	0.0635	-3.32	0.001
	/athrho		0.2031	0.1651	1.23	0.219
	Rho		0.2003	0.1585		

Number of observations = 391   Wald chi2(36) = 55.74   Prob>chi2 = 0.0189
Log Likelihood = -275.83619

The study results show that access to extension services is influenced by age, educational level, occupation, household income, farmer group membership, market information, labour and marital status.

Table 2 : Parameter Estimates of the bivariate Probit Regression for Non-Adopters

Response variable(s)	Explanatory Variables	Model Parameter	Coefficient	Std. Err.	Z	P>|z|
Credit Access-Non-Adopters	Constant	β_0	-0.6687	0.7867	-0.85	0.395
	Gender	β_1	-0.4600**	0.2323	-1.98	0.048
	Age	β_2	-0.0951	0.0087	-1.09	0.274
	Household Size	β_3	-0.7445***	0.0455	-1.64	0.101
	Educational level	β_5	0.9428	0.1218	0.77	0.439
	Occupation	β_6	0.3185	0.3333	0.96	0.339
	Household Income	β_7	-0.5585***	0.2146	-2.60	0.009
	Farming Experience	β_8	0.1855*	0.0996	1.86	0.063
	Land Ownership	β_9	-0.3676***	0.2243	-1.64	0.101
	Field Size	β_{10}	-0.0059	0.0255	-0.23	0.818
	Farmer group membership	β_{11}	0.3455	0.2160	1.60	0.110
	Market information	β_{12}	-0.0504	0.2990	-0.17	0.866
	Labour	β_{13}	0.0251	0.0637	0.39	0.694
	Marital status	β_{14}	0.0465	0.1460	0.32	0.750
	Source of extension service	β_{17}	0.1245*	0.0658	1.89	0.058
Extension Access-Non-Adopters	Constant	β_0	-1.2763**	0.5776	-2.21	0.027
	Gender	β_1	-0.2454	0.1681	-1.46	0.144
	Age	β_2	0.0119**	0.0060	1.98	0.048
	Household Size	β_3	-0.0402	0.0322	-1.25	0.212
	Educational level	β_5	0.2309***	0.0893	2.59	0.010
	Occupation	β_6	0.4994**	0.2165	2.31	0.021
	Household Income	β_7	-0.2785*	0.1080	-2.58	0.010
	Farming Experience	β_8	0.1000	0.0684	1.46	0.144
	Land Ownership	β_9	-0.0801	0.1791	-0.45	0.655
	Farmer group membership	β_{11}	1.2559*	0.1982	6.34	0.000
	Market information	β_{12}	0.5978**	0.2428	2.46	0.014
	Labour	β_{13}	-0.1287**	0.0520	-2.48	0.013
	Marital status	β_{14}	-0.1813*	0.1088	1.67	0.096
	Source of extension service	β_{17}	0.0476	0.0534	0.89	0.372
	/athrho		0.0585	0.1320	0.44	0.658
	rho		0.0584	0.1316		

Number of observations = 416   Wald chi2(36) = 98.66   Prob>chi2 = 0.0000
Log Likelihood = -337.24577

CONCLUSION

Based on the key findings of the study, the following policy recommendations are proposed. First, the study strongly advises farmers to keep proper financial records of their farming business operations to increase their creditworthiness. We also encourage farmers to form or join farmer organisations to enable them to access credit, enjoy group dynamism and have access to farm inputs including new technology that would help them improve their farm productivity through the association.

REFERENCES

1. Anang, B. T. (2018). Farm technology adoption by smallholder farmers in Ghana. Review of Agricultural and Applied Economics (RAAE), 21(1340-2018-5179), 41-47.
2. Cameron, A. C., & Trivedi, P. K. (2010). Microeconometrics using stata (Vol. 2). College Station, TX: Stata press.
3. Carter, M. R., Noronha, C., Peters, R. D., & Kimpinski, J. (2009). Influence of conservation tillage and crop rotation on the resilience of an intensive long-term potato cropping system: Restoration of soil biological properties after the potato phase. Agriculture, ecosystems & environment, 133(1-2), 32-39.
4. Conley, T. G., & Udry, C. R. (2010). Learning about a new technology: Pineapple in Ghana. American Economic Review, 100(1), 35-69.