Vol.14(1), pp. 24-32 January-March 2022
DOI: 10.5897/JAERD2021.1294
Articles Number: 1499EDA68725
ISSN: 2141-2170

http://www.academicjournals.org/JAERD

ACADEMIC JOURNALS
expand your knowledge

Journal of Agricultural Extension and Rural Development

Full Length Research Paper

Does access to credit influence the adoption of good agricultural practices? The case of smallholder potato farmers in Molo Sub-County, Kenya

Uwamariya Masca[1*], Kyule N. Mirriam[1] and Eric K. Bor[2]

[1]Department of Agricultural Education and Extension, Faculty of Education and Community Development Studies, Egerton University, P. O. Box 536 Egerton, Kenya.
[2]Department of Peace, Security and Social Studies, Faculty of Arts and Social Sciences, Egerton University, Kenya.

Received 2 November 2021; Accepted December 30, 2021

Potato (*Solanum tuberosum* L) is the major food and cash crop for many rural and semi-urban people in Kenya. It contributes to the national food security, nutrition, and income generation for those who are involved in its value chain. Despite its importance, smallholder potato farmers in Molo sub-county are still recording low potato yields which could partly be attributed to the low adoption of Good Agricultural Practices (GAPs). The main aim of this study was to investigate the influence of access to credit on the adoption of GAPs among smallholder potato farmers in Molo sub-county, Kenya. The research employed a descriptive survey design. A sample of 108 smallholder potato farmers from four wards: Molo, Turi, Elburgon and Marioshoni in Molo sub-county was selected using a purposive, random sampling technique. Data analysis was done using descriptive statistics and a binary logistic regression model was used to test the hypothesis at 5% level of significance. Statistical Package for Social Science (SPSS version 22) was used in data analysis. Therefore, the null hypothesis was access to credit has no statistically significant influence on the adoption of GAPs among smallholder potato farmers was rejected. The findings of the study were access to credit significantly ($p<0.05$) influences the adoption of GAPs among smallholder potato farmers in Molo sub-county. This study recommends that the government of Kenya should facilitate the lowering of the rate of interest on access to credit among smallholder potato farmers, to make it easier for them to have access to credit.

Key words: Adoption, access, good agricultural practices (GAPs), credit, influence.

INTRODUCTION

In Africa, potato production varies depending on the Good Agricultural Practices (GAPs) applied by the farmers. According to Chacha (2020), over 4.8% of agriculture production contributes to economic

*Corresponding author. E-mail: uwamariyamasca@gmail.com. Tel: +250-7-8120-4237.

development in Africa. The agricultural activities are the key players in Kenya's economy. In Kenya, 70% of agricultural production is done by smallholder farmers (FAO, 2020). Being a valuable source of income, it contributes to poverty reduction and the improvement of the livelihoods of Kenyans (Chacha, 2020; Kiplimo et al., 2015; Mabiso et al., 2012). For the benefit of all, efforts are being made to scale up agricultural technology that enhances yields. Among these, diffusion of GAPs has been given priority (Birch, 2018). Good Agricultural Practices refer to the typically developed techniques applied to improve agricultural production without compromising food safety, quality and with a reduced negative impact on the environment (Scheme FAO, 2016).

Despite the importance of agriculture in Kenya, smallholder farmers face challenges that result in low production due to different factors for instance climate change, pests and diseases and among others, this escalates into low adoption of GAPs. This leads to increased poverty and food insecurity cases among the farmers (Kinyangi, 2014). To increase productivity, the government of Kenya and private companies works together with the farmers to sensitize farmers on the adoption of GAPs. Farmer mobilization activities include increasing their access to credit by either initiating Savings and Credit Cooperative Organizations (SACCOs) among the farmers or linking them to external sources of credit. Best outcomes from GAPs can be achieved through proper site selection, land preparation, use of ideal crop varieties, execution of integrated soil and water management, and Integrated Pest Management (IPM) techniques, proper use of agro-chemicals, use of Personal Protective Equipment (PPEs), and field hygiene for bumper and quality production. The use of a combination or a group of these practices can help to sustainably increase food production in the face of population growth and climate change (Waaswa and Satognon, 2020). However, the level of adoption of the most yield-increasing technologies is still low among the farmers in Kenya and little has been documented on the constraints to adoption of most technologies such as GAPs (Smollo et al., 2017).

Institutional factors such as access to credit play an important role in accelerating the adoption of GAPs by the farmers (Jerop et al., 2018; Mwangi and Kariuki, 2015). In developing countries, agricultural credit capacitates smallholder farmers to improve agricultural production through enhanced personal investments and it speeds up the technology adoption (FAO, 2016; Hailu et al., 2014). In addition, credit availability is a crucial element that must be considered to solve bottlenecks faced by farmers in agriculture such as lack of inputs (Simtowe and Zeller, 2006). These improve agricultural production because of food security. Besides its farmer empowerment capacity through enabling them to obtain quality inputs for increased probability to adopt new technology (Melesse, 2018), adoption of GAPs is still low though most studies have reported that availability of credit leads to a favourable influence on technology uptake (Giang et al., 2019; Cornejo and McBrid, 2002).

Most farmers in Lesotho who accessed credit from banks and association groups with the purpose of improving production, adopted new technologies (Ogundeji et al., 2018). Minten et al. (2007) reported that financial services had a positive correlation with technology adoption, through the adoption of chemical fertilizers. Farmers increased agricultural production through access to credit from the Government of Kenya (GoK) (Rutten and Fanou, 2015). Financial services play the role of facilitating farmers to access farm inputs that include tractors, sprayers, weeders, hoes, rakes, spades, and wheelbarrows to improve their activities' effectiveness (Alobo, 2012). According to Giang et al. (2019), farmers with access to loans from banks improved their agricultural activities because of accessing good quality inputs, applying land preparation, and IPM. This translated into increased productivity and contribution to sustainable development.

Jerop et al. (2018) revealed that the availability of credit could influence the technology adoption in agriculture, however, the level of adoption of GAPs is still low (Odhiambo and Upadhyaya, 2020; Okech et al., 2017). In addition, a study conducted in Ghana shows that access to credit has an influence on the acceptance of organic farming in Ghana (Djokoto et al., 2016; Melesse, 2018). Chacha (2020) found that lack of capital among farmers was limiting them to adopt the technology. Therefore, access to credit could plays the main role in addressing all issues facing the farmers.

Therefore, this paper examines how access to credit influences the adoption of GAPs among smallholder potato farmers in Molo Sub-County, Kenya. The results from this study could help the credit agencies to understand the strategies they could use to support the farmers in accessing credit easily. This may contribute to the adoption of good agricultural practices which would improve potato production, generate income, and encourage environmental protection.

MATERIALS AND METHODS

Study area

The research was carried out in Molo Sub-County, Kenya. It is located in the Rift Valley and has four wards: Mariashoni, Elburgon, Turi, and Molo with a total area of 478.79 km^2 and a population of 140,584 (Nakuru, 2017) (Figure 1). It is the second-largest producer of potatoes in Kenya after Nyandarua Sub-County. Besides potatoes, it produces maize, barley, and vegetable crops like kales, cabbage, and carrot (Kamau et al., 2020; GoK, 2018), and is also important in livestock rearing. Cattle, poultry, sheep, and goats are among the animals kept Kenya Agricultural and Livestock Research Organization (KALRO, 2016). It receives a yearly rainfall average

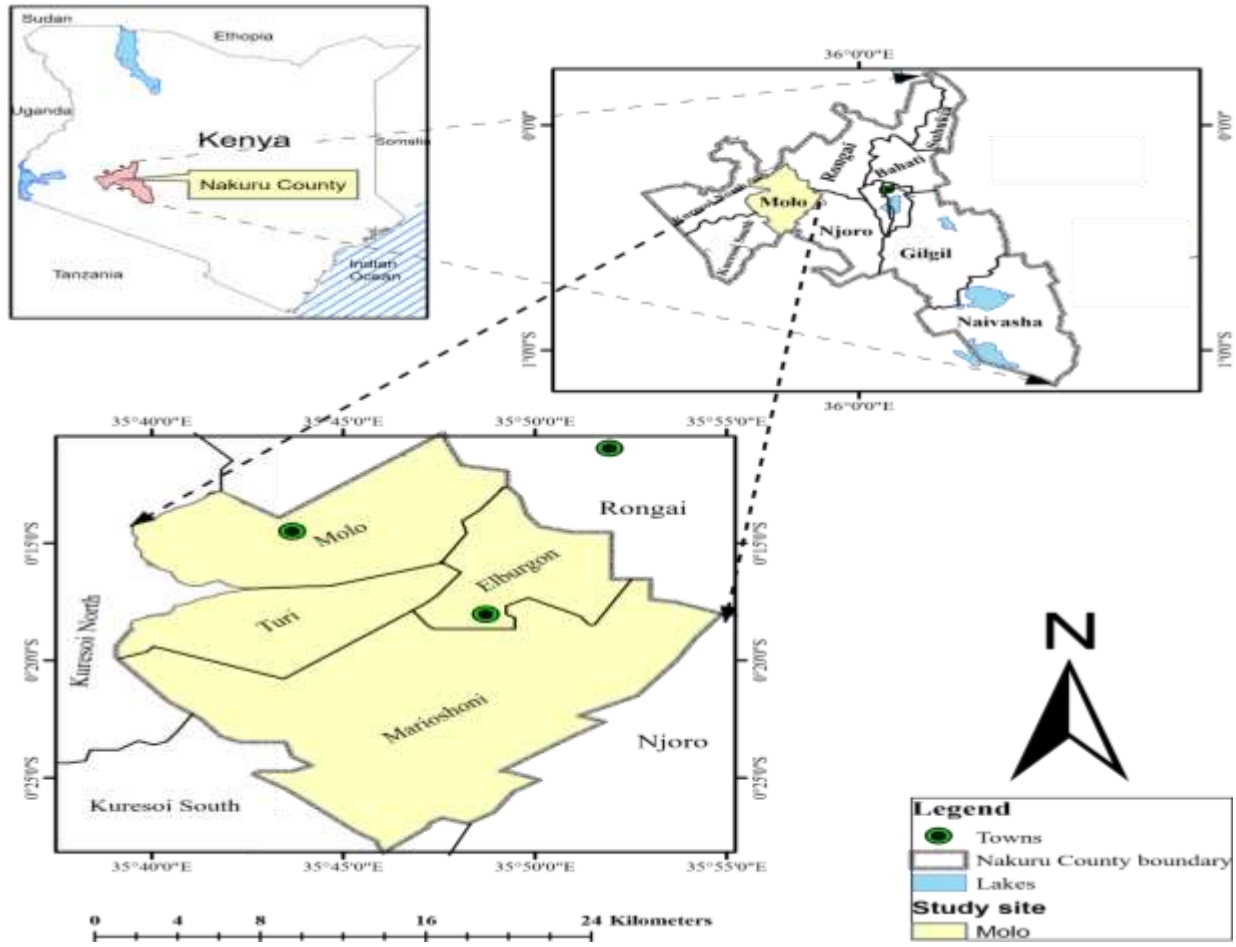

Figure 1. The study areas in Molo sub-county.

that ranges between 1100 and 1400 mm with falls under agricultural zone three of Kenya. Its altitude lies between 1800 and 2300 m above sea level, which is appropriate for agricultural activities (GoK, 2018).

Sampling procedure of the study area

The purposive sampling method was used to select Molo Sub-County because it is the second-largest producer of potatoes in Kenya (GoK, 2018). Additionally, the smallholder potato farmers were selected to participate in the study. A proportionate random sampling method was used to determine the number of smallholder potato farmers to be interviewed from the four wards in Molo Sub-County. A random simple sampling technique was used to obtain participants from the proportionate sample drawn from each ward. The formula by Nassiuma (2000) was used to come up with an appropriate sample size for the study.

$$n = \frac{NC^2}{C^2+(N-1)e^2}$$

where n= the required sample size, N = the population within the study area, C=Coefficient of Variation, and e=Standard error.

The sample was obtained by using the coefficient of variation of 21%, a standard error of 2%. The study expected 95% confidence (5% sampling error) to obtain a sample size of 108 smallholder potato farmers. $n = \frac{6000x(0.21)^2}{(0.21)^2+(6000-1)x(0.02)^2} = 108$.

Procedure for data collection

Data for the study was gathered using a semi-structured administered questionnaire. Semi-structured questionnaire guides were preferred because they enabled the respondents to interact with the researcher thereby giving the required information. In addition, it was easy to administer and analyze the data that it yields. The questionnaire was chosen due to the high number of interviewees in this study (Aryal, 2020). The survey was translated into the local language with the purpose to obtain good information required by the researcher. The questionnaire was pretested before it was finalized. Pretest was done to improve the questionnaire, as well as to check on critical factors such as the time it took to complete it, clarity, adequacy, and appropriateness of the question. Pretesting was done in a different area of Njoro Sub-County which

Table 1. Sample size distribution per ward.

Ward	Population	Proportion	Sample size
Molo	500	8	9
Turi	2000	33	36
Elburgon	1000	17	18
Marioshoni	2500	42	45
Total	6000	100	108

Figure 2. Gender by smallholder potato farmers.

has similar agricultural conditions and with smallholder potato farmers of similar characteristics to those in Molo Sub-County.

The instrument contained both closed-end and open-ended questions. Close-ended questions provided a basis for quantifying the data obtained while the open-ended ones provided useful information that was used in explaining the questionnaire in the study. The instrument had two sections. Section 1 contained general information on smallholder potato farmers including age, sex and education level and Section 2 contained information on access to credit, including percentage of farmers with access to credit.

Data analysis

Questionnaires were edited, coded and quantitative data analysed by using descriptive statistics to summarize and interpret the main findings of the study were measures in terms of frequencies and percentages. The data was analysed by using Statistical Packages for Social Sciences (SPSS version 22). The binary logistic model was used in testing hypotheses. In addition, the logistic model analysis was considered to be suitable for this study's data analysis because it helps a researcher to find out the relationship between independent variables and dependent variables. All tests of significance were computed at α=0.05 significance level.

The following logistic regression equation was as indicated:

$y = ß_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 + \ldots. + \varepsilon.$

Adoption of $(Y) = ß_0 + ß_1$ GENDER$+ ß_2$ AGE $+ ß_3$ EDUC LEV $+ ß_4$ CREDIT + E.

where y= GAPs (Dependent variables), $ß_0$ = intercept and $ß_1$-$ß_4$ = coefficient of determination,

X_3= access to credit (Independent variables), and ε = random error term (Table 1).

RESULTS AND DISCUSSION

General information on smallholder potato farmers

Gender of smallholder potato farmers

Figure 2 presents information on the gender of smallholder potato farmers who participated in the study. The results show that about 48% of the respondents were males, while 52% were females. This may indicate that the majority of the smallholder potato farmers are females. This implies that females are involved in different agricultural activities more than males, such as planting, weeding, harvesting among others. This is because women are pivotal in sustaining the food security of their families. These outcomes are comparable to those of Chimoita et al. (2016) who found that Kenya had 67% of the women involved in agricultural production. Also, the study carried out in Zashuke, KwaZulu-Natal Province shows that females were the most farmers involved in different activities in the agriculture sector especially in rural areas, for example, soil conservation and weeding (Ntshangase et al., 2018). In addition, smallholder farmers provide 60 to 70% opportunities for women to work in the agriculture sector. This contention is similar to the study of Alobo (2012), which found that most female household members are being engaged in agricultural production in arid regions of Kenya.

Age of smallholder potato farmers

Data collected on smallholder potato farmers were analysed to highlight farmers' age groups. The results obtained are as shown in Figure 3. The results also show that over 76.8% of smallholder potato farmers were above 40 years. Only 23.2% of the smallholder potato farmers were youths (between 20 and 39 years). This may indicate that majority of the youths do not embrace agricultural activities due to most of them not owning land and have low access to financial support services. This limits the options available for them to engage in agriculture. These findings are in agreement with the results of Ngongo (2014)) who found that young people could receive new information on adoption of agricultural technology but do not apply due to lack of financial resources and land. Further, findings show that farmers aged 70 and above have low-level involvement in agricultural activities unlike those aged 40-49. This could be because of farmers have less energy to enable

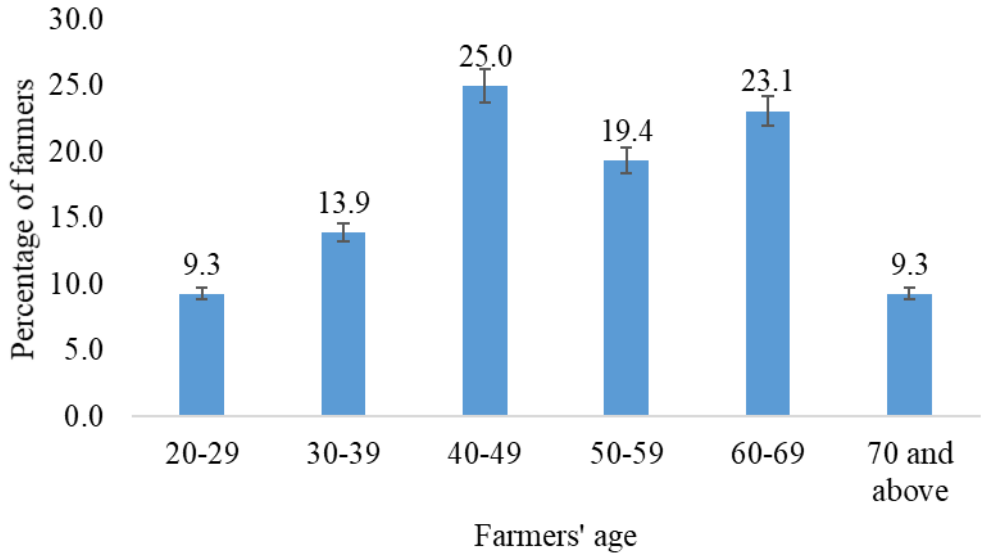

Figure 3. Smallholder potato farmer's ages.

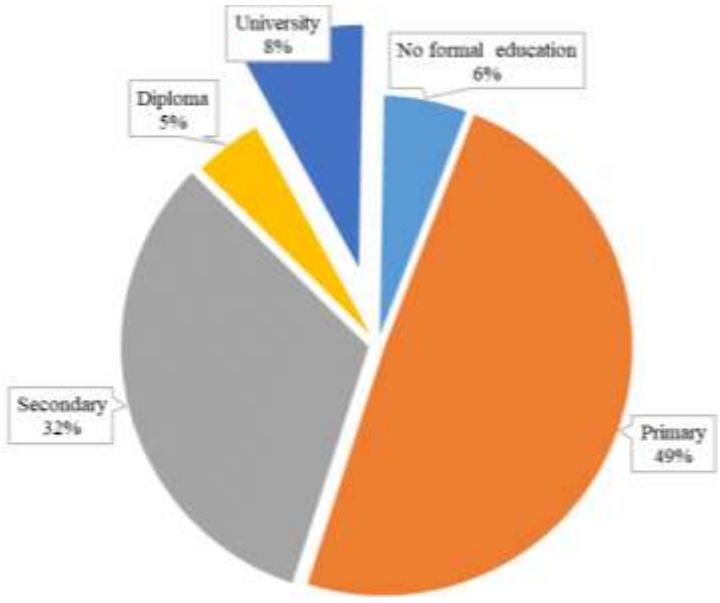

Figure 4. Education level of smallholder potato farmers.

effective execution of agricultural activities like planting, sowing, and irrigation.

Similarly, a study carried out by Rajendran et al. (2016) reported that older farmers had a low involvement in agricultural activities. Therefore, such farmers are less prone to change existing farming practices, yet this is the direction that agriculture has taken in recent. On the contrary, Mwangi and Kariuki (2015) argue that older farmers are expected to have knowledge and experience over time and are said to be able to embrace technology information than younger farmers.

Education level of the respondents

Figure 4 presents information on smallholder potato farmers' education levels. The responses were segmented into five levels: no formal education, primary,

Table 2. Access to credit of smallholder potato farmers.

Access to credit	Frequency	Percentage
No	63	58
Yes	45	42
Total	108	100

Table 3. Challenges faced smallholder potato farmers to access credit.

Challenges on accessing credit	Frequency	Percentage
No need	4	6
Not aware of the availability of credit	4	6
Lack of enough collateral to secure a facility	3	5
High interests on the credit	27	43
Long credit application procedures	25	40
Total	63	100

secondary, diploma and university. The results are presented in Figure 4. Findings show that the majority of the smallholder potato farmers had attained primary education (49%), followed by secondary education (32%), university education (8%), no formal education (6%) and lastly diploma level (5%). The result of the study thus suggests that a large number of smallholder potato farmers that are engaged in agricultural production attended primary level of education as most of them live at home and are therefore available for agriculture, unlike their counterparts with higher education levels who may seek white colour jobs in towns. This is consistent with Namwata et al. (2010) who found most respondents (>85%) with primary education and had high chances of participating in agriculture. Besides, Mwangi and Kariuki (2015) also reported that there is a negative influence between education level and technology adoption. However, this assertion disagrees with Rajendran et al. (2016) and Udimal et al. (2017) who revealed that farmers with high education levels were inclined to getting information on advanced agricultural technologies including GAPs, and therefore in a position to adopt more than their counterparts.

Access to credit and adoption of good agricultural practices

Access to credit among smallholder farmers

Descriptive statistics were used to analyze smallholder potato farmers' access to credit and results are summarized in Table 2. The study showed that 42% of the smallholder potato farmers had access to credit, while 58% did not. This may imply low adoption of GAPs, since most of them are costly to access and apply. This is because access to credit facilitates farmers to access inputs required to put the recommended GAPs into practice. This claim is supported by Nderitu et al. (2019) who found that access to credit facilitated farmers to adopt technologies such as GAP. Similarly, a study by Ogundeji et al. (2018) found that farmers with limited access to credit had diminished chances of adopting agricultural technologies.

Challenges faced by farmers in accessing credit

Smallholder potato farmers were asked to state the main challenges facing them on accessing credit and the results are presented in Table 3. When asked, out of the 58% of the farmers with no access to credit, 43% indicated that a high interest rate was the major challenge that turns them away from seeking credit and 40% claimed it requires long credit application procedures which they are unable to meet. While 5% said they lacked the collateral required to access credit, and 6% indicated they had no need for the credit and were not aware of the availability of credit, respectively. This result agrees with Ogundeji et al. (2018)'s findings where a high interest-rate (15-30%) was the major challenge that limited farmers from accessing credit in Lesotho. Also, several studies have found that lending procedure, distance to the formal credit sources, time lag and interest rate were constraints to access credit among farmers (Chandio and Jiang, 2018; Mohamed and Temu, 2008). On the contrary, Sindh and Jiang (2017) found that in Sindh province of Pakistan, farmers were not

Table 4. Sources of access to credit.

Sources of credit	Smallholder potato farmers	
	Frequency	Percentage
Formal bank	7	15
SACCOs	3	7
Informal sources (neighbor/family)	14	31
Micro finance institution	4	9
Community group	9	20
M-Shwari/mobile money/M-Pesa	8	18
Total	45	100

Table 5. Purpose of credit accessed by the farmers.

Various purposes	Percentage		
	Low	Average	High
For buying seeds	22	33	44
For buying Personal Protective Equipment's (PPEs)	13	0	87
For use in water management	83	17	0
Crop protection	8	38	54
Buying agro-chemicals	33	11	56
Soil management	50	50	0
Proper harvesting	38	63	0
Others	11	78	11

limited by lending procedure, time lag, and interest rate in accessing formal credit. Ogundeji et al. (2018) found that farmers are unable to adopt technologies due to a lack of financial investments in developing countries.

Sources of credit among smallholder potato farmers

Data collected showed that smallholder potato farmers who had access to credit had their preferred sources and these are summarized in Table 4. Results show that out of the 45 smallholder potato farmers who accessed credit, most relied on informal sources [Neighbor/Family] (31.0%), followed by community group (20%), Shwari/Mobile money/M-Pesa (18%), formal bank (15%), microfinance institutions (9%) and SACCOs (7%). This indicates that majority of the farmers' access credit from informal sources more than formal sources due to the high interest rates. This may imply that GAPs may not be adequately adopted by such categories of farmers, because informal sources of credit are not always sufficient to meet all the costs associated with GAPs adoption. This outcome is consistent with Iftikhar and Mahmood (2017) who found that farmers accessed credit from both informal and formal sources, though the majority accessed from informal sources. However, Heike (2012) found that majority of the farmer's accessed credit from banking institutions through various bank branches or mobile banking. Also, a contradiction is observed between this study and findings by FAO (2019) who found most farmers having access to credit from saving groups.

Purpose of credit accessed by the smallholder potato farmers

Table 5 shows rankings of various purposes for which smallholder potato farmers accessed credit. Buying of PPEs ranked high (87%) among the purposes for which the farmers accessed credit, and this was followed by crop protection (54%), buying agro-chemicals (56%) and buying seeds (44%). While an average of 78% of the farmers reported that they accessed credit for other reasons other than GAPs adoption. Similarly, an average of 50 and 63% accessed credit for the adoption of soil management and proper harvesting, respectively. On the other hand, water management practices ranked lowest with over 83% of the farmers accessing credit for its adoption at a low rate.

Table 6. Binary logistic regression analysis model on access to credit and moderating variables.

Variable	B	S.E.	Wald	df	Sig.	Exp(B)
Credit	1.452	0.695	4.361	1	0.037	4.272
Gender	1.018	0.619	2.701	1	0.1	2.768
Education level	0.499	0.411	1.474	1	0.225	1.646
Age	-0.316	0.216	2.148	1	0.143	0.729
Constant	0.777	1.633	0.226	1	0.634	2.174
Likelihood test x=5.025, df=7,p=0.009						
Cox & Snell R Square=0.118						
Nagelkerke R Square= 0.203						
Hosmer and Lemeshow Test=0.675						
N=108						

Binary logistic regression analysis model on access to credit influence adoption of GAPs among smallholder potato farmers

Binary logistic regression analysis was done to determine the influence of access to credit on the adoption of good agricultural practices among smallholder potato farmers. Results are presented in Table 6.

The results show that access to credit (p=0.035) significantly influences the adoption of GAPs since the p-value is less than 0.05. Nevertheless, the Exp (B) value is greater than 1.0. Gender (p=0.1) insignificantly influences the adoption of GAPs since the p-value is greater than 0.05. However, the Exp (B) value is above 1.0. Age (p=0.143) also insignificantly influences the adoption of GAPs since the p-value is greater than 0.05. Nevertheless, the Exp (B) value is less than 1.0. Education level (p=0.225) insignificantly influences the adoption of GAPs since the p-value is greater than 0.05. However, the Exp (B) value is above 1.0. The Cox & Snell R Square value was 1.18% and therefore, this suggests that the model corresponded to the data practically well. The Hosmer and Lemeshow test have a Chi-square test of 0.675, this indicates that the data fit the model at the same time, it significantly influences adoption of GAPs. The log-likelihood test is statistically significant at p=0.009 which suggests that the independent variables jointly influence the adoption of GAPs among smallholder potato farmers.

The binary logistic regression shows that access to credit (p=0.025) significantly influences the adoption of GAPs since its p-value is less than 0.05. The Exp (B) value is greater than 1.0 which signifies that access to credit increases the probability of adopting GAPs by 4.272 times compared to the farmers with no access. Its hypothesis stated that access to credit has no statistically significant influence on the adoption of GAPs among smallholder potato farmers in Molo Sub-County, Nakuru County. Therefore, the null hypothesis is rejected. From the study, it is concluded that there is a statistically significant influence of access to credit on the adoption of GAPs. This is in line with Simtowe and Zeller (2006) who showed that there is a positive and significant influence of access to credit and adoption of technologies among farmers in Kakamega North Sub-County, Kenya. Additionally, the study concurs with Nderitu et al. (2019) who found that access to credit has a positive significant effect on cassava production in Nigeria. However, farmers are unable to adopt technologies due to lack of finance to invest in agriculture especially in developing countries (Ogundeji et al., 2018).

CONCLUSION AND RECOMMENDATIONS

The findings showed that there is low access to credit among the smallholder potato farmers due to the high interest rate and long credit procedure process. The binary logistic regression model showed that access to the credit had a positive statistically significant influence on the adoption of GAPs among smallholder potato farmers since p-value was less than 0.05. Additionally, the major limitation for this study was language barrier and it was overcome by hiring a translator to help the researcher to easily communicate with the farmers during data collection. This study recommends that the government should facilitate lowering the rate of interest on accessing credit among smallholder potato farmers, to make it easier for them to access credit from the Banks, SACCOs, and microfinance institutions.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Alobo S (2012). Determinants of rural household income diversification

in Senegal and Kenya. SFER.
Aryal S (2020, January 14). Questionnaire method of data collection. Microbe Notes.
Birch I (2018). Agricultural productivity in Kenya: Barriers and opportunities 19 p.
Chacha G (2020). Where can farmers get affordable loans for their projects? Farm Kenya Initiative. Farm Kenya Initiative.
Chandio AA, Jiang Y (2018). Determinants of Credit Constraints: Evidence from Sindh, Pakistan. Emerging Markets Finance and Trade 54(15):3401-3410. https://doi.org/10.1080/1540496X.2018.1481743.
Cornejo J, McBride W (2002). Adoption of bioengineered crops. Agricultural economics report No. 810. 1800 M Street, NW, Washington, DC 20036-5831.
Djokoto JG, Owusu V, Awunyo-Vitor D (2016). Adoption of organic agriculture: Evidence from cocoa farming in Ghana. Cogent Food & Agriculture 2(1):1242181. https://doi.org/10.1080/23311932.2016.1242181.
Food and Agricultural Organization (FAO) (Ed.) (2016). Climate change, agriculture and food security. FAO. Rome.
Food and Agricultural Organization (FAO) (Ed.) (2020). Kenya at a glance | FAO in Kenya | Food and Agriculture Organization of the United Nations. http://www.FAO.Org/Kenya/FAO-in-Kenya/Kenya-at-a-glance/en/.
Giang MH, Xuan TD, Trung BH, Que MT (2019). Total Factor Productivity of Agricultural Firms in Vietnam and Its Relevant Determinants. Economies 7(1):4.
Government of Kenya (GoK) (2018). County Integrated Development Plan, Nakuru County. Nairobi: Government of Kenya.
Hailu BK, Abrha BK, Weldegiorgis KA (2014). Adoption and impact of agricultural technologies on farm income: Evidence from Southern Tigray, Northern Ethiopia. International Journal of Food and Agricultural Economics 2(1128-2016-92058):91-106.
Heike B (2012). Facilitating Agricultural Technology Adoption among the Poor: The Role of Service Delivery through Mobile Phones by Heike Baumüller: SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2237987.
Iftikhar S, Mahmood HZ (2017). Ranking and relationship of agricultural credit with food security: A district level analysis. Cogent Food & Agriculture 3(1):1333242.
Jerop R, Dannenberg P, George OG, Mshenga P (2018). Factors affecting the adoption of agricultural innovations on underutilized cereals: The case of finger millet among smallholder farmers in Kenya. African Journal of Agricultural Research 13(36):1888-1900.
Kamau PN, Gathungu GK, Mwirigi RN (2020). Technical Efficiency of Irish Potato (Solanum Tuberosum L.) Production in Molo Sub-County, Kenya. Asian Journal of Advances in Agricultural Research pp. 1-9. https://doi.org/10.9734/ajaar/2020/v13i330104.
Kenya Agricultural and Livestock Research Organization (KALRO) (2016). Annual Report 2015-2016.
Kinyangi AA (2014). Factors influencing the adoption of agricultural technology among smallholder farmers in Kakamega north sub-county, Kenya (Doctoral dissertation, University of Nairobi).
Kiplimo JC, Ngenoh E, Egerton K, Bett JK (2015). Evaluation of factors influencing access to credit financial services: Evidence from smallholder farmers in Eastern region of Kenya. Evaluation 6(17).
Mabiso A, Pauw K, Benin S (2012). Agricultural Growth and Poverty Reduction in Kenya: Technical Analysis for the Agricultural Sectoral Development Strategy (ASDS)-Medium Term Investment Plan (MTIP). Regional Strategic Analysis and Knowledge Support System (ReSAKSS) Working Paper 35.
Melesse B (2018). A Review on Factors Affecting Adoption of Agricultural New Technologies in Ethiopia. Journal of Agricultural Science and Food Research 9(3):1-4.
Minten B, Randrianarisoa JC, Barrett CB (2007). Productivity in Malagasy rice systems: wealth-differentiated constraints and priorities. Agricultural Economics 37:225-237.
Mohamed KS, Temu AE (2008). Access to credit and its effect on the adoption of agricultural technologies: the case of Zanzibar. African Review of Money Finance and Banking pp. 45-89.
Mwangi M, Kariuki S (2015). Factors determining adoption of new agricultural technology by smallholder farmers in developing countries. Journal of Economics and Sustainable Development 6(5).
Nakuru C (2017). First County Integrated Development Plan, Nakuru County. Nairobi, Kenya.
Namwata BML, Lwelamira J, Mzirai OB (2010). Adoption of improved agricultural technologies for Irish potatoes (Solanum Tubersum) among farmers in Mbeya Rural district, Tanzania: A case of Ilungu Ward. http://repository.businessinsightz.org/handle/20.500.12018/2726.
Nassiuma DK (2000). Survey sampling: Theory and methods. Nairobi: University of Nairobi.
Nderitu EM, Kamuru SM, Matofari JW (2019). Influence of Institutional factors on Adoption of Improved Cassava Processing Technologies among Small Scale Farmers in Migori County, Kenya. The Authentic Knowledge: African Journal of Pure and Applied Science Research 1(1):26-32.
Ngongo RN (2014). Factors Influencing the Adoption of modern Agricultural Technologies by Small scale Farmers: The case of Thika East Sub-County, Kenya P 119.
Ntshangase NL, Muroyiwa B, Sibanda M (2018). Farmers' Perceptions and Factors Influencing the Adoption of No-Till Conservation Agriculture by Small-Scale Farmers in Zashuke, KwaZulu-Natal Province. Sustainability 10(2):555. https://doi.org/10.3390/su10020555.
Odhiambo FO, Upadhyaya R (2020). Flexible loans and access to agricultural credit for smallholder farmers in Kenya. Agricultural Finance Review, Ahead-of-Print (ahead-of-print). https://doi.org/10.1108/AFR-05-2020-0072.
Ogundeji AA, Donkor E, Motsoari C, Onakuse S (2018). Impact of access to credit on farm income: Policy implications for rural agricultural development in Lesotho. Agrekon 57(2):152-166.
Okech K, Kiragu A, Sing'ora B, Ndonga S, Olan'g P, Kenyanito L (2017). Bridging the GAP: The Role of Data in Deepening Smallholder Financing. Nairobi: Alliance for a Green Revolution in Africa.
Rajendran N, Tey YS, Brindal M, Ahmad S, Shamsudin S F, Radam MN, Abdul Hadi AH (2016). Factors influencing the adoption of bundled sustainable agricultural practices: A systematic literature review. International Food Research Journal 23(5):2271-2279.
Rutten L, Fanou S L (2015). Innovative and Inclusive Finance for Youth in Agriculture. Africa Agriculture Status Report: Youth in Agriculture in Sub-Saharan Africa, Alliance for a Green Revolution in Africa (AGRA), Nairobi, Kenya.
Scheme FAO (2016). Training Manual on Good Agricultural Practices (Gap) for Fruits and Vegetables. FAO (Food and Agriculture Organization of the United Nations): Bangkok, Thailand.
Simtowe F, Zeller M (2006). The Impact of Access to Credit on the Adoption of hybrid maize in Malawi: An Empirical test of an Agricultural Household Model under credit market failure.
Sindh AA, Jiang Y (2017). Full article: Determinants of Credit Constraints: Evidence from Sindh, Pakistan: Cogent Economics and Finance 5.1 (2017):1369383.
Smollo DO, Mosi RO, Watako AO (2017). Analysis of factors influencing sustainable adoption of improved maize technologies among smallholder farmers in Ugenya sub-county, Kenya: International Journal of Agricultural Extension and Rural Development Studies 4:23-30.
Udimal TB, Jincai Z, Mensah OS, Caesar AE (2017). Factors influencing the agricultural technology adoption: The case of improved rice varieties (Nerica) in the Northern Region, Ghana. Journal of Economics and Sustainable Development 8(8):137-148.
Waaswa A, Satognon F (2020). Development and the Environment: Overview of the Development Planning Process in Agricultural Sector, in Uganda. Journal of Sustainable Development 13(6):1 https://doi.org/10.5539/jsd.v13n6p.