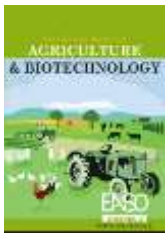


East African Journal of Agriculture and Biotechnology
eajab.eanso.org
Volume 7, Issue 1, 2024
p-ISSN: 2707-4293 | e-ISSN: 2707-4307
Title DOI: https://doi.org/10.37284/2707-4307

EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda

Mary Kyarisiima[1, 2*], *Rebecca Mutebi Kalibwani*[1] & *Benard Tumusiime*[1]

[1] Bishop Stuart University, P. O. Box 09, Mbarara.
[2] Lyantonde Local Government, P. O. Box, 10, Lyantonde Uganda.
* Author for Correspondence ORCID: https://orcid.org/0009-0004-3545-0295; Email: kyari.mary@gmail.com

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Date Published: *25 August 2024*

Keywords: *Agricultural Extension, Banana Farming, Logistic Regression.*

ABSTRACT

In Uganda, the agriculture extension program has been the main conduit for disseminating information on farm technologies, support rural adult learning, and assist farmers in developing their farm technical and managerial skills. It is expected that extension programs will help increase farm productivity, farm revenue, reduce poverty and minimize food insecurity. In this study, we estimate the effects of extension services on farm income with reference to Government Agricultural Extension Services (GAES) delivered by Ministry of Agriculture, animal husbandry and fisheries (MAAIF). The study used cross-section research design to randomly select and collect data from 165 banana farmers from Lyantonde subcounty. The collected data was entered and later analyzed using R software version 4.4.0. The results reveal that more than half of the banana farmers (58.2%) were accessing government agricultural extension services (GAESs), significantly higher than those not having access. Using binary logistic regression model, only two factors; - access to agricultural credit ($p = 0.006$) and membership to a farmer association ($p<0.001$) were found to significantly affect farmers' access to GAES. The study findings point the critical role of farmer associations as well as access to agricultural credit to banana farmers in agricultural extension. It is, therefore, recommended that formation of farmer association be given a top priority as it helps in reducing the extension-to-farmer ratio for efficient and effective agricultural extension service delivery.

APA CITATION

Kyarisiima, M., Kalibwani, P. M. & Tumusiime, B. (2024). Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda. *East African Journal of Agriculture and Biotechnology*, *7*(1), 416-426. https://doi.org/10.37284/eajab.7.1.2136

CHICAGO CITATION

Kyarisiima, Mary, Rebecca Mutebi Kalibwani and Benard Tumusiime. 2024. "Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda". *East African Journal of Agriculture and Biotechnology* 7 (1), 416-426. https://doi.org/10.37284/eajab.7.1.2136

HARVARD CITATION

Kyarisiima, M., Kalibwani, P. M. & Tumusiime, B. (2024) "Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda.", *East African Journal of Agriculture and Biotechnology*, 7(1), pp. 416-426. doi: 10.37284/eajab.7.1.2136.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

IEEE CITATION

M. Kyarisiima, P. M. Kalibwani & B. Tumusiime "Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda", *EAJAB*, vol. 7, no. 1, pp. 416-426, Aug. 2024.

MLA CITATION

Kyarisiima, Mary, Rebecca Mutebi Kalibwani & Benard Tumusiime. "Factors Influencing Access of Government Agricultural Extension Services Among Banana Farmers in Lyantonde District, Uganda". *East African Journal of Agriculture and Biotechnology*, Vol. 7, no. 1, Aug. 2024, pp. 416-426, doi:10.37284/eajab.7.1.2136

INTRODUCTION

Agriculture remains a vital sector in Uganda, contributing approximately 24% to the national Gross Domestic Product and employing over 70% of the rural population (WorldBank, 2021). Among the various crops cultivated, staple foods such as bananas, cassava, and maize dominate, with bananas being a significant crop for both subsistence and commercial purposes (Danso-Abbeam et al., 2018). Despite the importance of bananas in the Ugandan economy and food security, farmers face significant challenges that hinder productivity and sustainability. These challenges include soil fertility depletion, pest and disease outbreaks, and climate variability, which require timely and effective agricultural interventions (Kauky, 2024). In this context, agricultural extension services are designed to provide farmers with essential knowledge, skills, and resources needed to improve agricultural practices and increase productivity (UBOS, 2024) acting as main conduits of addressing rural poverty and food insecurity because it has the means to transfer technology, support rural adult learning, assist farmers in problem-solving and getting farmers actively involved in the agricultural knowledge and information system (Bonye et al., 2012; Rahman & Connor, 2022).

According to Rivera and Qamar (2003), extension refers to "systems that should facilitate the access of farmers, their organizations and other market actors to knowledge, information and technologies; facilitate their interaction with partners in research, education, agribusiness, and other relevant institutions; and assist them to develop their own technical, organizational and management skills and practices". By this definition, extension is deemed as a primary tool for making agriculture, its related activities as well as other economic activities more effective and efficient to meet the needs of the people. It is, therefore, regarded as a policy tool for promoting the safety and quality of agricultural products (Christoplos, 2010; Rahman & Connor, 2022).

Agricultural extension services in Uganda aim to disseminate information regarding improved farming techniques, pest management, and market access, yet many farmers, particularly those growing bananas, report limited access to these services (Shimali et al., 2016). Faced with this multitude of production challenges, the government of Uganda has put in place several extension programs including National Agricultural Advisory Services (NAADS) and Operational Wealth Creation (OWC), which are geared towards facilitating better and efficient transfer of agricultural information, knowledge, and skills to farmers; enhancing supply and promotion of improved seeds, fertilizers, on-farm demonstrations of improved farm practices and technologies for achieving sustainable development in rural areas through increasing farm productivity (yield), reducing poverty, increasing the level of food security (UBOS, 2024).

Access to extension services is affected by a multitude of factors, which can be broadly classified into socio-economic, institutional, and individual characteristics (Anang et al., 2020; Kassem et al., 2021). Socio-economic factors such as education level, age, gender, and income significantly influence farmers' willingness and ability to engage with extension services. Research indicates that educated farmers are more likely to adopt new practices and utilize available extension resources (Hu et al., 2012). Gender dynamics also play a crucial role, as women often face additional barriers to accessing and participating in extension programs, leading to disparities in knowledge transfer and agricultural

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

productivity (Aderinto et al., 2017; Berhane et al., 2018; Bonye et al., 2012; Danso-Abbeam et al., 2018). Institutional factors, including the quality and availability of extension services, affect how well farmers can access and benefit from these programs. Critical to the success of agricultural extension services is the quality of advisory services provided. Studies have shown that regions with well-trained extension workers and effective communication strategies experience higher levels of farmer engagement and improved agricultural outcomes (Aderinto et al., 2017; Ali & Rahut, 2013; Bonou-Zin et al., 2022; Buehren et al., 2017, 2019; Cawley et al., 2018; Deng et al., 2021; Ogunniyi et al., 2018).

Despite the recognition of agricultural extension services as pivotal in enhancing agricultural productivity and supporting smallholder farmers in Uganda, significant challenges persist that hinder their effectiveness and reach. Uganda's agricultural sector continues to face various obstacles, including limited access to extension services, inadequate training of extension personnel, and unequal participation across gender and socio-economic status (Anang et al., 2020; Rokhani et al., 2021; Sennuga et al., 2020; Shimali et al., 2016; Toroitich, 2021).

Research indicates that many farmers, particularly those in remote areas, still experience barriers in accessing relevant information and technologies (Zhuo et al., 2023). Furthermore, the transition from a government-centric extension framework to a pluralistic model has not uniformly resulted in improved service delivery, with many farmers reporting dissatisfaction with the quality of information received (Albore, 2018; Buehren et al., 2019). Women farmers and those with lower educational attainment are disproportionately affected by these constraints, leading to underutilization of available services (Shimali et al., 2016).

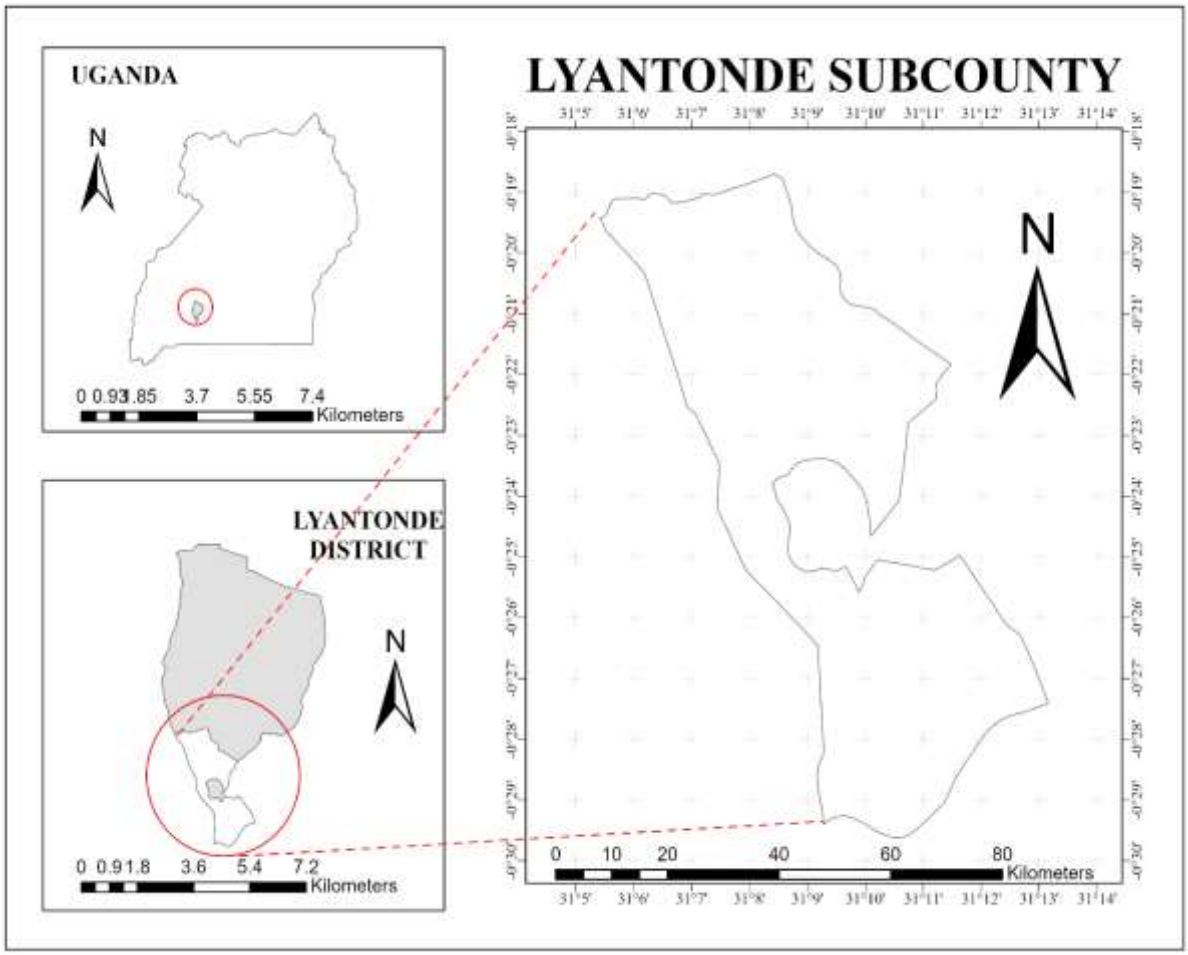
As Lyantonde district continues to strive for agricultural improvement and poverty alleviation, understanding the specific factors influencing access to extension services among banana farmers is vital. Therefore, this study seeks to investigate the current state of agricultural extension services in Uganda, analyze these determinants, providing insights that can lead to enhanced program design, equitable access to extension services, and improved agricultural outcomes and recommend strategies to improve outreach and effectiveness.

METHODOLOGY

This study was conducted in Lyantonde subcounty in Lyantonde district. Agriculture is the major economic activity in the study area contributing to about 95% of peoples' livelihoods, favored by the average annual rainfall ranging from 1400 mm to 1800 mm and annual daily average temperature ranging between 11°C and 25°C.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Figure 1: Map of the study area.



The selection was based on the strategic easy-reach location of the study area and having the highest number of banana farmers in the district. This study adopted a cross-sectional research design whereby the total population of banana farmers was unknown and simple random technique was used to obtain 165 farmers as estimated using Kish (1965) formula. Primary data were gathered using a questionnaire survey. Quantitative data collected were analyzed with the help of R software version 4.4.0 to explore the factors influencing accessing government extension services among banana farmers.

RESULTS AND DISCUSSION

Socio-demographic characteristics of the respondents

The farmers were asked to provide basic information, including gender, age, level of education, household size, household income, marital status, major occupation, land size, access to credit, and membership to farmer association. Table 1 reveals that more than half of the banana farmers (58.2%) have access to GAESs. Most of the respondents i.e., 57.6% are females, and most of the banana farmers i.e., 83.1% are within the age bracket of 20 – 50 years – showing a very big number of productive groups capable of providing enough labor and commitment to increasing banana production in the area. This finding concurs with those of Andersen (2017) and Midamba and Kizito (2022) who found that farmers whose ages range from 25 to 47 years were active and had great chances of participate in agricultural activities and this, most cases, increase the chance of accessing extension services to produce more. A big proportion of banana farmers, i.e., 85.5% have had formal education. This means that they know how to read and write, a characteristic that makes them better candidates for training in the GAESs program.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

More than 50% of the farmers have access to agricultural credit (53.9%). Eighty-one (81.2%) of the respondents stated that farming is their major occupation in the study area. This means that the sample used is the right one and are in position to provide the necessary information concerning farming activities. More than half of the respondents i.e., 55.2% revealed that banana farming is their major source of income. In addition, it was also found that 55.8% of the respondents are members of the banana farmers association, where they get information pertaining the banana agronomic practices as well as other services like marketing and credit for banana production. On average, each household accessing GAESs had 6 members and 7 acres of land. The households not accessing GAESs had an average of 4 members and about 5 acres of land. Overall, out of 165 respondents, only 96 i.e., 58.2% had access to GAESs in the study area.

Table 1: Descriptive characteristics of respondents accessing and not accessing GAESs

Variable	Not accessing GAESs (N=69)	Accessing GAESs (N=96)	Overall (N=165)
Gender			
Female	40 (58.0%)	55 (57.3%)	95 (57.6%)
Male	29 (42.0%)	41 (42.7%)	70 (42.4%)
Age			
21 - 30	12 (17.4%)	8 (8.3%)	20 (12.1%)
31 - 40	31 (44.9%)	25 (26.0%)	56 (33.9%)
41 - 50	15 (21.7%)	46 (47.9%)	61 (37.0%)
51 - 60	8 (11.6%)	15 (15.6%)	23 (13.9%)
Above 60	3 (4.3%)	2 (2.1%)	5 (3.0%)
Education level			
No schooling	9 (13.0%)	15 (15.6%)	24 (14.5%)
Primary	28 (40.6%)	34 (35.4%)	62 (37.6%)
Secondary	13 (18.8%)	35 (36.5%)	48 (29.1%)
College	19 (27.5%)	12 (12.5%)	31 (18.8%)
Access to agricultural credit			
No	55 (79.7%)	21 (21.9%)	76 (46.1%)
Yes	14 (20.3%)	75 (78.1%)	89 (53.9%)
Marital status			
Single	10 (14.5%)	3 (3.1%)	13 (7.9%)
Married	41 (59.4%)	71 (74.0%)	112 (67.9%)
Divorced	5 (7.2%)	6 (6.3%)	11 (6.7%)
Widowed	13 (18.8%)	16 (16.7%)	29 (17.6%)
Non-farming	28 (40.6%)	3 (3.1%)	31 (18.8%)
Farming	41 (59.4%)	93 (96.9%)	134 (81.2%)
No	48 (69.6%)	26 (27.1%)	74 (44.8%)
Yes	21 (30.4%)	70 (72.9%)	91 (55.2%)
No	58 (84.1%)	15 (15.6%)	73 (44.2%)
Yes	11 (15.9%)	81 (84.4%)	92 (55.8%)
Land size			
Mean (SD)	4.83 (2.82)	7.34 (3.82)	6.29 (3.65)
Household size			
Mean (SD)	3.96 (2.32)	5.92 (2.19)	5.10 (2.44)

Factors influencing participation in GAES.

The logistic model was used to predict access to GAESs with nine (9) independent variables. Standardized parameters were obtained by fitting the model on a standardized version of the dataset. 95% Confidence Intervals (CIs) and p-values were computed using a Wald z-distribution approximation. The model's explanatory power was found to be substantial (Tjur's $R^2 = 0.62$).

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Table 2: Factors influencing access to GAES.

Variable	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept)	-3.454	1.496	-2.309	0.021
Gender (Male)	-0.201	0.656	-0.306	0.760
Age				
31 – 40	-1.923	1.012	-1.900	0.057.
41 – 50	-0.258	0.937	-0.275	0.783
51 – 60	-1.073	1.204	-0.891	0.373
Above 60	0.370	2.237	0.165	0.869
Education level				
Primary	0.447	0.799	0.559	0.576
Secondary	1.753	0.918	1.910	0.056.
College	0.442	1.039	0.425	0.671
Land size	0.127	0.095	1.337	0.181
Household size	0.131	0.132	0.988	0.323
Access to agricultural credit (Yes)	1.706	0.624	2.735	**0.006****
Marital status				
Married	-1.176	1.280	-0.919	0.358
Divorced	0.347	1.502	0.231	0.817
Widowed	-0.818	1.466	-0.558	0.577
Occupation (Farming)	0.926	0.998	0.928	0.353
Banana is the main source of income (Yes)	0.642	0.678	0.948	0.343
Membership to farmer association (Yes)	2.959	0.591	5.009	**0.000*****

** Significance. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1*

Within this model, only two (2) factors i.e., access to agricultural credit and membership to farmers association were found to significantly influence access to GAES by the banana farmers in the study area. The other factors i.e., gender, age, education level, land size, household size, marital status, occupation and banana being a major source of income had no statistically significant influence on access to GAES in the study area.

The effect of agricultural credit is statistically significant and positive (beta = 1.71, 95% CI [0.52, 3.00], p = 0.006). This means that being having access to agricultural credit increases the likelihood of accessing GAESs. This is so because most of the extension services target farmers who have progressed and are serious with farming (most of which use credit from financial institution) to act as model farmers. This finding agrees with the findings of Masanja et al. (2023) and Anang et al. (2020). In addition, farmers who have access to credit can adopt most of the farming technologies and therefore their farms are used as demonstration sites by the government extension workers. Because of this, most of the banana farmers doing well (attributed to having access to credit) are usually targeted by the government extension workers and therefore they are always accessing GAESs. This finding is in line with that found by Mohamed and Temu (2008).

The effect of being an association member is statistically significant and positive (beta = 2.96, 95% CI [1.87, 4.21], p < .001). This means that being a member to a farmers' association increases the likelihood or the chances of accessing GAESs. This could be attributed to the fact that extension agents tend to deliver the services to organized individuals because of a big extension to farmer ratio i.e., 1:5000. Therefore, it not surprising to get this finding, which was also found by Masanja et al. (2023) in their study to examine factors influencing rural farmers' access to agricultural extension services provided by private organizations in Kibondo district, Tanzania. In addition, this finding is in agreement with other studies by Midamba and Kizito (2022), Nagar et al. (2021) and (Abdallah & Abdul-Rahaman, 2016) who reported that group membership significantly influences farmers' access to extension services since most farmers

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

prefer joining agricultural-related groups for the purpose of sharing and exchanging agricultural-related ideas which are very essential in improving agricultural production and easy accessibility of extension services to farmers.

The banana farmers who were accessing the government agricultural extension services were asked of the services they were getting from this program. Their responses were recorded and are summarized in table below.

The GAES delivered to banana farmers.

Table 3: The GAES delivered to banana farmers.

Services	No		Yes	
	Frequency (N=96)	%	Frequency (N=96)	%
1. Planting materials e.g. suckers	17	17.7	79	82.3
2. Agro-chemicals e.g. fertilizers and pesticides	48	50.0	48	50.0
3. Farm visits	26	27.1	70	72.9
4. Trainings/Workshops/Conferences	15	15.6	81	84.4

Attending trainings ranked high as one of the services obtained from the government agriculture extension program. This was followed by the provision of planting materials in form of seeds and cuttings of different crops. From the interview with one of the key informants,

> "*Through the NAADS program and the operation wealth creation (OWC), we identify the needs of the farmers and provide the available materials to support them. We are giving the farmers resistant banana varieties which are also high yielding. These have been received positively by the farmers and we are scaling it out to those that have not benefited."*

For farm visits, only 73% of the respondents indicated that they exist. The farmers and key informants stated that "*Few of them are on individual basis but rather on group basis. This is where they converge at a demonstration site to learn new practices. There are also individual farm visits but the farmer to be visited connects with the officer in charge to come and advise accordingly".* This finding is in line with that of Ganpat et al. (2017) in their study of assessing the impact of farm visits on farmers' satisfaction with extension: Examining the dependence on individual methods in the Caribbean.

Provision of agrochemicals was mentioned by half of the farmers participating in the government agriculture extension program. This is because they are not provided for free but at a subsidized price, which some farmers are unable to pay. This concurs with the finding of Baloch and Thapa (2018). Also, in line with this, a key informant said that.

> "*Farmers expect the fertilizers are for free and so they refuse to procure them even when they have the capacity so that they get them for free out of sympathy. This calls for a mindset change because the use of these agrochemicals has become part and parcel of crop production because of climate change".*

Strategies for improving the delivery of GAES.

The farmers were also asked for the different ways through which the income generated from bananas can be improved through the GAES. Their responses are summarized in Table below.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Table 4: Strategies for improving the delivery of GAES.

Strategy	Farmers not accessing GAESs (N=69)	Farmers accessing GAESs (N=96)	Overall (N=165)	χ^2	p-value
Training/Sensitization workshops					
No	23 (33.3%)	24 (25.0%)	47 (28.5%)	30.552	**<0.001**
Yes	46 (66.7%)	72 (75.0%)	118 (71.5%)		
Provision of agro-inputs					
No	13 (18.8%)	22 (22.9%)	35 (21.2%)	54.697	**<0.001**
Yes	56 (81.2%)	74 (77.1%)	130 (78.8%)		
Subsidies for agro-inputs					
No	31 (44.9%)	24 (25.0%)	55 (33.3%)	18.333	**<0.001**
Yes	38 (55.1%)	72 (75.0%)	110 (66.7%)		
Market awareness and creation					
No	14 (20.3%)	23 (24.0%)	37 (22.4%)	50.188	**<0.001**
Yes	55 (79.7%)	73 (76.0%)	128 (77.6%)		
Farm visits					
No	35 (50.7%)	22 (22.9%)	57 (34.5%)	15.764	**<0.001**
Yes	34 (49.3%)	74 (77.1%)	108 (65.5%)		

Provision of agro-inputs to boost banana production in the area was ranked as the number one strategy (78.8%) that should be emphasized by the GAESs, with 77.1% and 81.2% of the banana farmers accessing and not accessing GAESs respectively, highly significant (*p<0.001*).

Market awareness and creation by the GAES was ranked second by 76% of those accessing and 79.7% of those not accessing the services. This is very important because it helps in price negotiation, which is very crucial in banana production in the study area. This finding is supported by the findings of Aderinto et al. (2017) and Benin et al. (2011). More than 70% of the banana farmers i.e., 75% (accessing) and 66.7% (not accessing) GAESs suggested being offered trainings on different banana production practices through the GAESs programs and this percentage is highly significant (*p<0.001*).

Farm visits was mentioned by 65.5% of the farmers. In connection to this, one farmer stated that; "*Trainings at demonstration sites is good but farm visits should be made by the extension agents. This is because each farm is unique and specific interventions maybe needed at individual farms, which can only be achieved through farm visits*. This implies that training during workshops, seminars field tours may not be enough. This is in agreement with the finding of Ganpat et al. (2017). In addition, individual farm visits can motivate farmers to work hard and put in practice what they have learned, and seek more information on some technical issues, all of which can significantly increase banana production hence farm income.

Conclusion

More than half of the banana farmers have access to government agricultural extension services, with 85.5% having formal education. More than 50% of the farmers have access to agricultural credit, and were members of the banana farmers association, where they get information pertaining the production. Only two factors i.e., access to credit and membership to a farmer association were the only significant factors influencing access to government agricultural extension services.

Recommendations

Firstly, training farmers on different sustainable banana production technologies and/or practices should be a top priority of the government and

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

development partners. In addition to this, there is a need to build the capacity of the extension agents by retooling through refresher/in-service courses on the current banana production practices.

There is need to encourage formation and support of farmer associations since they were found to significantly influence access to GAES to ease dissemination of not only banana production knowledge and information but also other agricultural activities.

Finally, there is need to provide agricultural credit with low interest rates, and transparency in selecting the beneficiaries of this credit should be a priority.

REFERENCES

Abdallah, A.-H., & Abdul-Rahaman, A. (2016). Determinants of access to agricultural extension services: evidence from smallholder rural women in Northern Ghana. *Asian Journal of Agricultural Extension, Economics & Sociology*, *9*(3), 1-8.

Aderinto, A., Agbelemoge, A., & Dada, O. (2017). Effectiveness of extension service delivery and productivity of Cassava farmers in Southwestern Nigeria. *Journal of Agricultural Sciences*, *12*(1).

Albore, A. (2018). Review on role and challenges of agricultural extension service on farm productivity in Ethiopia. *International Journal of Agricultural Education and Extension*, *4*(1), 93-100.

Ali, A., & Rahut, D. B. (2013). Impact of agricultural extension services on technology adoption and crops yield: Empirical evidence from Pakistan. *Asian Journal of Agriculture and Rural Development*, *3*(11), 801-812.

Anang, B. T., Bäckman, S., & Sipiläinen, T. (2020). Adoption and income effects of agricultural extension in northern Ghana. *Scientific African*, *7*, e00219.

Andersen, J. (2017). *Access to and benefit of agricultural extension in Tanzania a study from the Dodoma Region* Master Thesis University of Copenhagen (Denmark)].

Baloch, M. A., & Thapa, G. B. (2018). The effect of agricultural extension services: Date farmers' case in Balochistan, Pakistan. *Journal of the Saudi Society of Agricultural sciences*, *17*(3), 282-289.

Benin, S., Nkonya, E., Okecho, G., Randriamamonjy, J., Kato, E., Lubade, G., & Kyotalimye, M. (2011). Returns to spending on agricultural extension: the case of the National Agricultural Advisory Services (NAADS) program of Uganda. *Agricultural Economics*, *42*(2), 249-267.

Berhane, G., Ragasa, C., Abate, G. T., & Assefa, T. W. (2018). *The state of agricultural extension services in Ethiopia and their contribution to agricultural productivity*. Intl Food Policy Res Inst.

Bonou-Zin, R. D. C., Hinnou, L. C., Ayedoun, A. O., & Obossou, E. A. R. (2022). Impact of the agricultural advisory service on the productivity of maize and cotton in the cotton-growing zone of North Benin. *Journal of Agricultural Extension and Rural Development*, *14*(3), 120-131.

Bonye, S. Z., Alfred, K. B., & Jasaw, G. S. (2012). Promoting community-based extension agents as an alternative approach to formal agricultural extension service delivery in Northern Ghana. *Asian Journal of Agriculture and Rural Development*, *2*(1), 76-95.

Buehren, N., Goldstein, M., Molina, E., & Vaillant, J. (2017). The impact of strengthening agricultural extension services: evidence from Ethiopia. *World Bank Policy Research Working Paper* (8169).

Buehren, N., Goldstein, M., Molina, E., & Vaillant, J. (2019). The impact of strengthening agricultural extension services on women farmers: Evidence from Ethiopia. *Agricultural Economics*, *50*(4), 407-419.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Cawley, A., O'Donoghue, C., Heanue, K., Hilliard, R., & Sheehan, M. (2018). The impact of extension services on farm-level income: An instrumental variable approach to combat endogeneity concerns. *Applied Economic Perspectives and Policy*, *40*(4), 585-612.

Christoplos, I. (2010). Climate information and agricultural advisory services: a square peg in a round hole?

Danso-Abbeam, G., Ehiakpor, D. S., & Aidoo, R. (2018). Agricultural extension and its effects on farm productivity and income: insight from Northern Ghana. *Agriculture & Food Security*, *7*(1), 1-10.

Deng, H., Jin, Y., Pray, C., Hu, R., Xia, E., & Meng, H. (2021). Impact of public research and development and extension on agricultural productivity in China from 1990 to 2013. *China Economic Review*, *70*, 101699.

Ganpat, W. G., Narine, L. K., & Harder, A. (2017). The impact of farm visits on farmers' satisfaction with extension: Examining the dependence on individual methods in the Caribbean. *Journal of International Agricultural and Extension Education*, *24*(3), 20-35.

Hu, R., Cai, Y., Chen, K. Z., & Huang, J. (2012). Effects of inclusive public agricultural extension service: Results from a policy reform experiment in western China. *China Economic Review*, *23*(4), 962-974.

Kassem, H. S., Alotaibi, B. A., Muddassir, M., & Herab, A. (2021). Factors influencing farmers' satisfaction with the quality of agricultural extension services. *Evaluation and Program Planning*, *85*, 101912.

Kauky, M. S. (2024). Role of Agricultural Extension Services (AES) on Farm Productivity and Household Food Security in Tanzania. *The African Review*, *1*(aop), 1-24.

Masanja, I., Shausi, G. L., & Kalungwizi, V. J. (2023). Factors Influencing Rural Farmers' Access to Agricultural Extension Services Provided by Private Organizations in Kibondo District, Tanzania. *European Journal of Agriculture and Food Sciences*, *5*(5), 115-122.

Midamba, D. C., & Kizito, O. (2022). Determinants of access to trainings on post–harvest loss management among maize farmers in Uganda: a binary logistic regression approach. *Cogent Economics & Finance*, *10*(1), 2148359.

Mohamed, K. S., & Temu, A. E. (2008). Access to credit and its effect on the adoption of agricultural technologies: the case of Zanzibar. *African Review of money finance and Banking*, 45-89.

Nagar, A., Nauriyal, D. K., & Singh, S. (2021). Improving farmers access to agricultural extension services delivery systems: Lessons from a field study in western Uttar Pradesh, India. *Journal of Tropical Agriculture*, *59*(2).

Ogunniyi, L., Fanifosi, G., Ajao, O., & Dlamini, D. (2018). Impact of Agricultural Extension Services on Crop Farmers' Productivity in Oyo State, Nigeria. *Applied Science Reports*, *23*(3), 97-101.

Rahman, M. M., & Connor, J. D. (2022). Impact of agricultural extension services on fertilizer use and farmers' welfare: Evidence from Bangladesh. *Sustainability*, *14*(15), 9385.

Rivera, W. M., & Qamar, M. K. (2003). *Agricultural extension, rural development and the food security challenge*. Food and Agriculture Organization of the United Nations Rome.

Rokhani, R., Asrofi, A., Adi, A. H., Khasan, A. F., & Rondhi, M. (2021). The effect of agricultural extension access on the performance of smallholder sugarcane farmers in Indonesia. *AGRARIS: Journal of Agribusiness and Rural Development Research*, *7*(2), 142-159.

Article DOI : https://doi.org/10.37284/eajab.7.1.2136

Sennuga, S. O., Fadiji, T. O., & Thaddeus, H. (2020). Factors influencing adoption of improved agricultural technologies (IATs) among smallholder farmers in Kaduna State, Nigeria. *International Journal of Agricultural Education and Extension*, *6*(2), 382-391.

Shimali, F., Mangheni, M., & Kabahenda, M. (2016). Towards a new role of agricultural extension in nutrition education: evidence from western Uganda.

Toroitich, C. J. (2021). *The Association Between Agricultural Extension Services and Food Security Among Small-Holder Farming Households in Uasin Gishu County, Kenya* University of Eldoret].

UBOS. (2024). *National Population and Housing Census 2024: Preliminary Results* (Energy, Issue.

WorldBank. (2021). Uganda Country Overview. In: World Bank Press: New York, NY, USA.

Zhuo, N., Li, B., Zhu, Q., & Ji, C. (2023). Smartphone-based agricultural extension services and farm incomes: Evidence from Zhejiang Province in China. *Review of Development Economics*, *27*(3), 1383-1402.

