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ASSESSMENT OF SOCIO-ECONOMIC AND INSTITUTIONAL FACTORS INFLUENCING FARMERS' UTILIZATION OF AGRICULTURAL EXTENSION SERVICE IN KADUNA STATE, NIGERIA

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ABSTRACT

This study assessed the socioeconomic and institutional factors influencing farmers' utilization of agricultural extension services in Kaduna State, Nigeria. A multi-stage sampling procedure was employed for the study. The first stage involved the purposive selection of two Local Government Areas (LGAs), i.e., Soba and Ikara, based on

Introduction

In Nigeria, agriculture is the backbone of the rural economy, playing a crucial role in the national economy and offering numerous entrepreneurial opportunities to a large segment of the population (Ahmed and Adisa, 2017). The effectiveness of agricultural extension services is vital, as agriculture employs approximately 70% of Nigeria's workforce and contributes 23% to the country's Gross Domestic Product (GDP). Small-scale farmers generate about 80% of the nation's crop production (National Bureau of Statistics, 2022).

Agricultural extension services play a vital role in enhancing farmers' productivity, yet factors affecting their adoption vary across regions. For most farmers in

the threshold of tomato production in the study area. Secondly, a random sampling of four communities from the two LGAs. A total of 214 tomato farmers were used for the study which was calculated using Slovian's formula. Descriptive statistics and Tobit regression analysis were used for the study. The findings showed that tomato farmers were young with an average of 38 years and relative experience of 15 years in tomato farming and had an average of 9 persons per household. The result of farmers' utilization of extension service delivery shows that the extension delivery method, farmers' indigenous knowledge and extension contacts were positive and a significant factor with a coefficient of 0.1346 at 1% probability. Farm size and income were positive and significant factors at 10% level in influencing farmers' utilization of agricultural extension services. The study recommends that structured training should focus on planting techniques, proper fertilizer application, agrochemical usage, mulching, weed control, and efficient harvesting. Therefore, efforts should be made by extension agents to organize field demonstrations and practical workshops that will equip farmers with hands-on skills to optimize yields and improve farm management practices.

Keywords: Socio-Economic, Institutional Factors, Extension Service, Utilization and Farmers.

rural areas, socioeconomic and institutional factors like education level, income, farm size, and access to credit and information profoundly shape farmers' engagement with these services. Iman, Gosbert and Vituce (2023) revealed that, critical factors influencing the utilization of extension services and use of recommended practices include age, wealth, level of living, capacity building, effectiveness of extension system, advisory methods, access to the market; and good government policies. These positively influence farmers' decisions to utilize extension services.

Socioeconomic factors, such as farmers' education levels, income, farm size, and age, influence their ability to engage with extension programs and adopt new practices. Those with higher education or larger farm operations, for instance, maybe more open to utilizing these services, seeing them as essential to improving their productivity (Issa and Adiyu, 2020). Additionally, institutional factors such as access to credit, government policies, availability of trained extension agents, and infrastructure support play crucial roles. Limited resources, traditional farming practices, and institutional barriers such as inadequate infrastructure and poorly trained extension agents hinder effective utilization. Assessing farmers' satisfaction with the quality of agricultural extension services is essential for developing extension programs that comply with farmers' needs and agroecological conditions. A study by Hazem, Bader, Muhammad, and Ahmed (2021) on accessibility of extension services revealed that, factors significantly influencing farmers' satisfaction included farm size, diversity of farming activities, annual income and participation in extension services in the study area.

The realization of the potential of tomato production to meet the necessities of life has made farmers embark on its production, not just for immediate consumption, but also for sale to improve their livelihood and well-being (Sa'Adu *et al.,* 2018). Tomato does not serve as a means of livelihood to farmers alone but to many intermediaries such as wholesalers, retailers, and farm agents who are involved in its value chain and responsible for its movement from the farmers to the consumers. Thus, tomato production has a great tendency to curb the problem of malnutrition and the high poverty rate among rural people (Momoh *et al.,* 2018).

Tomato farming has been ongoing for decades in Nigeria, contributing to income and serving as a means of employment for the growing population, especially dry season tomato farming (Mukaila *et al.,* 2021). Despite Nigeria ranked 2nd to Egypt in Africa and 13th position in the world hierarchy of tomato production, the country is still lagging in tomato production compared to Egypt

and the USA. The yield of tomato in Nigeria is low, estimated to be 20-40 tons per ha/year on average, and due to inadequate handling, processing, and preservation techniques, 40 to 50 percent of the production in the nation is wasted (FAOSTAT, 2021) and have significant effects on the livelihoods of smallholder tomato farmers and the overall national food security in general.

Even though studies (Saleh, 2019; Hazem, Bader, Muhammad, and Ahmed, 2021; Odoemenem and Obinne, 2021; Iman, *et al.,* 2023) have been conducted on factors influencing farmers' utilization of agricultural extension services in Nigeria and other parts of Africa and the world in general, these studies concentrated only on the accessibility of extension services on cereal (maize and rice), cash crop (cocoa) and livestock. Also, most studies that seek to address the issue of the utilization of extension services as it relates to farmers and their activities focus on production and adoption neglecting the socio-economic and institutional factors influencing farmers' utilization of extension services. There is thus a need to find out if the utilization of extension services has improved the yield of the farmers. This is important as it would allow policymakers to intervene in establishing monitoring and evaluation systems to assess the effectiveness of extension services and adjust programs according to feedback from farmers. Hence, this study aimed to fill the research gap by assessing the socio-economic and institutional factors influencing farmers' utilization of agricultural extension services in Kaduna State, Nigeria.

Methodology

The study was conducted in Kaduna State. It is located in the North-west geo-political zone of Nigeria and shares common borders to the north with Zamfara and Katsina State, to the north-east with Kano State, to the east with Platea State, to the west with the Niger States, to the south with Nasarawa State and the Federal Capital Territory. The State has an area of about 48,473km. The global location of the State is between latitude 1^0 and 12^0 N and extends from

longitude 6° and 9° E of Greenwich Meridian. The State extends from the tropical grassland known as the Guinea Savannah to the Sudan savannah in the north. There are two distinct seasons in Kaduna State namely, wet and dry seasons. The wet season spans from April in the Southern part of the State and late June in the Northern part (KADA, 2023). Kaduna State is known as one of the high thresholds of tomato production in Nigeria (Amurtiya and Adewuyi (2020). According to Growth Employment State, (2015) Kaduna State is one of the highest tomato producers in Nigeria, with a total produced of 1,095,513 tonnes of tomatoes yearly. Kaduna State Agricultural Development Agency (KADA) is the major public agricultural extension service provider in the State. The State is divided into four agricultural zones namely; Birnin Gwari, Lere, Samaru Kataf and Maigana.

Sampling Procedure and Sample Size

The study employed a multi-stage sampling technique. In the first stage, the Maigana Zone was purposely selected out of the four (4) zones (Birnin/Gwari, Lere, Maigana, and Samaru zones) of the KADA in Kaduna State. This is because it is one of the areas where tomatoes are cultivated in high quantities (KADA, 2023). In the second stage, four communities with more threshold of tomato cultivation were purposely selected from each LGA making a total of eight communities. The third stage was based on a random selection of 47% of 461 sampling frames of tomato farmers, making 214 were randomly selected using Slovian's formula (1967) (adopted from Abduazeez *et al.,* 2018) to calculate the sample size with 95% confidence level and 5% sampling error assumption. Giving a total sample size of 214 farmers in all. The formula is expressed as follows:

$$n_0 = \frac{N}{1+N\,(e^2)}$$

Where:

n= Sample size

N= Total number of observations

1= Statistical constant

e= Level of significance which is set at 0.05

Hence, $$n_0 = \frac{N}{1+N\,(e^2)}$$

$$n_0 = \frac{461}{1 + 461\,(0.05)^2} = \frac{461}{1 + 461(0.0025)}$$

$n_o = 214$

Table 1: Population and sample size of farmers

Zone	LGAs	Villages	Farmers' sample frame	Farmers' sample size (47%)
Maigana	Ikara	Kurmi kogi	50	23
		Ikara	62	29
		Janfalam	68	32
		Paki	40	18
	Soba	Takia-lafiya	60	28
		Maizare	60	28
		Dawata	57	26
		Dinya	64	30
TOTAL	**2**	**8**	**461**	**214**

Source: Reconnaissance Survey and Farmers Village Listing Survey (KADA, 2023)

Primary data were collected through the use of a questionnaire instrument and were administered to the farmers by well-trained enumerators from national agricultural extension and research liaison services (NEARLS). The analytical tools used for the objective and hypothesis of the study were descriptive statistics and Tobit regression analysis to determine the socio-economic and

institutional factors influencing farmers' utilization of agricultural extension services.

The model was expressed as:

$Yi^* = \beta_o + \beta iXi + Ui$

$Yi = YI^*$ if $\beta o + \beta iXi + Ui > 0$…… (1)

Where:

Yi= is the ratio of factors influencing the utilization of the extension services of the farmers.

Yi*= is the latent variable and the solution to the utility maximization problem of the intensity of the level of factors influencing the choice of use of extension services subject to a set of constraints per household and conditional on being above a certain limit.

$Yi^* = \beta + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + Ui;$

Where Yi = X_2= Extension delivery method (Access/no access), X_3 = Educational Level (Number of years spent in schooling)X_4 = Farmers' Indigenous knowledge (increase/decrease)X_5= Household size (number of household members)X_6 = Farm size (Hectare of tomato under cultivation)X_7 = Extension contacts (Number of contacts made)X_8= Cooperative membership (Number of years as a member of cooperative group)X_9 = Farming experience (Years)X_{10} = Farm income (Naira ₦) X_{11}= Access to credit ((Actual amount received in Naira ₦)and e -Error term

Results and Discussion

Socio-economic characteristics of tomato farmers

The findings of the study in Table 2 showed that tomato farmers' ages ranged between 30-39 with an average age of 39 years with a standard deviation (SD) of 9.947. This implied that tomato farmers in the study area are in their productive and economically active stage and can withstand the drudgery

involved in tomato production. In addition, the findings showed that 99% of the farmers were male and 1% were female. This finding implied that tomato production is dominated by male farmers in the study area. This finding is corroborated by the findings put forward by Mohammad *et al.,* (2021) who state that male farmers constitute the majority (84%) of the respondents in the study area.

Table 2 also shows that 91% of the respondents are married and 9% are single. This suggests that the tomato farmers were mature individuals who were dedicated to the provision of food. Also, majority (66%) of the farmers had a household size of 1-10. The mean household size was found to be 9. The implication is that the members of the household could be used as a source of labour by the farmers. Moreover, most of the farmers (82%) of tomato farmers in the study area had some form of formal and non-formal education, respectively. This implied that tomato farmers in the study area are literate. This result agrees with Amurtiya and Adewuyi (2020), that the majority (79.2%) of the respondents in their study had formal education.

The result presented in Table 2 showed that the majority (80%) of the farmers own a farm size of between 1-3.99 hectares, with a mean size of 3 hectares and a standard deviation of 3.794. Few (12%) of the farmers had between 4-6 hectares of farm size. This implied that tomato farmers in the study area produce on a small-scale. This is in support of Amurtiya and Adewuyi (2020), who found that all the farmers were operating on less than 5 hectares of land. It was also found that inheritance (43%) was the most common type of land tenure system among the farmers while 21% purchased the land they used in tomato farming, and some (19%) reported hiring of the land. This showed that most of the farmers had access to one of the most important factors of production. This result is in line with Ajibare (2022), who reported that 60% of the sampled farmers acquired land through inheritance while 31% purchased the land for tomato production.

Table 2: Socio-economic characteristics distribution of tomato farmers in the study area (n = 214)

Variable	Frequency	Percentage	Mean	Standard deviation
Sex				
Female	3	1		
Male	211	99		
Marital status				
Single	19	9		
Married	195	91		
Age				
<20	3	1		
20-29	42	20		
30-39	71	33		
40-49	69	32	38	9.947
50-59	25	12		
60-69	4	2		
Household size				
1-10	140	66	9	5.948
11-20	65	30		
21-30	9	4		
Farming experience				
1-10	92	43		
11-20	81	38		
21-30	32	14	15	9.068
31-40	8	4		
41-50	1	1.0		
Educational Level				
No formal education	40	19		

Primary education	46	22		
Secondary education	102	48		
Post-secondary education	16	7		
Adult education	10	5		
Farm size				
1.00-3.99	172	80		
4.00-6.99	26	12		
7.00-9.99	2	1	3	3.794
10 and above	14	7		
Farm income				
Less than ₦ 100000	2	1		
₦ 100000-399000	5	2		
₦ 400000-699000	74	35	1293168	1154434
₦ 700000-999000	46	21		
₦ 1000000 and above	87	41		
Types of land tenure system				
Inheritance	110	43		
Purchased	55	21		
Hired	48	19		
Rent	20	8		
Lease	14	5		
Gift	5	2		
Government allocation	4	2		
Total	**256****	**100**		

Source: Field Survey, 2024 *** Multiple choices allowed*

Institutional characteristics of tomato farmers

The result in Table 3 showed that the majority (74%) of the farmers were visited by extension agents. It was gathered that 80% of the farmers were visited 1-3 times a year, and 20% had about 4-6 extension visits a year. The mean annual extension visit was twice a year with a standard deviation of 1.716. This indicated that there were low or poor extension activities in the study area. The implication is that farmers may not be well equipped with the necessary knowledge for agricultural activities. This finding is contrary to that of Oyegbami (2018), who reported that more than three-quarters (83.4%) of the respondents submitted that extension agents visit them once or twice a month.

The study revealed that 55% of the farmers were members of one cooperative society or the other. The result showed that 78% of those who indicated being members of an association had 1-10 years of membership, and 21% of farmers had 11-20 years of membership experience. The mean year of experience was 5 years with a standard deviation of 5.925. The implication is that tomato farmers in the study area considered cooperative society as an important organization to identify with. This result is however contrary to Ajibare (2022), who found that the majority (90%) of the sampled farmers were members of farmers' associations or cooperatives.

The result in Table 3 revealed that only 28% of tomato farmers had access to credit, while the majority (72%) of them had no access to credit. Access to credit is one of the major factors that stimulate and sustain farmers to keep on utilizing inputs needed or required during production. The implication is that easy access to credit is well known to guarantee the availability of funds for production processes that cut across all stages of production. These findings agree with Saleh (2019) assertion that access to credit will improve farmers' farm activities, as this enables them to have the purchasing power to obtain inputs for production purposes.

Table 3: Institutional Characteristics of Tomato Farmers

Variable	Frequency	Percentage	Mean	Standard deviation
Extension contacts				
No	56	26		
Yes	158	74		
Total	**214**	**100**		
Number of visits				
1-3	126	80		
4-6	31	20	2	1.716
7-9	1	1		
Total	**158**	**100**		
Membership of cooperative				
No	97	45		
Yes	117	55		
Total	**214**	**100**		
Years of Membership				
1-10	91	78		
11-20	25	21	5	5.925
21-30 Access to credit **Had access to credit** **Had no access to credit**	1 60 154	1 28 72		
Total		**100**		

Source: Field Survey, 2024

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Socio-economic and institutional factors influencing farmers' utilization of agricultural extension services to tomato farmers

The Tobit Regression result presented in Table 4 showed that age, education, household size, membership of cooperatives and farming experience were not significant. This showed that these factors had no influence on farmers' utilization of agricultural extension services. The result showed that the extension delivery method was positive and a significant factor with a coefficient of 0.1346 in influencing farmers' utilization of agricultural extension services at 1% level of probability. This implies that increased access to various extension services or activities enables farmers to gain a better understanding of new techniques and practices that enhance tomato production. This result agrees with that of Musa *et al.* (2023), who reported that access to extension was positive and significant ($P<0.01$) in influencing the utilization of extension services delivery.

The result further showed that the coefficient of farmers' indigenous knowledge (0.3349) was positive and significant factor influencing the utilization of agricultural extension services among tomato farmers at 1% level of probability. This implies that extension services are not complicated and compatible with farmers' indigenous knowledge, the more they adopt new technologies.

The result also showed that the coefficient of farmers' extension contacts (β = 0.0625) was positive and significant factor influencing the utilization of agricultural extension services among tomato farmers at 1% level of probability. This implied that constant extension contacts would positively influence participation in agricultural extension activities and subsequent improvement in food crop production. This is in line with the findings of Sulum *et al*. (2021), who found that extension contact was positive and significant at 5% level probability.

Furthermore, the result in Table 4 showed that the coefficient of farm size (β = 0.0190) was positive and significant at 10% level of probability. This implies that

the more the farmers have access to the utilization of extension services activities, the more the farmers can effectively manage the farm size and increase his/her production. It was also found that farm income (β = 0.0248) was positive and significant factor at 10% level in influencing farmers' utilization of agricultural extension services. This showed that the higher the income received by the tomato farmers, the higher the likelihood that such farmers will purchase more inputs to expand their tomato farming. This is also in line with Alhassan and Muhammad (2019) who observed that farmers who utilized extension services had a higher income (F =3.95) than the farmers who had no access to utilization of extension services/ activities.

Table 4: Estimation of socioeconomic and institutional factors influencing farmers' utilization of agricultural extension services to tomato farmers

Variable	Coefficient	Standard error	T-value	Marginal effects
Constant	0.6909	0.1026	6.735	
Age	0.0039	0.0164	0.241	0.004
Extension delivery method	0.1346***	0.0196	6.874	0.135
Education	0.0077	0.0116	0.664	0.008
Farmers Indigenous knowledge	0.3349***	0.0259	12.951	0.335
Household size	-0.0100	0.0156	-0.644	-0.010
Farm size	0.0190*	0.0112	1.696	0.018
Extension contacts	0.0625***	0.0230	2.718	0.062
Membership of Cooperative	0.0146	0.0122	1.190	0.015
Farming experience	0.0030	0.0153	0.198	0.003

Farm income	0.0248*	0.0126	1.967	0.025
Sigma	0.0216***	0.0021		
LR chi²	43.625			
Log-likelihood	102.32			
Prob > chi²	0.000			
Pseudo R²	0.684			

*Note: *** and * significant at 1% and 10% levels of probability*

Source: Field Survey, 2024

Hypothesis testing:

The null hypothesis (Ho_2) which states that socioeconomic and institutional factors have no significant influence on the utilization of AESD to tomato farmers was tested using the result of the Tobit regression presented in Table 4. The log-likelihood of 102.32, the pseudo-R2 of 0.684, and the LR (Chi^2) of 43.625 (significant at 1% and 10% levels) implies that the overall model is well fitted in the data and the explanatory variables used in the model were collectively able to explain the utilization of AESD in Kaduna State. Out of the ten variables included in the model, five namely; Extension delivery method, farmers' indigenous knowledge, extension contact, farm income, and farm size were significant. Hence, the hypothesis that socioeconomic and institutional factors of tomato farmers have no significant influence on the utilization of AESD is hereby rejected.

Conclusion

The study concluded that some socioeconomic characteristics such as farm size, Income and farmers' indigenous knowledge and institutional factors such as extension contacts and extension delivery methods are the major factors that influence the utilization of agricultural extension services delivery in the study area in Kaduna State, Nigeria. Based on the result of this work, a greater

proportion of the farmers are within their active and productive age bracket and are married whose access to extension contact was quite low.

Recommendation

Based on the findings the study revealed low female participation in AESD. To address this, recruit more female extension agents, provide gender-sensitive training, create inclusive policies, and promote women-led agricultural initiatives. Empowering women's groups will also enhance their involvement in agricultural extension services. In addition, efforts should be made by extension agents to organize field demonstrations and practical workshops that will equip farmers with hands-on skills to optimize yields and improve farm management practices.

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