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DEVELOPMENT AND VALIDATION OF SOCIO-ECONOMIC STATUS (SES) INDICATORS FOR AGROPASTORALISTS IN NORTH-CENTRAL, NIGERIA

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ABSTRACT
Social intervention in the agricultural sector requires an evaluation of the changes such intervention has brought, therefore without valid socio-economic indicators (SES) such assessment could not be empirically determined. This present work is a baseline information for construction of SES scale for measuring changes in status of agropastoralists especially before and after intervention and for prediction of intervention outcome. This study was designed to develop indexes of SES indicators for agropastoralists (sub-rural population) in North-central, Nigeria. Multiple-stage sampling procedures comprising simple random sampling and cluster sampling techniques were used to select respondents in the three states of the study area to get 557 respondents. Structured interview was used for data collection while discriminant analytical tool was used to analyse the data. Out of 79 universe of cross sectional variables collated, 40 variables were valid indicators. Indicators with high indexes included grinding stone, types of bathrooms, mattress, GSM phone, wrist-watch and donation of cows.
Keywords: Agropastoralists, Discrimination coefficient, Item analysis, SES indicators, valid indices

INTRODUCTION

Socio-economic status as is variously defined deals with access to value resources in the society. These resources include material, cultural, economic and social variables. There is a growing interest of contemporary scholars in socio-economic status study because it serves as an indicator of the strength of social system or society, often measured against some meritocratic or democratic ideal (Oakes and Rossi, 2003).

Agropastoralists are settled pastoralists who cultivate sufficient areas of land to feed their families and for marketing purposes alongside their reared livestock. Agropastoralists in Nigeria comprises of various ethnic groups such as *Kenembu, Bororo, Manga, Koyo, Shuwa Arab, Fulbe,* and *Bodani* among others. Fulani or Fulbe is the largest of the country's agropastoralist ethnic groups and constitute about 95% of the nomadic herders in Nigeria (Fabusoro, 2007; Ismail, 1995). Nigerian pastoralists are estimated to be around 14 million accounting for a quarter of Sub-Saharan Africa's (SSAs) 50 million pastoralists (Ibrahim, 2012; Rass, 2006). However, as it occurs in every society, there is significant differentiation within agro- pastoral communities. Some households are rich while others are poor. This is due to unequal access to resources or social position and unequal utilisation of resources or advantage in the market.

Socio-economic status (SES) is the term used to assess this social and economic inequalities in a given society, households and family or group. This is defined as the position of an individual, household, family or group in a community with respect to the amount of cultural, economic (wealth), and material possessions, level of education and social participation (Busari, *et al*., 2021). Thus, SES can be measured by a single indicator, by several indicators which are used separately, or by combining several indicators (or variables) to form an index (Cowan et. al., 2012). Multiple and composite measures are derived from an array of variables such as occupation and educational achievement, income and possessions, such as video recorders, television, cars, size of home and types, number of books in the home and other home possessions (Marks et.al.,2000;). It is not only income, consumption, wealth, education, and occupation that can be used as concepts for SES typology, but demographic and cultural activities (variables) are also of interest, particularly for population sub-groups (Australia Bureau of Statistics, 2011). A composite index is a mathematical combination (or aggregation) of a set of individual indicators that represent the different dimensions of the phenomenon to be measured.

The Nigeria National Bureau of Statistics (NBS) report showed that the incidence of multidimensional poverty (MPI) in Nigeria is higher in rural areas where 72% of the population are poor (NBS, 2022). Therefore, the government strategy of lifting people out of poverty requires adequate data for proper intervention.

The main objective of social intervention in rural farm families is to improve the rural livelihood/socio-economic conditions. Social-economic status indicators offer the best insights to the type of intervention and extension support in term of technological transfer and adoption of improved practices. Socio-economic indicators are prerequisite for decision support (local monitoring which are based on specific features and issues of each settlement/farmstead). It is also used for policy evaluation which can bring information on the impact and efficiency of policies in order to justify

their conception or improve on their implementation. It is a tool for comparing farms and settlement and for benchmarking (Ambre *et al*, 2014). Therefore, this research has two theoretical implications: first, it indicated that SES affect overall human functioning including physical, mental, social, cultural and economic life. Second, it provided empirical evidence from agropastoralists socio context to support SES inequality as a result of differences in possession of socio-economic indexes.

Validation is a statistical procedure that variables are subjected to in order to be included as indicators of latent variable of interest through item analysis. Previous study on scale development have used different statistical tools for item analysis. These included t-test and point biserial correlation as used by Ovwigho (2009) to validate 69 SES indicators out of 106 items that were collated. Also, Oladipo and Adekunle (2009) used t-test and point biserial correlation for item analysis of 94 SES indicators out of which 46 were found valid. However, Olaniyi (2013) used Pearson Product Moment Correlation (PPMC) to determine 38 valid items out of 75 collated. Other statistical tools that could be used include Multiple Regression Analysis (MRA), Tetrachoric Correlation (rt) and factor analysis among others.

Majority of the indicators of SES developed in Nigeria were meant for either rural households, head of rural farm families or rural youth. However, pastoral and agropastoral communities are different from other rural groups by the specific dependence on livestock-based activities and mobility patterns of their livelihoods. Furthermore, there is significant differentiation within pastoral communities. Some households are rich while others are poor. This is due to unequal access to resources or social position and unequal utilisation of resources or advantage in the market. This type of indicators has not been developed for agropastoralists, particularly, in north-central Nigeria. The findings of this research work could not only be a baseline information for ascribing socio-economic position to agropastoralists in the North-central zone of Nigeria, but also a useful tool for extension/rural development experts in giving policy direction and advice to the government on how to integrate the pastoral society in the economic development of the zone. Furthermore, the present work is additional contribution to the enhancement of literature methodologies on the validation and development of indicators in scale/ index construction in applied sciences.

This study, therefore, aimed to develop indexes of socio-economic status (SES) indicators for agropastoralists in north-central, Nigeria. The specific objectives were to determine the valid indicators through item analysis; select the valid SES indicators for the agropastoralists in north-central, Nigeria; categorise the valid indicators into different components of SES; and examine social and economic importance of some of the valid socio-economic indicators.

METHODOLOGY

This study was conducted in North-central Nigeria (Figure 1). It is situated in the moist Savannah Agro-ecological zone of the country. It has a total land area of 296, 898km^2 representing about 32% of the total land area of the country. North-central Nigeria comprises six states and the Federal Capital Territory (FCT), Abuja. The states are Benue, Kogi, Kwara, Nasarawa, Niger and Plateau.

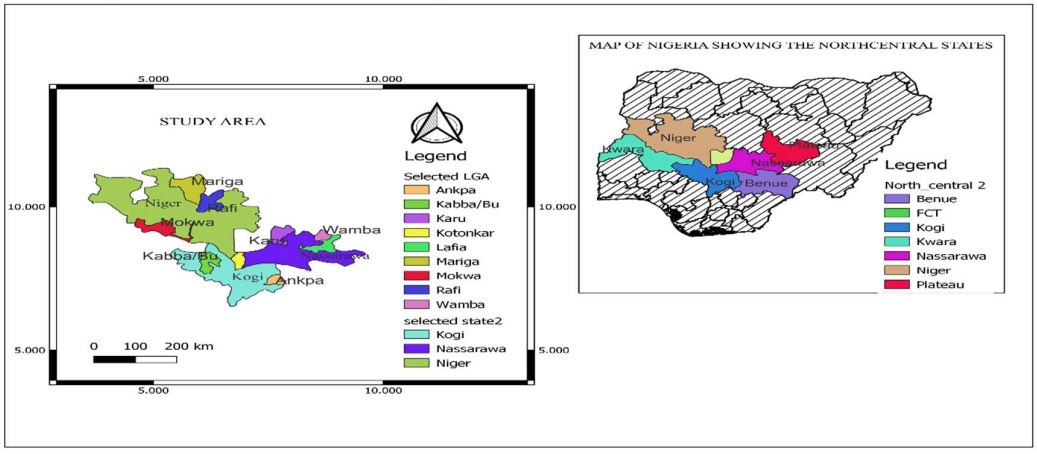

Figure1: Map showing the study area

This study adopted multi-stage sampling procedure which involves simple random sampling and cluster sampling techniques as follows: firstly, three states (Kogi, Nasarawa and Niger) were randomly selected for the study. In the second stage, three Agricultural Development Programme (ADP)

agro-ecological zone in each state were randomly selected, which gave a total of nine ADP zones. Thirdly, from each of the three agro-ecological zones in each state, one Local Government Area (LGA) having preponderance of Agropastoralists was purposively selected for the study. Thus, a total of nine LGAs were sampled. Fourthly, from each LGA selected, four clusters of agropastoralists were randomly selected for the study to give a total of 36 clusters. In the fifth and final stage, simple random sampling technique was employed in selecting 60% of respondents from each cluster to give a total of 557 respondents.

Reconnaissance survey, observation and focus group discussion were used to gather information regarding those items that were indicators of the construct of the study. A universe of 93 items were collated from pre-research survey which was later pruned to 79. These are indicators considered suitable for the areas visited, observable during the survey, measurable and being representatives of SES. The questionnaire contains final 79 indicators and interview schedule technique was used to elicit information from the respondents.

Measurement of variables- The indicators were first assigned value of two (2) for possession and one (1) for non-possession of dichotomous items, while the quantitatively measured items were assigned continuous scores ranging from one (1) upward depending on the number of items listed against a particular indicator. The respondents were asked to indicate possession or non-possession of dichotomous indicators or tick the number of items possessed in the case of quantitative items.

This study used discriminant analytical tools which consists of the inter-item homogeneity that ensures that sample items measure the same concept (SES indicators) along a one-dimensional scale and approximate them into popular Bernoulli Density Distribution (BDD). Therefore, discriminant analysis as a pre-diagnostic test was conducted on each of the 79 cross sectional variables. As a result, variables with lower coefficient were taken in line with the Bernoulli principle and Ebel and Frisbie (1988) rules for item selection signifying that they were less likely to be defaulted in the intended outcome (result) of the model. The above means that 70% of the respondents who make up the sample size will have a validate value of 1 in order to be functionally used in our model creation for analysis. The standardized canonical discriminant function coefficients allow us to compare variables measured on different scales and coefficients with large absolute values corresponding to variables with greater discriminating ability.

Also, in assessing the contribution of each variable to the discriminant model, the equality of means, canonical discriminant function coefficient and the structure matrix revealed the potential (contribution) of each variable to the function. Furthermore, Wilk Lambda revealed that every variable in the discriminant model is statistically significant given that the p-values are less that 0.10 (or 10%) significance level. This is because the Wilks' Lambda coefficients measure the variable potential in measurement of studied phenomenon and the smaller the value the better the model. Similarly, the associated chi-square showed that there was a significant difference in the contribution of each variable in the model. Furthermore, in order to ensure the robustness of the intended model for accurate prediction and simulation, classification table was employed to identify those items that would enhance the model precision and would not default.

RESULTS AND DISCUSSION

Forty variables were identified as valid indicators of socio-economic status (SES) for agropastoralists across North-central Nigeria. These indicators and their indices were listed in the Table 1.

Table 1: Valid Socio-economic Status Indicators of Agropastoralists in North-central, Nigeria

Indicators	Index	Indicators	Index
Number of wives	5.4	Ladder	7.8
Total number of Children	7.4	Wall hanger	3.8
Total number of male children	0.3	Portmanteau	4.7
Children Tertiary Institution	2.4	Grinding stone	26.9
Total number of relatives living in the Household	3.5	Travelling bag	0.9
Total number of Household	3.1	Coal/electric Iron	4.4
Sources of cooking	10.5	Gourd spoon	7.0
Types of bathroom	25.1	Commercial vehicle	4.9
Chieftaincy Title	11.0	Plot of land outside the village	5.8
Axe	14.7	Herd of Cattle	3.2
Mattresses	22.1	Herd of Sheep	10.6
Types of beds	10.5	Herd of Goat	0.8
GSM phones	16.3	Donation of cow	12.9
Rain coat	11.2	Farm size	4.5

Wrist watch	17.9	Do you belong to a social club?	0.7
Umbrella	1.3	Do you travel to city during festival?	4.6
Sources of light	0.5	Are you a member of traditional dancing group?	3.3
Metal bucket	7.2	Are you a member of Kraal cattle sellers association?	8.4
Calabash Gourd	3.0	Do you hold official post in Kraal market?	2.4
Floor mat	0.3	Highest education level	1.0

Categorisation of socio-economic status indicators

All the forty 40 valid socio-economic status indicators of agropastoralists in North-central Nigeria were categorised into components that made up socio-economic status for proper placement and identification. These are cultural indicators, economic indicators, material indicators, social participation and educational level.

Table 2: Categorisation of Socio-economic Status Indicators

Cultural indicators	Economic indicators	Material indicators	Social participation	Educational
Number of wives	Commercial vehicle	Mattresses	Do you belong to a social club?	Educational qualification
Total number of Children	Plot of land outside the village	Types of beds	Do you travel to the city during festival?	
Total number of male children	Herd of Cattle	GSM phones	Are you a member of trade? dancing group?	
Children Tertiary Institution	Herd of sheep	Axe	Are you a member of Kraal cattle association?	
Total number of relatives living in the Household	Herd of goat	Raincoat	Do you hold official post in Kraal market?	
Total number of Household size	Donation of cow	Wristwatch		
Sources of cooking	Farm size	Umbrella		
Types of bathrooms		Sources of light		
Chieftaincy Title		Metal bucket		
		Calabash		
		Floor Mat		
		Ladder		
		Wall hanger		
		Portmanteau		
		Grinding stone		
		Travelling bag		
		Coal/Electric iron		
		Gourd spoon		

Table 2 reveals the categorization of SES indicators for agropastoralists in North-central, Nigeria. It shows that cultural possession consisted of nine (9) indicators, economic possession had 7 indicators, material possession was 18, while social participation had 5 indicators and highest educational level with seven sub-types (i.e. No formal education, below primary education, Primary Education, Arabic education, Junior Secondary Education, Secondary Education and Tertiary Education).

Indexes of valid indicators of socio-economic status for agropastoralists in North-central, Nigeria was given in Table 1. From the final 79 SES indicators only 40 were found to be valid indicators of SES for agropastoralists in the North-central, Nigeria. These are the items that were socially, culturally, educationally and economically valued by the agropastoralists. Some items like Grinding stone, types of bathrooms, mattresses, GSM phones, wrist watches and donation of cows among others were items with higher discriminating indexes while ladder, portmanteau, Gourd spoon, commercial

vehicle and plot of land outside the village were some of the items of moderate indexes. However, level of education, floor mat, sources of light, travelling bag, belonging to social club and the like were items with low indexes. This indicates that those indicators with high indexes were own by few members of the society, while moderate ones were possessed by relatively more people. Indicators with low indices were possessed by majority of the respondents within the study area. This result is consistent with earlier works on validation of items of SES by Adegboye et. al. (2015), Olaniyi, (2013), Oladipo and Adekunle (2009) and Ovwigho, (2009).

Social and economic implication of valid items among the agropastoralists

The valid items are those indicators of SES that were culturally, economically and socially valued by the respondents. A few of these items namely: Grinding stone; types of bathrooms; mattresses; GSM phones; wrist watches and donation of cows have a very significant social and economic implication in the study area.

Grinding stone: Grinding stone stands out with highest discrimination index of 26.9. Based on our experience on the field, three reasons can be adduced for this: First, majority of respondents particularly the low SES class live in remote settlements where grinding machines were not available and only few among them possessed this stone. Since they live a communal life, some of them who did not have preferred to go to their neighbour's house to grind whenever they wanted to cook stew/soup. Second, where the grinding machines were available, either electric or diesel powered, they have to trek a long distance or wait till the market day which hold every seven days. Third, there are few who, despite the availability of both electric and diesel-powered grinding machines, still believed that grinding their pepper and other cooking ingredients with this stone maintains the natural taste of their soup/stew and thus hold on to its usage within themselves. They only resorted to grinding machine during any big occasion when the volume of their ingredients was much high.

Types of bathrooms: The types of bathrooms used by a given household indicates how affluent the family was. This is because the common type of bathroom among the agropastoralists were communal and open roof bathrooms. However, few households were using private, bricked and roofed bathrooms which confers on them special status among their peers.

Mattress: Mattress is considered an important indicator of social status among agropastoralists because majority were either using mat or bamboo bed. Therefore, for someone who is using mattress within their midst is a sign of high social status.

Cell phone: Cell phone has become one of the important determinants of social and economic status among the rural dwellers particularly the agropastoralists because it gives them opportunity to connect with market for information about current prices of cattle in distance places (New Zealand Statistics Bureau, 2008; Adegoye, *et al* 2015). Those who possessed phone take advantage of the market by deciding where and how much they sell their livestock based on price variations. However, a number of agropastoralists in the study area were still lagging behind to join the phone revolution.

Wristwatch: Wristwatch is another important indicator of SES among the agropastoralists in North-central. This confirms the result of Adegboye, *et al* (2015) who also validate wristwatch among the indicators of SES for the rural dwellers in Northern Nigeria. It is a symbol of richness among the respondents and usually worn during a very important ceremony by chiefs and wealthy among them.

Donation of cow/cattle: Cattle is a very important asset among the agropastoralists and signifies the importance and recognition of individual in the community. Livestock (cattle) represents the means through which the continuity of pastoral institutions, customs and cultural ties are guaranteed and are the currency for building connection between families, group or communities (Daramola, 2012). Few individuals who were rich among the respondents donate cattle and this signifies their status in the community.

CONCLUSIONS

The result revealed the indicators of socio-economic status (SES) for agropastoralists in North-central Nigeria. These forty valid indicators play a very significant role in the socio-economic, cultural and educational lives of the agropastoralists of the North-central Nigeria. They are indicators with varying indexes ranging from high to low index. These indicates that these indicators are robust owing to its power of discrimination across different groups. Indexes of socio-economic status provide basis for assessing such changes among the agropastoralists and could be used to predict the expected impact of social intervention or project. These empirical indicators, are therefore, recommended for the construction and standardization of socio-economic status scale for agropastoralists in North-central.

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LEVEL OF AGRICULTURAL COMMERCIALISATION AMONG HONEY PRODUCERS IN ABIA STATE, NIGERIA

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ABSTRACT
The agricultural commercialisation of honey in Abia State, Nigeria was evaluated in this study. Primary data were obtained using a well-structured questionnaire. Descriptive statistics were used to examine socio-economic and institutional characteristics of honey producers and constraints associated with honey production while Household Commercialisation Index (HCI) was used to determine level of honey commercialisation in the study area. The result of the socioeconomic and institutional characteristics showed that majority of honey producers were male. Furthermore, 58% have been in the honey business for more than five years with 57% practicing modern type of bee keeping and also, about 80% of the respondents produced honey at medium and large-scale levels. The result of HCI showed that majority of the households were in high Commercialised household (which have sold about 67% of their total honey outputs) followed by medium Commercialised household (have sold about 30% of their total honey outputs. The result also shows a mean commercialisation index of 0.646970. This implies that there is a high level of orientation of bee farmers towards commercialisation in the study area. The major constraints affecting bee farmer's production include pest and predators (89.70%), lack of access to credit facilities (85%), lack access to bee keeping equipment (85%), fire outbreak/bush burning (82.16%) and theft (74.43%). It is recommended that policies geared toward modern bee farming/production that requires techniques and equipment to enhance honey yield should be encouraged by government and non-governmental agencies while bee farmers associations should organise training/workshops to create awareness on negative effects of bush burning especially during dry season on honey production.
Keywords: Agricultural commercialisation, honey, producers, Abia state, Nigeria

INTRODUCTION

Tackling poverty and unemployment problems has been major policy challenge to every successive government in Nigeria. Nigeria is agrarian, and the discovery of crude oil in Nigeria adversely affected the once booming agriculture in Nigeria especially in the 1940s and early 1950s which became a shadow of itself. Notwithstanding, Agriculture remains the hub of the economy; a key component in achieving the Millennium Development Goals (MDGs) around the world; providing employment for over 90 percent of the rural dwellers who constitute about 70 percent of the total population. The agricultural gross domestic product (GDP) is contributed by crops (87.60%), livestock (8.10%), fisheries (3.2%), and forestry (1.1%). More than 90 percent of the agricultural output is accounted for by small-scale farmers with less than 2 hectares under cropping (Oyaniran and Omomia, 2023).

Although successive governments have attempted to revitalize the agricultural sector to cushion the effect of poverty and unemployment, Nigeria has not succeeded wholly in turning the fortune of agriculture for economic growth. Ebiafue, *et al.,* (2024) and Financial inclusion data (2011) has it that, agricultural production must increase by 70% by 2050 to feed the planet, despite the fact that population growth, climate change, and urbanization are putting pressure on available cultivable landS. Thus, the need to develop an approach that will ensure that better progress is made towards achieving the first Millennium Development Goal and promote agricultural sub sectors' income generating activities to meet the growing need of the economy becomes a necessity.

Commercialisation of bee keeping is one of the agricultural sub sector's activities that can promote economic growth of Nigeria through provision of employment and poverty reduction but has received little attention. Bee keeping or apiculture entails the rearing or keeping of bees with the aim of exploiting its products. Bee keeping is a sustainable form of agriculture that can provide rural people with a source of much needed income and nutrition, therefore they have economic reasons to retain the natural habitat or modify it to boost honey product because it has potentials to increase yield such as other agricultural ventures (Okezie, *et al.,* 2021).

Nigeria is naturally endowed with good climatic condition for honey production but their full potential has not been tapped due to the fact that it has not been given its full right of place and priority within the overall frame of agriculture (Okezie*, et al.,* 2021). Also, Ama-Ogbari (2014) and Babatunde and Omotesho (2017), opined that, commercial beekeeping was one aspect of agriculture that was neglected and almost non-existent in Nigeria as the country had relied on crude oil and imported products like honey to meet the growing domestic demand. Also, many farm families and rural dwellers run away from honey hunting because of the scare of bee sting. The few honey hunters and

traditional bee farmers that produce the local output of honey use traditional harvesting and processing techniques, which often lead to poor-quality honey. Giving the health benefits of honey and the increase demand for honey has commercialised the production of honey through naturally available nectar which has led to a huge investment for growing commercial farming of bee culture (Gibson *et al.,* 2021; Partners and News, 2021; and Fakhrildin and Alsaadi 2014), there is a need to examine the degree and level of commercialisation of honey producers looking at the scale of operation and their orientation towards the market to meet the growing demand. Few studies have addressed different aspects of honey production in Nigeria (e.g. Ogunola, *et al.,* 2019 and Okezie, *et al*., 2021), there is still gap in the level of commercialisation of honey production in the study area. . This paper contributes to the existing literature by looking at the level of agricultural commercialisation among honey producers in Abia State, Nigeria. Hence, specifically this study examined the socio-economic and institutional characteristics of honey producers; the degree and level of commercialisation of honey producers, and identify constraints affecting output of bee farmers in Abia State, Nigeria The definition of agricultural commercialisation adopted in this study is as defined by Jaleta *et al.,* (2009); Pradhan *et al.,* (2010): Agricultural commercialisation refers to the process of increasing the proportion of agricultural production that is sold by farmers. The commercialisation of agricultural households implies the increased focus on market signals and comparative advantages in a household's production decisions, as opposed to a primary focus on subsistence production and the sale of purely the surplus that remains after the household's consumption requirements have been satisfied.

METHODOLOGY

The study was carried out in Abia State, Nigeria. The state is located in the South Eastern Nigeria and lies between longitudes 07^0 08′ - 08^0 04′ East of the Greenwich Meridian and latitudes 04^0 49.30′ - 06^0 02′ to North of the Equator. The state is divided into 17 local government areas (LGA), organised within three (3) agricultural zones namely, Umuahia (5 LGAs), Aba (7LGAs) and Ohafia (5LGAs) agricultural zones. The estimated population of Abia State was 4,143,100 persons with a relatively high density of 660 people per square kilometre (NPC 2022).

The sample units of analysis are the honey producers/marketers in Abia state. A multi-stage sampling procedure was employed in selecting the respondents. The first stage involved the selection of the three agricultural zones (AZs) in Abia State which are Umuahia, Aba and Ohafia AZs. The second stage involved the purposive selection of one local government area each (LGA) from each of the three AZs making it three LGAs studied. The essence of the purposive selection is the preponderance of honey producers in the LGAs selected and to ensure equal representation of respondents in each zone whose major occupation is bee farming. The LGAs purposively selected from each of the three agricultural zones were Ikwuano LGA in Umuahia AZ, Isi Ala Ngwa North LGA in Aba AZ and Bende LGA in Ohafia AZ. In the third stage, two autonomous communities also known for high honey production were purposively selected from each LGAs to have a total of six communities/villages. Lastly, in each of the six communities, a list of registered beekeepers were compiled with the assistance of the beekeepers association's head and resident Abia State Development Program (ADP) extension agents. From each community/village list, 15 honey producers/marketers (marketers that are also producers) were randomly selected for the study, making a total of 90 respondents used for the study. Primary data were collected with the use of a well-structured questionnaire. Also, scheduled interview was conducted for respondents who could not read and write and the results of the interview were entered into the questionnaire and used for analysis. Information on the scale of production was collected per cycle (a cycle is five-six months), and this was used to categorize bee farmers depending on the quantity of honey produced/sold per cycle.

Model specification: Measurement and Levels of Honey Commercialisation

To measure the status and level/extent of agricultural commercialisation of honey, this study adopted the Household Commercialisation Index (HCI) as used by Mengesha (2021). Commercialisation of agriculture was calculated as the ratio of the total value of honey sold by the households to the total value of honey produced by the same households expressed as a percentage. The index measures the extent to which honey production oriented towards the market. A value of zero would signify a total subsistence and the closer the index is to 1, the higher the level of commercialisation. If the smallholder households sell most of their agricultural outputs to the market, they will become more commercialised and vice versa. Also, the Index captures variation in terms of intensity of commercialisation across honey output which measures the volume of honey sold in percent, thus the degree of commercialisation was grouped into four categories of non-commercialised (0%), low commercialised (≤25% volume of output sold), medium commercialised (26% -50% volume of output sold) and high commercialised (> 50% volume of output sold).

$$HCI = \frac{\text{Gross amount of honey marketed/cycle}}{\text{Gross amount of honey produced/cycle}} \times 100 \quad \ldots\ldots \ldots (1)$$

RESULTS AND DISCUSSION

Socioeconomic and institutional characteristics

The results of socio-economic and institutional characteristics of Honey Producers in Table 1 shows the frequency, mean and percentage distribution of respondents. The result shows that 70% of the respondents were males which implies that honey production in the study area is dominated by male. It could also mean that female farmers recognize beekeeping as a dangerous enterprise because of the fear of bee stings as such were not directly involved in field production of honey, but engaged in processing and selling of the bee-products. This is in line with the findings of Okezie *et al.,* (2021) and Ogunola *et al.,* (2019) who found that beekeeping is gender-sensitive involving male members of the household probably because beekeeping is seen as a dangerous enterprise by female farmers due to the fear of bee stings. The mean age was 35years which present bee farmers as agile, able-bodied and productive. The implication of the mean age result is that the respondents are able-bodied and still economically active which could signify increase in the output of honey which helps to generate substantial income for the household and expansion of their farm size. Also, majority (63%) were married with average household size of 5 persons. This suggest that the honey business enterprise is dominated by married people and the implication of the result may be cheap availability of family labour in the honey productions and thus decreasing the cost of labour in the business enterprise. For level of education, respondents that went to secondary school ranked highest with 46%, 25% stopped at primary school level, 22% went to higher schools while only 5% of the respondents were illiterates.

The study revealed that Majority (64%) of honey producers had bee keeping/honey production experience of more than five years. This implies that most of the farmers have been in the business for a long time. Beekeepers with long years of experience would be able to adjust production to meet market demand and price fluctuation that may occur. Okezie *et al.,* (2021) who had similar result in a related study observed that number of years of experience in honey production/ bee keeping is crucial for adjustments in the face of changing production demands and conditions. With experience, beekeepers are able to make and take necessary decisions regarding risk and uncertainty that are inevitable in any business enterprise.

Table 1. Socio-Economic and Institutional Characteristics of Honey Producers

Variables	Frequency	Percentage (%)
Sex		
Female	27	30.00
Male	63	70.00
Age (years)		
Less than 25 years	11	12.22
26 – 35	15	16.67
36 – 45	33	36.67
46 – 55	25	27.78
More than 55 years	6	6.66
Mean	**35.34**	
Marital status		
Single	41	45.60
Married	48	53.30
Divorced	1	1.10
Household size		
1-3	10	11.10
4 – 6	61	67.80
7 – 9	17	18.90
≥ 10	2	2.20
Mean	**5.26**	
Standard Deviation	**1.745**	
Level of education		
Primary	23	25.56
Secondary	42	46.67
Tertiary	20	22.22
None	5	5.55
Beekeeping experience		

Variables	Frequency	Percentage (%)
Less than 2years	15	16.67
2 – 5 years	17	18.89
More than 5years	58	64.44
Access to market Information		
Yes	68	75.60
No	22	24.40
Type of Hive used		
Modern	57	63.33
Traditional /wild bee hunting	33	36.67
Farm scale		
Small (1-10L of honey/cycle)	20	22.22
Medium (11-20L of honey/cycle)	23	25.56
Large (>20L of honey/cycle)	47	52.22
Total	**90**	**100**

Source: Field survey 2020

Approximately, 75.60 % of honey producers had access to market information. Access to market information is associated with a higher level of market participation. Martey (2013) in his study stated that access to market information arrangements assures producers flow of insights on market conditions and opportunity sets that enable farmers to plan effectively on enterprise choices and efficient resource allocation. This reduces the cost for searching for suitable prices and also, gives them opportunity to make high profit. Majority of the respondents (63%) adopted modern hives techniques in honey production. Going by the recent increase in the demand of honey and its by-products which is of great economic importance, this result implies the use of modern techniques of production which is more efficient and profitable from the obsolete and traditional methods to meet this demand. This result is in line with the findings of Okezie, *et al.,* (2021) who stated that the preponderance of the bee keepers avows that modern techniques of bee keeping is profitable, produces more by-products such as bee wax and bee pollen; and is more ecological and that gradual exposure of modern techniques of bee keeping influence their choice and technique of production. Quantity of honey produced is associated with a higher level of sales which leads to increase in the level of commercialisation. From Table 1, a great number of the respondents produced honey per production cycle at large scale (52%) and medium scale (25%) while only 22% produce at small scale. Higher scale of production indicates an incentive or potential to produce surplus for the market. Increase in honey production is driven by area under cultivation (type and number of hives), and ready market and information availability. This indicates that honey producers in the study area are high level producers. The result confirms the findings by Olwande and Mathenge (2011) and Martey (2013) that households with larger farm sizes are able to produce marketable surplus and hence participate more in the market.

Level/degree of commercialisation by honey farmers

Results in Table 2 indicate that the minimum and maximum value of commercialisation were 0.336 and 1 respectively. This implies that commercialisation ranges from 0 to 1. Specifically, majority (97.67%) of the honey farmers were commercialised at different levels in the study area.

From the result, Based on the categorization made by Martey, (2013) and Mengesha, (2021) level of commercialisation of households in the study area include high Commercialised household which have sold about 67% of their total agricultural outputs, medium Commercialised household have sold about 30%,while Non-commercialised category include low Commercialised household have sold about 3% or Non-commercialised households sold none, indicating non participation because their volume of output sold was zero and or less than or equal to 25%.

Table 2. Commercialisation index of honey farmers in the study area

Commercialisation index	Frequency (F)	Percentage (%)	Rank
0.1 – 0.25 (≤25%)	3	3.33	Low
0.26 – 0.50 (26%-50%)	27	30.00	Medium
0.51 – 1 (>50% - 100%)	60	67.67	High
Minimum	0.336		
Maximum	1		
Mean	**0.646970**		
Standard Deviation	**0.1984673**		

Source: Field survey (2020)

This result depicts the extent at which qualitative and quantitative commodities of honey are produced and sold. It showed that majority of bee keepers produce honey for commercial purpose. The result also shows a mean commercialisation index of 0.646970. This implies that there is a high level of orientation of these farmers towards commercialisation in the study area. This result is in accordance with Mengasha, (2021) who reported high level of agricultural commercialisation. Also, according to Govereh *et al*. (1999) and Strasberg *et al*. (1999) in Madududu *et al.,* (2021), the closer the index is to 1(100%), the higher the degree of commercialisation. It also shows that the level of commercialisation in the study area was considerably high and most bee farmers produce for the market.

Constraints associated with honey production in Abia State

Table 3 shows the results of the problems encountered by the bee farmers in the study area. The results indicate that pest and predators were the most (89.70%) identified problems associated with honey production in the study area. Mbah, (2012) in profitability of honey production enterprise found that pest and predators like termites, wall gecko, wax moth and lizards were major threat to honey production in Umuahia agricultural zone of Abia State. Another major constraint associated with honey production includes lack of access to credit facilities (85%) and lack access to bee keeping equipment (85%) and these deprive farmers from accessing available modern inputs and usage of improved technologies. Access to credit has a correlation with adoption of technology innovations and output of honey. Ogunola., *et al.,* (2019) had similar result that lack of access to bee keeping equipment's was one of the problems affecting bee farmers effectiveness in the honey production business and which also affected the output of honey in general.

Table 3. Constraints of honey production in Abia State

Constraints	Percentages (%)*	Ranking
Pest and Predators	89.70	1st
Fire outbreak/bush burning	82.16	3rd
Inadequate market opportunities	46.20	6th
Lack of access to land	60.80	5th
Lack of access to credit facilities	85.00	2nd
Theft	74.43	4th
Lack access to bee keeping equipment	85.00	2nd

Source: Field Survey data, 2020, * Multiple responses recorded

Again, another major challenge are bush burning and theft. 82.16% and 74.43% of bee farmers agreed that fire outbreak and theft respectively were also major problems affecting their bee farms and yield. Fire outbreak occurs mainly during dry season, and it threatens the bee population and bee flora because the heat from the fire leads to a severe destruction of the honey bee thereby affecting output of honey in the study area. Ama-Ogbari (2014) in a study reported bush burning as a major challenge to bee farming in Nigeria.

CONCLUSIONS AND RECOMMENDATIONS

The study examined the socioeconomic and institutional characteristics of honey producers, degree and level of commercialisation of honey producers, and constraints affecting output of bee farmers in Abia State, Nigeria. Primary data were collected with the use of a well-structured questionnaire and scheduled interview. The Socioeconomic and institutional characteristics result obtained showed that, greater percentage of the respondents were male (70%), married (53.30%), educated (94.45), and have been in honey production for more than five years. Also, 63.33% of the respondents practice modern type of honey production techniques and 52.22% produce mainly

on large scale levels per production cycle. The household commercialisation index was used to determine level of commercialisation and the result showed that honey production households sell most of their honey outputs to the market. The major constraints affecting bee farmer's production include pest and predators, lack of access to credit facilities, lack access to bee keeping equipment, bush burning and theft. The study concludes that bee farmers in Abia State are highly commercialised and produce for the market. The degree and level of honey commercialisation increases with increase in scale of production and this provides the opportunity to meet the growing demand for honey, thus, the study recommends policies geared toward modern bee farming that requires improved techniques, equipment and credit facilities to enhance honey production should be encouraged by government and non-governmental agencies while bee farmers associations should organise training/workshops to create awareness on negative effects of bush burning especially during dry season on honey production.

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ECONOMIC ANALYSIS OF FISH FARMING ON FARMERS HOUSEHOLD INCOME IN OGUN STATE, NIGERIA

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ABSTRACT
This study examined the economic analysis of fish farming on farmers household income in Ogun state. A multistage sampling procedure was used to obtain the sample size for this study. A sample size of 150 fish farmers was used. Data obtained were analysed using descriptive statistics, Tobit regression model and Net farm income analysis. The results show that both genders were involved in fish farming, and they were within their productive age (41-50years). The majority were married (66.7%) and educated (40.0%) with relatively large households. Most (66.7%) of the farmers rely on loans to finance their operations. The study further revealed that BCR was greater than 1, which is an indication that fish farming is very profitable in the study area. Factors such as size of ponds, number of ponds owned, fish feed, initial capital investment, and labour were significant factors influencing the intensity of fish farming. The study concluded that fish farming is a profitable business and recommends measures to enhance productivity, improve access to capital, and strengthen market linkages to further boost the profitability of fish farming in Ogun State.
Keywords: Fish, Income, Output, Ogun State, Production

INTRODUCTION

Nigeria is the second-largest producer of fish in Africa after Egypt (FAO, 2020), rated 64th among other nations in terms of fish consumption (Ashley-Dejo *et al.,* 2019). Nigerians consume less protein on a daily basis than is ideal. The contribution from animal sources is also below average. As a result, there is a growing understanding of the importance of getting enough protein in the human diet. In Nigeria, where agriculture made up 22% of GDP, the fisheries industry contributed 0.88% of the country's agricultural Gross Domestic Product (GDP). Furthermore, 8.632 million people in the primary sector and 19.55 million people in the secondary sector can find work in the fisheries subsector (FDF, 2018). Nigeria as a country has one of the most vibrant economies in Africa and is going through a demographic shift. By 2023, it is anticipated to overtake other Sub-Saharan African nations as the region's largest economy in terms of GDP (Frontier Strategy Group, 2018). However, compared to economies of comparable size in other regions, Nigeria is anticipated to continue to face persistent challenges such as high rates of poverty, income inequality, governance issues, a difficult business environment, and a relatively constrained public spending budget (Frontier Strategy Group, 2018). But as the world's population is increasing, so too does the need for fish. Nigeria has a population of over 200 million people and is predicted to consume 17.5 kg of fish annually per person (FAOSTAT, 2019). However, it is clear that Nigeria needs more than 1.61 million metric tons of fish annually to meet the dietary needs of its population, which is estimated to be over 200 million people (FAOSTAT, 2019). Despite these projections, Nigeria, the greatest fish producer in Africa, now has a shortfall of 2.5 million metric tons of fish. According to Olaoye and Ojebiyi (2018), the nation's overall fish production, including imports, is insufficient to satisfy fish demand. The current estimate of the annual fish demand in Nigeria is 2.66 million metric tonnes, however only 800,000 metric tonnes can be produced domestically, leaving a gap of 1.2 million metric tonnes. As a result, the government imports 1.90 million metric tonnes of fish annually for a cost of N125 billion (Olaoye and Ojebiyi, 2018), which is a waste of resources. Hence, Nigeria has become the largest importer of frozen fish in Africa due to this significant reliance on imports. This emphasizes the substantial gap in fish supply within the country (Adeleke *et al.,* 2020). Nevertheless, the considerable amount of money spent annually on fish imports in Nigeria could instead be directed towards investing in fish farming. By substituting fish importation with domestic production, Nigeria could generate employment opportunities, alleviate poverty in rural areas where 70% of the population resides, and improve the country's balance of payments situation (Galappathithi *et al.,* 2020).

An examination of various food production systems highlights the significance of aquaculture (fish farming) as a crucial strategy in the global fight against hunger, malnutrition, and poverty, especially in developing nations like Nigeria (Jerimoth *et al.,* 2017). Fish farming plays a crucial role in providing employment opportunities, household income, and food security for numerous individuals (Galappathithi *et al.,* 2020). Small-scale fish farming serves as a vital safety net for vulnerable households, offering income security to those who face sudden income declines due to factors such as crop failure, fish farming challenges, economic

downturns at the local or national level, civil conflicts, population displacement, and natural disasters (Wally, 2016). In such circumstances, individuals often turn to fish farming as an additional or alternative source of income, food, or employment. Given the current economic situation in Nigeria, there is a pressing need to adopt a result-oriented, economically viable, and environmentally friendly agricultural system that can effectively supplement household income. Therefore, the study specifically described the socio-economic characteristics of the respondents, estimated the cost and returns of fish farm business in the study area, estimated the net farm income and benefit cost ratio of fish farming in the study area, identified constraints to fish farming involvement and analysed the factors affecting the intensity of fish farming in the study area.

METHODOLOGY

The study was carried out in Ogun State, Southwest Nigeria. Ogun State is bordered to the south by Lagos State, to the north by Oyo and Osun States, to the northwest by Ondo State, and to the west by the Republic of Benin. The headquarters and most populous city of Ogun State is Abeokuta. Other significant cities in the state include Sagamu, Sango Ota, and Ijebu Ode, the old royal capital of the Ijebu Kingdom. The majority of Ogun State is the rain forest zone, and the northwest region is of the woody savanna zone. Ogun State was the 16th most populous state in Nigeria in 2006 with a total population of 3,751,140 people. Ogun State has a surface area of 16,762 km^2, making it the 24th largest state in Nigeria by total area (Olaoye *et al*., 2017).

The population of the study consisted of fish farmers in Ogun State. However, due to high population in Ogun-State, a multi-stage random sampling procedure was adopted for this study. In the first stage, Ijebu-Ode and Odogbolu Local government areas were purposively selected.

The second stage involved a random selection of five (5) towns/settlements each in the selected local government areas, which include Itamerin, Odogbolu, Okun owa, Imagbon and Araromi from Odogbolu Local government and Eriwe, Atiba, Ososa, Iwata and Ogbo from Ijebu-ode Local government. At the third stage, fifteen (15) fish farmers were sampled from each selected town through a snowball technique. Overall, a total of one hundred and fifty (150) fish farmers were sampled as the population size for this study.

Data were obtained from both primary sources. The primary source of data was the aid of structured interview schedules with the fish farmers in the study area Data obtained from the study was analysed using descriptive statistics, Tobit regression model and Net farm income analysis with the aid of Statistical Package of Social Sciences (SPSS)

Descriptive statistics was used to describe and summarize the data. This involved the use of frequency tables and percentages. These tools were used to achieve socio economic characteristics of fish farmers, species of fish and culture systems and constraints to fish farming involvement. Also, Tobit regression model was used to examine factors such as size of pond, number of ponds, farming experience, initial capital investment, fish feed, labour and level of education which influence the intensity of fish farming. The Tobit regression analysis was used to achieve factors influencing the intensity of fish farming.

The Tobit model is expressed thus:

$Y_i^* = \alpha + \sum X_i\beta_j + \mu_i$, $\mu_i \sim N(0, \sigma^2)$

$Y_i = Y_i^*$ if $Y_i^* > 0$

$Y_i = 0$ if $Y_i^* \leq 0$

Y_i^* = Latent variable

Y_i = Dependent variable

X_i = Vector of explanatory variables

β_j = Parameters to be estimated

μ_i = Error term

Where,

Y_i = Net farm income

The independent variables specified as factors influencing the intensity of fish farming were defined as follows:

X_1 = Size of pond (m^2),

X_2 = Ponds owned (number),

X_3 = Fish feed (kg),

X_4 = Initial capital investment (Naira),

X_5 = Labour (man days),

X_6 = Farming experience (number of years)

X_7 = Educational level (years)

Net Farm Income and Benefit Cost Ratio Analysis

Net farm income analysis was used to determine how profitable fish farming business is in the study area. The net farm income specifically provided the amount of money that has been returned to the owner of the farm or business for their investment of labour, management and other resources. This analytical technique was used to estimate the profit or the net income which is the difference between the gross farm income and the total costs of production (Olukosi and Erhabor, 1988).

The model is specified as follows:

NFI = TR-TC

Where;

NFI = Net Farm Income,

TR = Total Revenue and TC = Total Cost (Total Variable Cost + Total Fixed Cost).

Benefit cost ratio = Total revenue ÷Total cost

RESULTS AND DISCUSSION

Socio economic characteristics of fish farmers in the study area

Table 1 presents the socio-economic characteristics of fish farmers in the study area and reveal that 82% were male, indicating the involvement of both genders in fish farming in Ogun State. This finding aligns with previous studies by Oladimeji *et al.,* (2017), Olaoye *et al.,* (2017), and Folayan (2017), which also reported male dominance in the fish farming sector. Regarding age distribution, majority (42.7%) were between 41-50 years old. This implies that a significant proportion of respondents were in their productive years, which can greatly influence resource allocation, reasoning, and management abilities, as described by and Ashley-Dejo *et al.* (2017) and Oke and Kehinde (2019) who identify the age range of 41-50 years as productive and economically active. Moreover, 56.7% had a household size of 5-8 people. Regarding education, the majority (40.0%) had post-secondary education. This indicates that most respondents had average educational attainment, suggesting that they might possess the necessary skills to carry out their fishing activities without significant external assistance. Approximately 60% of the respondents reported an estimated monthly income ranging between N50,000 to N100,000. However, in terms of attraction to fish farming, 40% of the fish farmers were attracted to it as a means of supplementing their household income. This finding suggests that most respondents were drawn to fish farming to diversify their income. Majority (66.7%) of the respondents obtained capital through loans. This indicates that access to capital is an important factor in fish farming, with many farmers relying on loans to finance their operations. Nevertheless, as for the nature of involvement in fish farming, 73.3% of the respondents engaged in it on a part-time basis. This suggests that many respondents may have other sources of income besides fish farming. This finding aligns with the work of Ele *et al.* (2013) on the economic analysis of fish farming in Calabar, Nigeria, which reported that 89% of farmers practicing aquaculture were part-time fish farmers. Furthermore, the selection of the species to be cultured is crucial for the success of any aquaculture venture (Ugwumba and Ugwumba, 2003). The results reveal that 66.7% of the respondents cultivated catfish. This indicates that catfish is the most popularly cultivated fish in the study area. It was also observed that the majority (80.0%) fingerlings/juvenile from external hatcheries. This indicated that fish farmers in the study area depend on external sources for their fingerlings/juveniles. In addition, the study revealed that the majority (65.3%) used both earthen pond and concrete tank facilities. This indicates that earthen pond facilities are the most used culturing facilities in the study area. This finding aligns with that of Ele *et al.,* (2013) who reported that earthen pond facility is the most preferred culture facility in Nigeria. Choice of this culture facility might be due to ease of management and faster production facilitated by the addition of natural food to supplement artificial feed.

Table 1. Distribution of respondents by socio-economic characteristics

Variables	Frequency	Percentage
Sex		
Male	123	82
Female	27	18
Age (Years)		
20-30	11	7.33
31-40	45	30.0
41-50	64	42.7
> 50	30	20
Marital status		
Single	25	16.7
Married	100	66.7
Divorced	15	10.0
Widowed	10	6.7
Religion		
Christianity	120	80.0
Islam	20	13.3
Traditional	10	6.7
House hold size		
1-4	30	20.0
5-8	85	56.7
> 9	35	23.3
Educational status		
No formal education	15	10.0

Variables	Frequency	Percentage
Primary school	30	20.0
Secondary school	45	30.0
Post-Secondary education	60	40.0
Estimated monthly income (N)		
< 50,000	20	13.3
50,000 – 100,000	90	60.0
> 100,000	40	26.7
Years of farming experience		
< 5	40	26.7
6 – 10	45	30.0
11 – 15	30	20.0
≥ 16 years	35	23.3
Attraction to fish farming		
Self-employment	45	30.0
Supplement household income	60	40.0
Parents are into it	15	10.0
It is highly profitable	20	13.3
It is my profession	10	6.7
Source of capital for fish farming		
Personal savings	50	33.3
Loan	100	66.7
Source of loan		
Banks	45	30.0
Friends	15	10.0
Cooperative societies	25	16.7
Family members	15	10.0
Nature of involvement in fish farming		
Full time	110	26.7
Part time	40	73.3
Species of fish cultivated		
Catfish	100	66.7
Tilapia	20	13.5
Both	30	20.0
Source of fingerling and juveniles		
Purchased from fish farms with hatchery	120	80
Purchased from fish farms and self-hatchery	14	9.3
Self-hatchery	16	10.7
Rearing facilities		
Concrete	11	7.3
Concrete and earthen	32	21.3
Plastic	9	6
Earthen	98	65.3

Source: Field survey, 2023

Cost and return of fish farming in the study area

Table 2 illustrates the expenses and earnings of fish farming per production cycle. The total variable cost (TVC) amounted to ₦922,861.82 while total fixed costs (TFC) was ₦17,012.04. The TVC accounted for 98.2. Notably, the cost of feed alone constituted approximately 77.9% of the total cost figure. The table also presents the revenue generated from the production cycle. The total revenue (TR) was ₦2,481,888. With gross margin of ₦1,542,014.14. Overall, this table provides a comprehensive overview of the costs and returns associated with fish farming in this specific production cycle. The positive gross margin indicates profitability in the fish farming enterprise during this cycle.

Table 2. Costs and returns of fish farming per production cycle

Items	Cost
A. Variable cost (Naira)	
Fish feed	732,488.23
Fingerling/juveniles	98,246.55
Lime and fertilisers	7,223.62
Drugs/supplement	6,775.11
Labour	70,353.08
Fuel	4,320.00
Miscellaneous	3,455.23
Total variable costs (TVC)	₦922,861.82
B. Fixed costs (Naira)	
Cost of renting pond	1,800.14
Cost of renting pumping machine	150.23
Cost of renting net	500.00
Pond	5,231.31
Pumping machine	3,482.32
Nets	5,003.42
Weighing scale	844.62
Total fixed costs = (TFC)	₦17,012.04
Total cost = (TVC+ TFC)	₦939,873.86
C. Revenue (Naira)	
Average fish quantity harvested	3,012.00kg
Average price of fish per kg	₦824
Total Revenue (TR)	₦2,481,888

Source: field survey, 2023

Net Farm Income and Benefit Cost Ratio (BCR)

From Table 2.

Net Farm Income (NFI) = TR – TC

NFI = ₦2,481,888 – ₦939,873.86

NFI = ₦1,542,014.14

Benefit cost ratio = Total revenue ÷Total cost = ₦2,481,888 ÷ ₦939,873.86

BCR = 2.6

The BCR greater than 1 reveals further that Fish farming is very profitable in the study area.

Constraints to fish farming involvement

The results in Table 3 indicate that the most identified constraint were high feed prices (48%), inadequate funding (41.3%) and unsuitable market (32.7%). This finding aligns with the analysis of costs and returns, where the cost of feed constituted 77.9% of the total cost of production for the farmers. The increase in feed prices could be attributed to the importation of most commercial feed and the associated problems with importation and distribution. These commercial feeds are preferred by fish farmers due to their floating and high protein qualities.

Table 3. Distribution of respondents on constraints to fish farming involvement

Constraints	Frequency	Percentages	Rank
High feed prices	72	48.0	1st
Inadequate funding	62	41.3	2nd
Unsuitable market	49	32.7	3rd
Poor extension services	36	24.0	4th
Insufficient fingerlings	43	28.7	4th
Poaching	26	17.3	6th
High expense of drilling borehole	18	12.0	7th

Source: Field survey, 2023

Factors influencing the intensity of fish farming in the study area

Table 4 displays the results of a regression analysis to determine factors that influence the fish farming net farm income in the study area. It presents the coefficients, standard errors, and t-ratios for each variable included in the regression model. The constant coefficient of 0.6211 represents the baseline level of fish farming intensity when no other variables are present. The coefficient for pond

size is 0.0010, indicating that for every unit increase in pond size, fish farming intensity increases by 0.0010 units, assuming all other factors remain constant. The t-ratio of 3.525*** demonstrates that this coefficient is statistically significant at the 1% level. The coefficient for the number of ponds owned is 0.1123, suggesting that for each additional pond owned, fish farming intensity increases by 0.1123 units, holding all other factors constant. The t-ratio of 6.621*** indicates that this coefficient is statistically significant at the 1% level. The coefficient for fish feed is 0.6421, indicating that for every unit increase in the amount of feed used, fish farming intensity increases by 0.6421 units, assuming other factors remain constant. The t-ratio of 3.481*** demonstrates that this coefficient is statistically significant at 1% level. This result aligns with the findings of Onoja and Achike (2011) on resource productivity in small-scale catfish farming, which highlighted the significant contribution of fish feed to fish output. The coefficient for initial capital investment is 0.5111, implying that for each unit increase in start-up capital, fish farming intensity increases by 0.5111 units, assuming other factors remain constant. The t-ratio of -3.8421*** indicates that this coefficient is statistically significant at the 1% level.

The coefficient for labour is -0.006, suggesting that for every unit increase in labour, fish farming intensity decreases by 0.006 units, assuming other factors remain constant. The t-ratio of -3.6231*** indicates that this coefficient is statistically significant at the 1% level. The coefficient for farming experience is 0.0105, indicating that for each unit increase in years of farming experience, fish farming intensity increases by 0.0105 units, assuming other factors remain constant. The t-ratio of 0.746* shows that this coefficient is statistically significant at the 10% level. This finding contradicts the work of Ele *et al.* (2013) on economic analysis of fish farming in Calabar, Cross River State, Nigeria, which reported that extensive experience is not a prerequisite for entering fish production. The coefficient for educational level is 0.0178, suggesting that for every unit increase in educational level, fish farming intensity increases by 0.0178 units, assuming other factors remain constant. The t-ratio of 2.387** indicates that this coefficient is statistically significant at the 5% level.

The table includes 150 observations, and the sigma value is 0.2895 with a standard error of 0.0231, representing the degree of variability in the data. The log likelihood value is -26.721, which reflects how well the regression model fits the data. Overall, the Tobit regression results indicate that size of ponds, number of ponds owned, fish feed, initial capital investment, and labour are significant factors influencing the intensity of fish farming in the study area.

Table 4. Tobit regression analysis on factors influencing the intensity of fish farming

Variables	Coefficients	Standard error	t-ratio
Constant	0.6211	0.1532	3.841***
Size of pond ($m^{2)}$	0.0010	0.0004	3.525***
Ponds owned	0.1123	0.0213	6.621***
Fish feed (kg)	0.6421	0.1321	3.481***
Initial capital investment (Naira)	-0.5111	0.2888	-3.8421***
Labour	- 0.006	0.0003	-3.6231***
Farming experience	0.0105	0.00048	0.746*
Educational level	0.0178	0.00081	2.387**
Sigma	0.2895	0.0231	15.901***
Log likelihood	-26.721		

*** Significant at 1%, **Significant at 5%, * Significant at 10%, SE = Standard error

CONCLUSIONS AND RECOMMENDATION

In conclusion, the study revealed a diverse group of fish farmers, with both male and female engaged in the sector, predominantly in their productive years. Fish farming was primarily seen as a means of income diversification, often financed through loans. Catfish emerged as the preferred fish species. However, the study's economic analysis indicated that fish farming in the area was highly profitable, with a benefit-cost ratio of 2.6, highlighting its economic viability. From the study it was observed that fish farming is a profitable sector capable of enhancing household income through income diversification. To enhance productivity, fish farmers should endeavour to improve access to capital, and strengthen market linkages to further boost profitability of the enterprise.

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INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) USAGE AMONG YAM PRODUCERS IN KWARA STATE, NIGERIA

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ABSTRACT
The study assessed usage of Information and Communication Technology (ICT) by yam producers in Kwara State. The study used a four-stage sampling technique to select 120 respondents for the study Information was gathered using a structured questionnaire and analysed using percentages, mean score, Pearson Product Moment Correlation (PPM) and Chi square statistics. The findings show that the mean age of the respondents was 45.5 years, 65% of them had formal education with an average of 19 years of farming experience yam production. The most available ICTs to yam farmers were the radio and mobile phones. The benefits they derived from ICT usage include market accessibility and marketing information. The constraints to ICT usage include incessant power outages and network fluctuation. There was a positive significant relationship between income level and ICT usage ($r \leq -0.294^{**}$, $p- \leq -0.001$). Also a significant relationship was established between the constraints and the usage of the ICT. The government should improve power supply in the study area.
Keywords: Information, Communication, Technology Agricultural Development, Digital Device, ICT Usage, Yam producers (farmers) and Yam production information.

INTRODUCTION

Information and Communication Technologies (ICTs) have affected the lives of people and organisations across the globe positively. In Nigeria, the role of ICTs is identified in the Millennium Development Goal Number 8 (MDG8), where the relevance of emerging technologies to combat poverty was emphasized. In Africa, small – scale agriculture provides the majority of people with a living (Adeyemi *et al*., 2023). For a sector to be productive, there must be a fair interaction between the diverse actors thus and information communication flows are very vital to this process (Roberts & Sbihi, 2013). Yam (Dioscorea species) is a root tuber crop with about 600 species which is grown annually for consumption, and for medicine International Institute of Tropical Agriculture (IITA), (2020). A few of the species include Water yam (Dioscorea alata), white yam (Dioscorea rotundata), yellow yam (Dioscorea cayanensis), Chinese yam (Dioscorea sculant) and three – leaf yams. According to the Food and Agriculture Organisation (FAO), (2020), yams are grown on 8.9 million hectares in roughly 47 countries around the world, with Nigeria as the top producer, followed by Ghana, Ivory Coast, and Togo. Yam tubers are usually sold fresh. They are source of income and food consumption as well as a major employer of labour in Nigeria. In West Africa yam is a high – valued crop. In Nigeria, yam has a higher production value than all the other five major food staples (maize, cassava, rice, millet and sorghum) combined. (IITA,2020). In Agricultural extension, ICTs used include radio, television, mobile phones, World Wide Web (WWW), web publishing, feature and smart devices, videos, and computer – aided presentations, e-books, online newspapers, ipod and ipad etc (Fadiji, 2017; Ayeni *et al*.2023). It enhances farmer's productivity and effective communication. As a result of these components, developing countries have embraced the opportunities in ICTs for higher outcomes. According to Nyarko & Kozari (2021), globally, information and communication technology in agriculture has been identified as the driving force in the sector's growth (Ifabiyi & Abdulrahman, 2023a). Yam production in Nigeria is faced with numerous challenges which include the use of old varieties of seed yam, weed pressure, decline in soil fertility, pests and diseases, and high cost of labour. Also, the ratio of extension worker to farmer is 1;2000 instead of 1:500 or at most 1:1000 (FAO 2017). These have affected or reduce the number of farmers reached by extension agents and the availability of information to them. Information technology can be used to disseminate new innovations to rural dwellers. Although, it is not certain now whether yam producers in Kwara State are actually exposed to information's that can improve their production. This is why it is necessary to access the use of ICT by yam producers in Kwara State so that appropriate steps will be taken to bridge the knowledge gap. The general objective of these study is to assess the usage of information and communication technology (ICT) in yam production. The specific objectives of the study were to: (i) ascertain the socio – economic characteristics of the respondents (ii) Identify the type of ICT available for the respondents. (iii) Ascertain the benefits derived from ICT usage (iv) Investigate the constraints **to** ICT usage by the respondent**s**.

$H_0 1$ = There is no significant relationship between the income of the yam producers and the usage of ICT.

$H_0 2$ = There is no significant relationship between ICT constraints and ICT usage level.

METHODOLOGY

The study was carried out in Kwara State Nigeria. The State is located within the North Latitude $11^{0}2$` and $11^{0}45$`. The State is divided into four Agricultural Development zones (A,-B,-C, and D). The target population was the yam producers in Kwara State. A four – stage sampling techniques was adopted in the selection of sample size. In stage one, two local government areas which are Asa and Ifelodun were purposively selected out of the 16 local governments in Kwara State. Secondly, LGAs. Thirdly, five communities were randomly selected from each of the wards making a total of 20 communities. Finally, a proportionate sampling technique was used to select 44 % of the farmers available in each of the communities with large population of yam producers. Thus, a total of 120 farmers were selected and used for the study. A validated structured interview schedule was used to gather primary data. Descriptive statistics such as frequency counts, percentages, mean was used to analyses the data while inferential statistics such as Pearson Moment Correlation and Chi – square statistical tool were employed in testing of hypotheses.

RESULTS AND DISCUSSIONS

Socioeconomic characteristics

Results represented in Table 1 shows that all the respondents are male, this is in line with Ufondu, *et al* (2021) whose study showed majority (71.7%) of yam farmers were males. Majority of the respondents where between the ages of 51-60 (30%), years indicating that young people in the study area are not into yam farming. About 75 % of them were married men with (40 %) having primary school education and (10%) having tertiary education with a farming experience of 21 years this is good because they farmers will understand the farming system better and this will translate to high yield. Ameh & Iheanacho (2017) reported that increase in the years of farming experience enables the farmers to manage and operate a farm better. With their age and experience, some of them may be willing to new technologies in order to improve their production. Also Muhammad *et al.*, (2019) in a study discovered that marital status and educational level of farmers had positive significant relationship on the use of ICT. The study also showed that, about 35% have a farm size of about 4-5.9 ha and 6-7.9ha. About 86% of the farmers do not belong to any cooperative society. Oyegbami *et al* (2020) encouraged the joining of associations for easy access to information.

Table 1: Socioeconomic characteristics of respondents

Variable	Class	Frequency	Percentage (%)	Mean
Gender	Male	120	100	
Age (years)	21 – 30	12	10	45.5
	31- 40	18	15	
	41 – 50	24	20	
	51 – 60	36	30	
	61 and above	30	25	
Marital status	Single	12	10	
	Married	90	75	
	Widower	18	15	
Education	No formal education	30	25	
	Primary education	48	40	
	Secondary education	18	15	
	Tertiary education	24	10	
Household size	4 – 6	30	25	7
	7 – 9	18	15	
	10 -12	60	50	
	13 above	12	10	
Monthly income (N)	20,000-40,000	12	10	62,000
	41,000-60,000	12	10	
	61,000-80,000	42	35	
	81,000 and above	54	45	
Farming experience	Below 5 years	18	15	19
	6 – 10 years	12	10	
	11 – 15 years	18	15	
	16 -20 years	24	20	
	21years above	48	40	

Variable	Class	Frequency	Percentage (%)	Mean
Membership of cooperative societies	Yes	7	14	
	No	42	86	
Farm size (hectare)	< 1	12	10	6.7 ha
	2 - 3.9 ha	24	20	
	4 -5.9 ha	42	35	
	6 - 7.9 ha	42	35	
Yield (t/ha)	< 2	6	5	6.2t/ha
	2 - 3.9 t/ha	30	25	
	4 – 5.9t/ha	30	25	
	6 – 7.9t/ha	36	0	
	8 and above	18	15	

Source: Field survey, 2020

Type and level of Usage of ICT by Yam producers in Kwara State

Table 2 shows that about 100% of the farmers always use the radio while 95% use cell phones. The usage of radio was the most used ICT facilities by the respondent in the study area others include mobile phone (95%). According to Sennuga (2020), smallholder farmers used their mobile phones in a wide range of ways. Achukwu *et al*., (2023) also agreed that the ability of farmers to access markets and conduct business may be greatly enhanced by mobile phone usage. Ifabiyi and Abdulrahman (2023b) stated mobile phones have advantages sure as access to information and improved communications between farmers and extension agents. While television was never used by them (75%), camera (95%), handbill and fliers, computer and internet (100%). A research work carried out by Idu *et al* (2024) also showed very low usage of television, computer, email in the study area. Whereas Dokubo *et al* (2023) says traditional media such as radio, movies, televisions, slides, photos, exhibitions, and field demonstrations have all been employed to speed up information flow in rural areas of developing nations. With this, the hope of using electronic medium (e-extension) for information dissemination which is necessary is still a long way to becoming a substitute for farm and home visit extension approach in Nigeria thereby.

Table 2. Type and level of Usage of ICT by farmers in Kwara State

ICT	Always	Sometimes	Never	Mean	STD	Rank
Radio	100.0	0	0	3.00	0.00	1st
Mobile phones	95.0	0	5	2.90	0.44	2nd
Television	0.0	25	75	1.30	0.44	3rd
Cinema	10.0	0	90	1.10	0.45	4th
DVD	5.0	0	95	1.10	0.44	5th
Camera	5.0	0	95	1.10	0.44	5th
Multimedia	5.0	0	95	1.10	0.44	5th
Newspaper	5.0	0	95	1.10	0.44	5th
Web publishing	5.0	0	95	1.10	0.44	5th
Fax	0.0	5	95	1.10	0.22	6th
Computer	0.0	0	100	1.00	0.00	7th
Internet	0	0	100	1.00	0.00	7th
Handbill and fliers	0	0	100	1.00	0.00	7th

Source: field survey, 2020

Benefits of ICT usage to yam production in Kwara State

In descending order of importance, Table 3 revealed the benefits of ICT usage to yam producers in Kwara State. The usage of radio for accessibility to information on market outlets was (75%) a study carried out by Oke *et al* (2019) also showed (37.5%) of maize farmers using radio for the same purpose, making contact with sales representatives and gathering of information when listening to radio (80%), This is in line with Idu *et al* (2024) whose research survey in 2022 showed farmers agreeing that the use of ICTs helps to increase sales and income. Also Ifabiyi & Abdulrahman (2023a) agrees that ICTs are useful in monitoring crop growth and conditions of the soil, recording yields and accessing market information. Awareness of current yam price through radio (65%), keeping abreast with current government policy on agriculture through radio (60%) and checking the occurrence of disease outbreak on crop with camera and forwarding the documentary to the extension

agent for solution (75%) who disagree to the benefiting from the use of camera, keeping abreast with government policy on agriculture through (55%) disagree same as knowing current prices through the use of television (70%).

Table 3: Benefits of ICT usage to yam production in Kwara State

Benefits	SA	A	D	SD
Through radio, I have accessed information on market outlet.	75	0	25	0
I do contact sales agent on farm inputs.	80	0	5	1
I do listen regularly to agricultural program to gather new innovation on farming through radio.	70	5	25	0
Through radio, I am aware of current price.	65	5	30	0
I am keeping myself abreast of current government policy on agriculture through radio.	60	5	35	0
I am keeping myself abreast of current government policy on agriculture through television.	20	25	55	0
Through television, I am aware of current price.	25	5	70	0
Through newspaper, I do access information on market price.	20	10	60	10
I do get extension information through the use of ICT.	0	30	50	20
Through television, I do access information on market and at market price.	0	15	75	10
I do listen regularly to agricultural programme to gather new innovation on farming through television.	5	5	75	15
I do check disease situation of my crop with camera and forward to the extension agent for solution.	0	10	75	15

Source: Field survey,2020

Table 4 shows that, the major constraints to ICTs usage by the respondents include irregular power outage (70%), fluctuations in network (55%), low level of education (55%). Inadequate training on use of ICT by extension agents and the high cost of acquiring ICT facilities (50%), it is evident that mobile phones, radio, and television need network to function properly. Network fluctuation is a great threat to effective use of ICT. About (40%) assert that ICT technologies are too expensive for them to acquire, this is in line with Idu *et al*., (2023) that cost of ICT services has been noted as one factor that negatively affects the use of ICTs for agricultural input information. while (35%) do not possess adequate skills to operate ICT properly.

Table 4: Constraints to the use of ICT by yam producers in Kwara State

Challenges	HS	MS	NS	Mean	SD	Rank
There is irregular outage of electricity in our domain	70	15	15	2.55	0.74	1st
There is fluctuation of network on usage of ICT in our locality	45	55	0	2.45	0.49	2nd
Due to my level of education, the language of communication is not understood by me	55	30	15	2.40	0.74	3rd
Inadequate training on use of ICT by extension agents	50	25	25	2.25	0.83	4th
The cost of acquiring ICT facilities is high	50	25	25	2.25	0.83	4th
There is difficulty in getting feedback for solution of farm problem from extension agencies.	40	35	25	2.15	0.79	6th
I do not have access to the area where I can repair ICT equipment	30	55	15	2.15	0.66	6th
I do not possess adequate skill to operate ICT properly	35	40	25	2.10	0.77	8th
The ICT technologies are too expensive for me to acquire	40	30	30	2.1	0.83	8th

Challenges	HS	MS	NS	Mean	SD	Rank
The use of ICT is not readily available for me in my area	20	45	35	1.85	0.73	10th
The cost of maintenance of ICT facility is extremely high	15	40	45	1.70	0.72	11th
The ICT are not easy to come by in our locality	15	35	50	1.65	0.73	12th

Field survey, 2020.

Hypothesis of the study

Pearson's ranked ordered correlation between the income level and usage of ICT

The result in Table 5 indicated a positive significant relationship exists between the yam farmers' income and the usage of ICT (multimedia) in yam production so the increase in income level significantly raises ICT usage level. This is contrary to the findings of Idu *et al* (2023) which showed low annual income of farmers leading to a more engagement in the usage of ICT I believe so they can have better yield next season leading to increase in their income level.

Table 5: Pearson's ranked ordered correlation analysis between level of income and usage of ICT

Factors	Level of income
Multimedia	0.294**

Sources: Field Survey, 2020 ** **Correlation is significant at the 0.001 level (2-tailed)**

Chi–square between ICT constraints and level of ICT usage

Table 6 shows a significant interaction between the ICT usage level and constraints associated with it, indicating the level of usage depends on the associated constraints. According to Ifabiyi & Abdulrahman (2023a), the high cost of buying airtime and data was a most severe factor limiting the use of ICTs (mobile) which hinder farmers from using them. Idu (2023) also agrees that there many obstacles to farmers using ICT in developing countries.

Table 6: Chi – square analysis between constraints faced while using and level of ICT usage.

Chi-Square Value	df
1.202*	1

Sources: Field Survey, 2020

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that all the yam producers in the study area were male, married, had primary education and in their active age. The yam producers had significant years of experience but do not belong to any cooperative society. Radio and mobile phones were the most available and most used ICTs by the respondents while television, newspaper and computer/internet were never used by the respondents. Accessibility to market information and contact with sales agent were the most glaring benefits of radio as ICTs. The major challenges to the use of ICT by the respondents was power outrage, network fluctuation, education level of farmers, high cost of ICTs facilities and inadequate training of extension agents on the use of ICTs.

The following were recommended based on the findings:

Need for Government to pay attention to power supply and all other infrastructural services to increase the usage of ICTs.

Farmers should be trained and encouraged to use ICT facilities for accessing information. Extension agents should also be empowered on e–extension services to farmers in Nigeria. Telecommunication companies should increase/improve network services for effectiveness and accessibility.

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ROLES OF STAKEHOLDERS IN FARMER-PASTORALIST CONFLICT PREVENTION AND RESOLUTION IN THE CONTEXT OF A RURAL COMMUNITY IN A DEVELOPING COUNTRY - NIGERIA

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ABSTRACT
Farmer-pastoralist conflict in Nigeria is a serious cause of concern for the nation's security, requiring various approaches and methods to get a lasting resolution. This paper investigated the roles of stakeholders in farmer-pastoralist conflict prevention and resolution in the context of a rural community in a developing country like Nigeria. Data was collected using key informant interviews with 45 stakeholders and were subjected to a stakeholder analysis. Results of the study revealed that most of the primary and external stakeholders lacked the power to enforce their roles. Additionally, the high interests of the primary stakeholders in conflict prevention and resolution could be due to them being the primary victims in these types of conflicts. On the contrary, some important secondary stakeholders had low interest in preventing and or resolving farmer-pastoralist conflicts despite their high powers. The paper recommended that sensitisation on state grazing laws, community customs, and ethical guidelines related to land use, livestock management, conflict management, and conflict resolution for stakeholders with low levels of interests should be fostered realistically, as it could help enhance awareness and facilitate adjudicating over conflict issues for speedy resolution and management in the study area.
Keywords: Farmer-pastoralist, conflict, stakeholder analysis, roles, Nigeria

INTRODUCTION
A common feature of livelihood systems around the world is the inter-connectivity by locations, ethnicities and their dependence on natural resources. As societies become increasingly connected, they are confronted with challenges that demand creativity and innovation. In some cases, such challenges inevitably engender conflicts as individuals seek to live their lives and interact in society. Such is the dynamics presented in farmers-pastoralists' communities across Nigeria. In the past, farmers and cattle pastoralists have coexisted inter-dependently, sharing common resources for farming and grazing with a manageable level of tolerance and accommodation (Madi *et al*, 2021). Unfortunately, this appreciable level of peaceful relationship has gradually transformed from that of cooperation, to competition and now, to conflict (Twumasi *et al*, 2021). Recent years have witnessed an emergence and escalations of farmer-pastoralist conflicts (F-PCs) which together with its management have become one of the challenges facing the country's security landscape today (Igwe, 2020), especially because these conflicts have in some cases escalated into serious humanitarian crisis situations.

Although, the causes of conflicts are multifaceted and interconnected, research have narrowed the reasons for F-PCs to two categories of causes. While most studies on F-PCs have generally held an assumption of a causal link between natural resource scarcity and F-PC (Brunnschweiler & Bulte, 2009; Moritz, 2010; Bukari, 2017; Madi *et al*., 2021), other studies, however, perceive the conflicts as a social phenomenon underpinned by the embedded ecological, economic, political, and social interactions of the everyday realities of their environments (Bukari, 2016; Moritz, 2010). Across the different strands of thought, there is a consensus that climate change has reinforced these F-PCs, especially in the context of increasing migration, commercialisation, commodification and individualisation of land and water resources (Benjaminsen *et al*., 2012; Moritz, 2010).

As a natural and inevitable phenomenon in life (Twumasi *et al*., 2021**),** conflicts cannot be eradicated completely. The most concerning aspects are their disaster outcomes which are characterised by physical losses (homes/farms destructions, casualties), economic losses (income/resources/yield), and socio-psychological effects (emotional exhaustion) (Adisa, 2012). Their culminations of which include weakening a community's social structure, a heightened level of insecurity, stunted economic development (Igwe, 2020) stalling development effort, and threatening food security. Hence, various stakeholders in Nigeria have been seeking, designing and adopting approaches/methods to resolve/manage these F-PCs. Unfortunately, their efforts have not gained significant lasting successes so far as evidenced by the frequent F-PCs across the country which resulted in 60,000 fatalities between 2001 and 2023 (Omogbolagun, 2023) and 2800 fatalities in Benue State in two years (Ogwuche, 2024).

There is a wide range of methods and instruments that constitute conflict management (Fogg, 1985). For simplicity, Twumasi (2021) suggested two broad categories: violent (force, coercion) and non-violent (negotiation, and mediation). In any case, successful outcomes involve careful coordination and cooperation among the various stakeholders concerned. These are defined as the individuals or groups with vested interests in the outcome of a particular situation (Chiloane, 2023). With regards to F-PC cases, these stakeholders can vary widely, including governments, non-governmental organisations (NGOs), local community leaders, religious leaders, law enforcement agents and individuals. Therefore, stakeholder engagement involves identifying, communicating with, and applying these parties for their recognition as crucial catalysts in achieving peace and solutions in conflict situations (Chiloane, 2023).

Conflicts are almost inevitable due to the dependence of individuals on common resources for their livelihoods and survival. In such cases, it is almost impossible to satisfy all stakeholders at all times, especially considering that these natural resources may be scare and limited. The rational for stakeholder involvement is to explore available opportunities for conflict management/resolution. Therefore, ways are needed with the hope that stakeholders can cooperate and agree to some level of reconciliation/resolution. Considering the devastating effects of conflicts, it is necessary to identify stakeholders: the people, groups or organisations that should be involved in meeting and agreeing to reasonable proposals without undermining the rights of any individuals/groups/communities. In this process, identifying stakeholders, understanding their involvement in these activities, understanding their existing relationship dynamics and exploring the possibilities for cooperation, could foster the process of management and/or resolutions.

Located in north-central Nigeria, Jigawa State has been experiencing its own fair share of F-PCs with cases dominating media outlets' headlines over the years (The New Humanitarian, 2008; Channels Television, 2020; Premium Times, 2021; Daily Trust, 2022). These conflicts are usually seasonal in nature as they occur in the onset of the rainy season during which the *Fulani* pastoralists migrate in search for pasture. The start of their migration from the dryer north coincides with the commencement of the rainy season in the southern part of the country and neighbouring country of Cameroon, and they return to the northern part at the onset of its rainy season (Mustapha & Usman, 2021). Areas in the state where these conflicts are frequent include communities around international borders and government designated international cattle routes (Mustapha & Usman, 2021). While available literature is replete with F-PC studies focusing on various aspects such as their causes (Joseph, 2023) and their consequences (Mustapha & Usman, 2021; Madi *et al*. 2021), this study addresses the gap in research by highlighting the roles of various stakeholders in a F-PCs. With a focus on Jigawa State, Nigeria, the objective of this study was to identify and understand the different individuals, groups, organisations, or entities that are involved in or affected by the occasional F-PCs. It mapped out their roles, interests and power dynamics, providing insights into how they may influence F-PCs and their resolutions.

Conflict Transformation Theory

This study adopts the 'Conflict Transformation Theory' (CTT), which is based on the concept of initiatives introduced by local actors as key stakeholders in driving sustainable peace in communities. In the individual, structural, relational, and cultural domains, peace-building is a long-term process of systemic transformation from conflict to peace (Lederach, 1997). The "middle out" approach, which divides a conflict society into three pyramidal categories of actors as top leadership, middle level leadership, and grassroots, is based on the idea of local owned peace-building (Pattenholz, 2015). Together, these groups gather resources for promoting peace (Lederach, 1997). Lederach (1997) emphasised the potential of grassroots and middle level leadership in building and maintaining peace for an extended length of time. Ultimately, reconciliation and the significance of mending damaged relationships are established by the CTT (Paffenholz, 2015). In the context of this paper, the CTT provides a useful guide in understanding local actions initiated to prevent and manage conflicts between pastoralists and farmers in Jigawa State. It highlights the crucial role of local stakeholders in initiating and sustaining peace-building initiatives to prevent conflict recurrence in future.

METHODOLOGY

The study was conducted in Jigawa state, situated in the north-western part of Nigeria and is located between latitudes 10^0 57' N and 13^0 03' N, longitudes 8º 08 E and 10º 37' E. It has a land area of about 22,210km^2 (2.2 million hectares). Average annual rainfall is about 700m and a mean annual temperature of about 25°C. Using an annual growth rate of 2.75%, the population of the State in 2022 was projected at 7,499,100 (City Population, 2024). Most parts of the state lies within the Sudan vegetation zone with the climate ranging between arid and semi arid. The state is considered to be agrarian as more than 90 percent of the working adults are engaged in agriculture as a means of livelihood. Jigawa State is blessed with large expanse of agricultural land, rivers and flood plains,

suitable for crops, livestock and fish production. The main rivers are Hadejia, Kafin Hausa and Iggi with several tributaries feeding extensive marshlands in the north-eastern part of the state. The combination of vast fertile land and water resources provides a favourable environment for crop and livestock production, including millet, rice, wheat, sorrel, sesame, cattle, sheep and goat. Hence, the economy of the state is largely characterised by informal agriculture-based economic activity. Over 80% of the population is engaged in farming at various scales and livestock rearing, however, pastoralism is unique to the *Fulanis* who are usually settled in the hinterlands. Languages commonly spoken in the state are *Hausa*, *Fulfulde*, and *Kanuri*. F-PCs in the state are concentrated around the resource-endowed locations like the fertile flood plains, river valleys and other water points which involve the right to ownership and access (Ajuwon, 2004). This explains why the conflicts are spread across almost the entire part of the state with popular conflict affected Local Government Areas (LGAs) being Miga, Jahun, Birnin Kudu (southern), Ringim, Garki, Maigatari (northern), Kaugama, Guri (eastern).

Pastoralists are individuals whose major source of livelihood is livestock herding and are important contributors to food production and food security in Nigeria. In this study, these pastoralists are categorised into two: Sedentary pastoralists who are resident almost permanently in specific locations and migratory pastoralists who do not have permanent locations nor possess assets like land, houses and bicycles and so are frequently in transit with their livestock in search of pasture for their livelihood.

A four stage purposive sampling approach was employed to target areas with prevalence of F-PCs in each stage of the sampling procedure. First was a selection of three out of the four administrative zones of Agricultural Development Programme (ADP) in the state. This was narrowed to one LGA from each of the three selected ADP zones out of which a further three villages were selected as presented in Table 1.

Table 1: Summary of sampled locations

SN	Zone	LGA	Village/Homestead
1	I - Birnin Kudu	Jahun	Harbotsohuwa
			Buduma
			Yankunam
2	II - Gumel	Ringim	Malamawar yandutse
			Zangon kanya
			Auramo
3	III - Hadejia	Guri	Adiyani
			Gagiya
			Majanguwa
Total	3	3	9

Source: Jigawa Agricultural and Rural Development Authority, 2018 (JARDA)

In the final stage, 45 leaders/staff representing stakeholders were selected randomly from a prepared sample frame established from a reconnaissance survey as shown in Table 2.

Table 2: Sample size of stakeholders in F-PCs in Jigawa state

SN	Stakeholders	Estimated number of stakeholders	Sample size	Proportion (%)
1	Religious leaders	40	6	13.33
2	Traditional leaders	30	6	13.33
3	Law enforcement agents	38	9	20.00
4	State and L.G. officials	25	5	11.11
5	Extension agents	10	4	8.89
6	Officials of pastoralists associations	15	10	22.22
7	Officials of farmers association	9	5	11.11
Total		158	45	100.00

Source: Preliminary survey, 2018

Qualitative primary data were sourced using key informant interviews (KIIs) to identify the roles of the stakeholders in conflict prevention/resolution in 2018.

Stakeholder analysis (Bruce, 2014) was used in this study. It is a tool for identifying the needs and concerns of different stakeholders. It involves identification of a project's key stakeholders, an assessment of their interests and the ways in which these interests affect the project and its viability. Stakeholder analysis is a process of systematically gathering and analysing qualitative information to determine whose interests should be considered when developing and/or implementing a policy or program (Bruce, 2014).

RESULTS AND DISCUSSION

The obtained information on stakeholders was analysed to determine their clusters based on different levels of interest and levels of power over the crisis.

Types of stakeholders

Following Bruce's (2014) categorisation, three types of stakeholders were identified as presented in Table 3: -

1. Primary Stakeholders: - These are individuals, groups and institutions ultimately affected by decisions and actions regarding certain project management, use, development and conservation. These include intended beneficiaries or those negatively affected – i.e. winners and losers. Examples are farmers and pastoralists.
2. Secondary Stakeholders: - Are intermediaries in the design and implementation of a certain management framework, programme or project. They can be sub-divided into funding, administrative, implementation and advocacy institutions and can also be more simply sub-divided into governmental, NGO and private sector institutions.
3. External Stakeholder: - They include those with other vested interests. Examples are politicians and traditional leaders.

Table 3: Stakeholders' roles and their perceived levels of interest in F-PC in Jigawa state

Stakeholders	Level of interest in preventing/resolving conflicts	Level of power in preventing/resolving conflict	Roles/Capacities	Nature of interest
Secondary				
State (S) and Local (L) Government (G) officials	Low	High	● L.G report potential conflict situations to S.G through their cabinets for immediate action. ● Assists farmers and pastoralist leaders in setting of conflict prevention committees.	2 (-)
Extension agents	High	Low	● Prevent conflict through creation of awareness among farmers and pastoralist to live in peace with one another.	1 (+)
Police	Low	High	● Timely response to resolve conflicts. ● Sets up farmers - pastoralists' conflict prevention and resolution committees which consist of representative of the farmers and pastoralist leaders & traditional leaders of the study area. ● The established committees report anticipated conflict situations to the police for immediate actions to be taken.	2 (-)

Stakeholders	Level of interest in preventing/resolving conflicts	Level of power in preventing/resolving conflict	Roles/Capacities	Nature of interest
Civil defence corps	High	Low	● Control conflicts ● Provides necessities for residents in times of arrival of migratory pastoralists in the LGAs of the study. ● They assist in the maintenance of peace and order and in the protection and rescuing of victims during periods of emergency. ● Provide necessary warnings for communities on arrivals of migratory pastoralists in the L.G.As of the study. ● Aids in restoring and maintaining order in distressed areas.	1(+)
Vigilante	Low	Low	● Sometimes get involved in pastoralists' confrontations given that they are members of the farming communities.	2(-)
Area court judges	Low	High	● Have constitutional power to punish offenders. ● Preside over conflict cases. ● Pass judgements such as compensatory payments for cattle encroached farmlands.	2(-)
Primary				
Officials of farmers associations	High	Low	● Creating awareness among their members to live in peace with the pastoralists. ● Warn members avoid encroaching designated cattle routes, watering points and grazing fields during farming activities. ● Possess low power in preventing/resolving conflict in the study area because they lack legal support.	1 (+)
Officials of pastoralist associations (MACBAN)	High	Low	● Warn their members to obey rules and regulations guiding their grazing activities. ● Set conflict prevention committee among the sedentary and migratory pastoralists.	1 (+)

Stakeholders	Level of interest in preventing/resolving conflicts	Level of power in preventing/resolving conflict	Roles/Capacities	Nature of interest
Crop farmers	Low	Low	• They commonly adopt negotiation approach in conflict resolutions • Avoid encroaching designated cattle routes, watering points and grazing fields.	
Sedentary pastoralists	High		• Prevent their livestock from trespassing farmlands and also • Prevent their livestock from consuming harvested produce stored in farmlands.	1 (+)
Migratory pastoralists	Low	Low		2 (-)
External				
Traditional leaders	High	Low	• Warn farmers against encroaching designated cattle routes, watering points and grazing fields during farming activities. • They appoint representatives of farmers and pastoralists to mediate and agree on rules that promote harmonious co-existence.	1(+)
Religious leaders	High	Low	• Preach to their communities on the importance of peaceful co-existence. • Advocate for reporting any pastoralist related incidents to nearest authority, rather than take laws into their own hands.	1(+)

Source: Field Survey Data, 2018
Key: 1(+) represents positive interest and 2(-) represents negative interest.

Stakeholders' roles and their perceived levels of interests in conflict prevention and resolution in the study area

It is important to understand two terms used in Table 3. Power, which measures the degree of ability of stakeholders to help or to impact the situation and interest, which measures their degree of support or opposition to conflict prevention/resolution efforts and goals. It can be seen from the table that the stakeholders are aware of their unique roles but some of them lack the power to enforce their roles. This is peculiar to the primary and the external stakeholders. However, it is not surprising that most of them have high interest in conflict prevention/resolution because they are usually the primary victims in these conflicts.

Unfortunately, most of the secondary stakeholders had low interest in preventing/resolving F-PCs despite their high powers. This attitude could influence the frequency of F-PCs in the study area since these types of stakeholders are responsible for delivering protection and justice to primary stakeholders. Their negative interest despite possessing high power is a catalyst for conflict because the primary stakeholders could easily violate the rules and regulations governing farming and grazing activities established by the secondary stakeholders, thereby inciting conflicts.

Stakeholders with high power but low interest means that although they have the capacity to affect conflict resolution processes and management

outcomes, their low interests in conflict prevention/resolution efforts are a cause of concern. This implies that such stakeholders may be a source of significant risk, thus, will require careful monitoring and management. Among these stakeholders are traditional leaders with questionable characters. For example, it was alleged that they sometimes sell parts of pastoralists' designated watering points and grazing fields to crop farmers for farming activities like irrigation, and as well as accept bribes from pastoralists, which consequently create conflicts between farmers and pastoralists in the study area.

Ideally, stakeholders that exhibit high levels of interests as well as possess high power are most desirable but unfortunately these were lacking in this study. Such stakeholders have the advantage of aligning with the goal of resolution and prevention efforts and so are critical to achieving them. They are the primary audience and should include both the immediate decision makers and opinion leaders i.e., the people whose opinion matters. On the other hand, stakeholders with high interest but low power, or vice-versa, should be kept informed about developments in prevention/resolution efforts. Ideally, they should be supporters of the efforts to achieve the goals of conflict prevention/resolution.

CONCLUSIONS AND RECOMMENDATIONS

As a complex issue challenging the security in agricultural communities across Nigeria, F-PCs have been on the rise in recent years with no lasting solution in sight. In Jigawa State, some of these cases had escalated to violent levels with reported casualties. Thus, a continuous engagement of stakeholders seems to be an effective way to manage such crisis situations. By applying a stakeholder analysis, the study identified multiple stakeholders with varying levels of power and interests. The empirical contribution of this paper is that it provides a realistic perspective of the diversity of stakeholders, highlighting the important roles they play in their efforts towards F-PC prevention and resolution which could help foster better coexistence in the study area. Although stakeholder have their individual roles, their interactions in a multi-stakeholder initiative process of decision-making, early warnings of potential conflicts, advocacy, enforcement of rules and punishment of offenders could enable a more harmonious system as well as a key to better address conflicts in the study area. To promote their efforts and strengthen their roles towards more peaceful conditions, some recommendations were proffered. Firstly, sensitisation on state grazing laws, community customs, and ethical guidelines related to land use, livestock management, conflict management, and conflict resolution for stakeholders with low levels of interests such as state and local government officials, police, vigilante and crop farmers and migratory pastoralists should be fostered realistically, as it could help enhance awareness and facilitate adjudicating over conflict issues for speedy resolution and management in the study area. Secondly, stakeholders with low power such as extension agents should be trained on the use of technology and provided with mobile phones or community radios to provide early warning systems for potential conflicts by disseminating information about seasonal movements, or potential resource shortage locations so as to avoid confrontations. Thirdly, stakeholders with low levels of power such as extension agents, civil defence corps and traditional leaders should be empowered by law enforcement agencies by recognising and formalising their roles as legitimate authorities, ensure that their decisions are backed by law, or provide them with the authority to engage in informal dispute resolution with the possibility of legal enforcement of outcomes.

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SOCIOECONOMIC FACTORS INFLUENCING ADOPTION OF POTATO VALUE CHAIN SUPPORT PROJECT (PS-PVCSP) TECHNOLOGIES IN PLATEAU STATE, NIGERIA

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ABSTRACT

The study examined the factors influencing adoption of potato value chain support project technologies in Plateau State, Nigeria. A multi-stage sampling technique was used in selecting 390 respondents. Data were collected using structured questionnaire and analysed using descriptive statistics and regression analysis. The result revealed a mean age, household size, farming experience and farm size of 38.0 years, 7.0 persons, 12.0 years and 0.7ha, respectively. majority (58.5%) of the respondents were female and 73.8% were married. Key technologies promoted by the project includes fertiliser application (52.7%), planting time (50.5%) and planting material (49.5%). This is followed by weeding (44.9%), harvesting (44.1%), planting depth (43.6%), method of planting (42.1%), and planting space (39.7%). The results of regression analysis of socio-economic factors influencing adoption of the PS-PVCSP recommended technologies reveal the adjusted R^2 value of 0.621, implying that the independent variables explained 62.1% of the variations in the dependent variable. The result revealed that age (r = 0.0820), education (r = 0.0950), household size (r = 0.470), farm size (r = 0.0920), farming experience (r = 0.320), capital (r = 0.580), sources of information (r = 0.380), and extension contact (r = 0.1570) were the factors significantly influenced the adoption of recommended production technologies promoted by the project. The study recommended that extension programmes should focus on training and educating farmers about the benefits and application of the recommended technologies, incentives such as subsidies for planting materials and fertilisers can encourage adoption among the age group while ensuring long-term sustainability. There should be accessible credit schemes specifically tailored for potato farmers to ease the procurement of fertilisers, improved planting materials, and other necessary and farmers should be encouraged to form and join cooperatives in other to enjoy economy of scale.

Keywords: Adoption, Technology, Potato Value Chain.

INTRODUCTION

Agriculture plays a fundamental role in economic growth, enhancing food security, poverty reduction and rural development. It is the main source of income for about 2.5 billion people in the developing world (Wandji, *et al*., 2021). Consequently, additional sustainable agricultural technologies such as improved agricultural technologies remain an important part of the efforts to boost food availability, crop production and improve soil quality in a bid to reduce food and nutrition insecurity which is currently threatening humans' right to food accessibility in developing countries (Sennuga and Fadiji, 2020).

Irish potato (*Solanum tuberosum L*.) is the world's fourth largest food crop in terms of production after maize, rice and wheat (Food and Agriculture Organisation Statistics) [FAOSTAT], 2016). It is thus, the largest non-cereal food crop cultivated in the world after it was first cultivated in South America and its global output is estimated at 388 million metric tonnes and the yield per hectare stands at 20,110.8kg/ha (FAOSTAT, 2019). In Africa, potato output stands at 25 million metric tonnes with yield per hectare of 13,215.4 kg/ha (Zhang *et al*., 2016). Algeria is the leading producer of Irish potato in Africa with a production 4,606,400 metric tonnes, followed by Egypt (4,325,480 metric tonnes) (FAOSTAT, 2019) and South Africa (2,450,540 metric tonnes). Over half of the global output is produced in developing countries, almost one-third of the output is harvested in China and India alone while China is the leading producer in the world with 99 million metric tonnes (FAOSTAT, 2019).

Farmers generally obtain very low crop yields because the local varieties used by farmers have low potential yield, most of the Irish potato is grown under rain-fed conditions and irrigation is used only in limited areas, little or no fertilisers are used and pest control is not adequate (Sennuga, *et al*., 2020). Nigeria's production level has been on the increase with the harvested area of Irish potato is 345.2 thousand hectares and production is as high as 1,284,368 tons while yield is 3,720.1 kg/ha (FAOSTAT, 2019). Technology is one of the resources for agricultural production.

Mhoja *et al*. (2021) define adoption as the integration of new technology into existing practice and is usually proceeded by a period of 'trying' and some degree of adaptation. For Rogers (2003), adoption is a decision of "full use of an innovation as the best course of action available". The process of adopting an idea or new innovation does not happen as a single unit act, but rather a mental process that consists of at least five stages namely; the awareness stage, the interest stage, the evaluation stage, trial stage and finally, the adoption stage (Rogers, 2013, Cheteni *et al*. 2014; Sennuga and Oyewole, 2020).

Adoption of agricultural technologies has been associated with higher earnings and lower poverty, improved nutritional status, lower staple food prices, increased employment opportunities as well as earnings for landless labourers (Sennuga *et al*. 2020). Adoption of improved technologies is believed to be a major factor in the success of the green revolution experienced by developed countries (Ravallion and Chen, 2014). Conversely, non-adopters can hardly maintain their marginal livelihood with socio-economic stagnation leading to deprivation (Jain *et al*., 2019).

Several efforts have been devoted to the development and transfer of new technologies to improve Irish potato production in Nigeria, one of which is the Plateau State Potato Value Chain Support Project (PS-PVCP). The project is an off-shoot of Fadama II Project Implemented from 2004 to June, 2013 and supported by the African Development Bank (AfDB). The project was conceived based on the impressive performance of Plateau State Project Office that came first among other States of Borno, Katsina, Jigawa and Kogi that participated in Fadama II Project. This necessitated the Federal Ministry of Finance (FMoF), the Federal Ministry of Agriculture and Rural Development (FMARD) and the African Development Bank (AfDB) to consider channelling the unutilised funds into a single State Project called Potato Value Chain Project because Plateau State produces over 90% of the Potato in the Country. The project become disbursement effective in November, 2017 and was closed in December, 2022 **(**Plateau State, (2023).

Socio-economic factors refers to the position of individual or group relative to others in the society (Idowu, 2017). The choice for appropriate technology according to Erhabhor and Nwagbo (2016), should be based on the socio-cultural considerations of the farmers with particular reference to simplicity of the technology, such that vast majority of the farmers can put it into practice at reasonable cost and returns. Also, World Bank (2018) recommended that for a project to be appropriate and viable, it should be formulated and designed so that it is sustainable under prevailing socio-economic conditions and be seen as an advantage to those intended to benefit from it. Socio-economic characteristics significantly influence the adoption of PS-PVCSP technologies, as they shape farmers' decision-making, resource allocation, and ability to manage risks.

Plateau State is potentially conducive for potato production due to its favourable weather conditions and good strategic location. One important way to increase agricultural productivity is through the introduction of improved agricultural technologies and management systems. This study therefore attempts to examine the factors influencing the adoption of the Plateau State Potato Value Chain Support Project (PS-VCSP) that previous studies did not address. Improved technologies are core to agricultural development and the improved technologies selected are compatible to local environment of the farmers in Plateau State. Specific to the Plateau State region, studies have not been conducted on the determinants factors influencing adoption of the PS-PVCSP. This research intends to address the gap in the literature by providing information on the factors influencing the projects recommended technologies among beneficiaries in Plateau State, Nigeria. The study attempted to**;**

i. describe the socio-economic characteristics of potato farmers in the study area;
ii. assess level of adoption of the technologies promoted by the project;
iii. determine the contributions of socio-economic characteristics to the adoption of technologies promoted by the project among potato farmers and

METHODOLOGY

Plateau State, located in north-central Nigeria, has a projected population of 4,864,480 million people in 2023 and covers 30,913 km^2. Its temperate climate (13°C–22°C), high-altitude terrain (up to 1,600m), and mean annual rainfall of 1,450mm favour Irish potato production. The State grows cereals like maize, yam, and rice alongside horticultural crops and supports livestock farming (NBS, 2022).

A multi-stage sampling procedure was used for the selection of the respondents for the study. In the first stage, all the 11 beneficiary Local Government Areas were purposively selected because they were the areas of project intervention, the selected LGAs were Bassa, Barkin Ladi, Bokkos, Jos East, Jos South, Jos North, Langtang North, Mangu, Pankshin, Riyom, and Shendam. In the second stage, 0.5% were proportionately selected across the list of beneficiaries in the 11 participating LGAs giving a total of 390 respondents as the sample size for the study. The sampling frame is the list of beneficiaries of PS-PVCSP obtained from the project office.

The study used primary data which were collected using a structured questionnaire. Information on beneficiaries' socioeconomic characteristics, type of technologies promoted as well as constraints to the Irish potato production were collected. Descriptive statistics such as frequency, percentage and mean were used to achieve objective i, ii and iv. On the other hand, multiple regression analysis (OLS) was used to achieve objective iii.

Table 4: Sampling size determination plan

State	LGA	Sample Frame	Sample Size (0.5%)
	Bassa	6,987	35
	Barkin Ladi	9,882	49
	Bokkos	12,508	63
	Jos East	5,041	25
Plateau	Jos South	7,405	37
	Jos North	2,504	13
	Langtang North	4,160	20
	Mangu	11,984	60
	Pankshin	5,017	25
	Riyom	7,509	38
	Shendam	5,003	25
Total		**78,000**	**390**

Source: PS-PVCSP Office (2022)

A regression model that contains more than one regressor variable is called a multiple regression model (Montgomery and Runger, 2017). An MLR model is "typically employed to measure the effects of the explanatory variables on performance" (Farina *et al*., 2015). It can accurately reflect the correlations among factors, indicate the degree of fit and improve the effect of the regression equation (Holmes and Rinaman, 2015). Linear relationships among the various factors can be analysed intuitively and promptly by using multiple sets of data. In this study, considering that farmers' adoption of technology is associated with multiple factors, it is effective and realistic to estimate the dependent variable by using the optimal combination of multiple independent variables, which can be accurately realized by an MLR model.

Model specification

$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \ldots. B_{10}X_{10} + u$

where;

Y= Adoption of recommended technology promoted (total no. of recommended technologies adopted by the respondent).

X_1 = Age (in years)

X_2 = Marital status (Single = 1, Married =2)

X_3 = Level of education (Number of years in formal schooling)

X_4 = Household size (number of people in household)

X_5 = Farm size (ha)

X_6 = Farming experience (number of years in potato production)

X_7 = Capital (₦)

X_8 = Sources of information (in number)

X_9 = Membership of cooperatives (Number of cooperatives a farmer belongs)

X_{10} = Extension contact (Number of visits the respondents)

U = Error term a = Constant

b_1- b_{13} = Regression coefficients

RESULTS AND DISCUSSION

Socioeconomic characteristics

Age is critical in agricultural production activities, essentially due to the labour-intensive nature and the drudgery associated with agricultural production. The result presented in Table 2 revealed that half (50%) of the respondents were within the age bracket of 31-40 years with a mean age of 38.0 years and standard deviation of 10.85. This implies that most of the respondents in the study area were still in their active years which is expected to enhance their farming activities as well as their ability to adopt PS-PVCSP for household food security. Analogously, Ekwe, (2019) reported the mean age of 42 years among potato farmers in Plateau State, Nigeria. This result conformed also to the findings of Nze and Azubuike (2016) that most of the potato farmers in Abia State were in their productive ages and were thus able to cope with the challenges of agriculture.

The results of sex distribution of the respondents indicated that more than half (58.46%) of the respondents were female and 41.54% were male. The findings indicated that there is more

female involvement in Potato Value Chain Support Project than male. In contrast, Wassihun *et al.* (2019) who found that Irish potato farmers were mostly male in Ethiopia. The result also is in disagreement with the findings of Otitoju and Arene (2010) that Nigerian Agriculture is dominated by men.

The findings in Table 2 also revealed that majority (73.08%) of the respondents were married in the study area. The result agreed with Dominic *et al.* (2021) that over 30% of Irish potato farmers in Nigeria were married. This implies that majority of the potato farmers were more committed in farming because of the need to supplement the family's means of livelihood as such they could adopt Good Agronomic Practices (GAP).

The results in Table 2 further revealed that 30.77% and 24.87% of the respondents had primary and secondary education with 25.64% that have never been to school. Education is key to development of any economy as it enhanced behavioural changes of individual and thus, facilitate for awareness. Technologies developed and disseminated usually suffer setbacks in places where the level of literacy is low. The implication of this findings is that there is likelihood for higher adoption of PVCSP technologies in the study area. The result also is in tandem with Wassihun *et al.* (2019) that most of the farmers possessed some form of formal education, predominantly at the secondary level.

Table 5: Distribution of respondents according age, sex and marital status and educational level (n= 390)

Variable (n=390)	Frequency	Percentage	Mean	Std. Dev.
Age (Years)				
20-30	75	19.23	38.0	10.85
31-40	197	50.51		
41-50	56	14.36		
51-60	40	10.26		
61-70	22	5.64		
Sex				
Male	162	41.54		
Female	228	58.46		
Marital status				
Single	80	20.51		
Married	285	73.08		
Divorced	10	2.56		
Widowed	15	3.85		
Educational Level				
Non-formal Education	23	5.90		
Never being to school	100	25.64		
Primary	120	30.77		
Secondary Education	97	24.87		
Tertiary Education	50	12.82		

Source: Field Survey, 2022

In a typical African community, the size of a household has great implication for labour availability and dissemination of information relevant to the household (Ekong, 2010). The result in Table 3 revealed that more than half (50.77%) of the respondents had household size of 6-7 persons with a mean household size of 7 persons and standard deviation of 4.8. This implies that there will be availability of family labour for potato production among the respondents since they have large household sizes. This agreed with the report of Ogheneruemu and Dominic (2020) that households size is a critical consideration for family labour in farming activities for African countries, due to the possibility of substituting or complementing hired labour with family labour for farm activities.

The findings in Table 3 also show that almost half (46.15%) had farm size that ranges from 0.6-1.0ha and 26.15% had 0.1-0.5ha with a mean farm size of 0.7 ha and standard deviation of 0.57. This implies that, the respondents in the study area were small scale farmers operating on a farm land that is less than 3 ha. The result agreed with the report of Aheisibwe *et al*. (2017) which put small scale farmers in Nigeria into the category 0.16 hectares. This may have negative implications for high level of PS-PCVSP adoption in potato production. However, Pailwar *et al.* (2010) opined that, large farmland ownership helps farmers to benefit from economies of scale, higher production and income and thus increase adoption of recommended technologies.

The result in Table 3 also revealed that, a reasonable proportion (41-79%) of the respondents had 11-15 years of experience in Irish potato value chain with an average years of farming experience

of 12 years and standard deviation of 5.58. The results imply that most of the respondents have acquired long years of farming experience in potato production and thus, are expected to adopt new practices that could enhance their productivity. In a related study Arimi (2014) opined that higher number of years of experience in farming helps farmers understand and tackle the complications of the enterprise. Similarly, Kabir and Ranais (2012) reported that farming experience increases the likelihood of adoption of best practices among farmers since they have both knowledge and adequate information.

Table 6: Distribution of respondents' according to household size, farm size and farming experience (n= 390)

Variable (n=390)	Frequency	Percentage	Mean	Std. Dev.
Household size				
1.00-5.00	94	24.10	7.0 persons	4.85
6.00-10.00	198	50.77		
11.00-15.00	68	17.44		
16.00-20.00	20	5.13		
21.00-25.00	10	2.56		
Farm size (ha)				
0.1- 0.5	102	26.15		
0.6-1.0	180	46.15	0.7 ha	0.57
1.1-1.5	55	14.10		
1.6-2.0	32	8.21		
2.1-2.5	21	5.38		
Farming experience (Year)				
1-5	55	14.10		
6-10	74	18.97		
11-15	163	41.79	12.0 years	5.58
16-20	65	16.67		
21-25	33	8.46		

Source: Field Survey, 2022

Respondents' access to extension and sources of information on project

Extension contact has been described as essential in driving adoption of improved agricultural innovations (Ekwe and Nwachukwu, 2011). The results in Table 4 showed that majority (67.69%) of the respondents had access to extension. The results were in disagreement to the findings by Osahon (2018) which indicated that most of the farmers in potato production had no contact with extension in South East, Nigeria.

The result in Table 4 also point out that almost half (46.21%) and a reasonable proportion (21.21%) of the respondents' sourced information from research institutes and co-farmers/friends, respectively. According to Namwata *et al.* (2010), the efficiency of co-farmers, friends/relations; extension agents and mobile phone providing information to farmers on improved Irish potato production technologies play a significant role in the level of farmers' adoption technologies.

Table 4: Distribution of respondents according to access to extension and source of information (n= 390)

Access to extension agent	Frequency	Percentage*
Yes	264	67.69
No	126	32.31
Sources of information		
Extension Worker	18	4.02
Village/Community Leaders	47	10.49

Co-Farmers/Friends	95	21.21
Research Institutions	207	46.21
Traders	66	14.73
Internet	15	3.35

Source: Field Survey, 2022 ***Multiple response**

Adoption of technologies promoted by the PS-PVCSP to farmers

The Plateau State Value Chain Support Project promoted some technologies and Good Agronomic Practices to the beneficiaries in the study area. As shown in Table 5 the major technologies promoted and adopted were fertiliser application (52.7%), planting time (50.5%) and planting material (49.5%). In contrast to this finding, Jacinta and Edward (2019) reported that Irish potato value addition technologies promoted to smallholder in Zomba, Malawi famers were on processing.

Table 5: Distribution of respondents according to adoption of technologies promoted by the PS-PVCSP (n= 390)

Recommended technologies	Frequency	Percentage*
Fertiliser application	205	52.7
Planting time	197	50.5
Planting material	193	49.5
Weeding	175	44.9
Harvesting	172	44.1
Planting depth	170	43.6
Method of planting	164	42.1
Planting space	155	39.7

Source: Field Survey, 2022 ***Multiple response**

Socioeconomic factors influencing adoption of the PS-PVCSP recommended technologies

The results of regression analysis of socio-economic factors influencing adoption of the project's recommended potato production technologies are presented in Table 6. According to the analysis, the adjusted R^2 value was found to be 0.621, implying that the independent variables explained 62.1% of the variations in the dependent variable. The fitness of the model was further confirmed by the low value of the standard error of the estimate (Standard Error = 0.001). Again, the overall significance of the model was depicted by the F-value which was significant at 1% level of significance. The significance of F-ratio shows that the regression result was statistically reliable. The result revealed that out of the ten (10) variables included in the regression model age ($p\leq 0.01$), education, household size ($p\leq 0.01$), farm size ($p\leq 0.01$), farming experience ($p\leq 0.05$), capital ($p\leq 0.05$), sources of information ($p\leq 0.05$), and extension contact ($p\leq 0.05$) were the factors that significantly influence the adoption of recommended potato production technologies promoted by the PS-VCSP at 1%, 5% and 10%, respectively, in the study area.

Coefficient for age (0.0820) was found to be positive and statistically ($p\leq 0.001$) significant at 1% level of significance. This might be attributed to the fact that majority of the farmers had more years of experience in potato value chain in the study area as buttressed in Table 3. This is in tandem with the report of Ajibefun (2016) that young farmers adopt less of technologies than older farmers. This could be due to their experience and knowledge accumulated over the years

The coefficient of household size (0.0470) was found to be positive and statistically ($p\leq 0.01$) significant at 10% level of significance. This means that as the household size increases, adoption of the project recommended technologies also increases. This could be due to the large household size under the care of the respondents which include the provision of food among others. Consequently, technologies promoted by the PS-PVCSP is expected to increased yield in the study area. This agrees with Adesope (2016), who opined that youth are less conservative in their nature and are more receptive to change.

Similarly, the coefficient of farm size (0.0920) was found to be positive and statistically ($p\leq 0.001$) significant in influencing adoption of the PS-PVCSP recommended technologies. This means that as the farm size increases, adoption of the project's recommended Irish potato production technologies also increases. Farm size has a bearing on the capacity of farmers to adopt improved technologies. Farmers with large farm size can afford to devote part of their farms for irish potato production without significantly affecting the total land left for the production of the staple food crops compared to small land holders. Ajibefun (2016) observed that land size is also one of the indicators of the level of economic resources available to farmers.

The coefficient of farming experience (0.0320) was found to be positive and statistically ($p \leq 0.05$) significant. This means that the more their farming experience, the higher the probability of adoption of the recommended Irish potato production technologies promoted by the PS-PVCS Project. Years of experience in farming is an important determinant of the respondents' level of farm income. Farming involve a lot of risks and uncertainties, therefore to be competent enough to handle all the vagaries of agriculture, farmers must have stayed in farming business for quite some time (Ogundele and Okoruwa, 2016).

The coefficient of capital (0.0580) was also found to be positive and statistically ($p \leq 0.05$) significant. This suggests that farmers who received credit adopted more of the project's recommended technologies than otherwise. Implying that availability of credit enhances adoption of recommended Irish potato production technologies. This is in accordance with a priori expectation that availability of credit enhances farmers' ability to purchase inputs embodied in a new technology. It also pays for hired labour needed for the use of these inputs and improved management practices. This corroborates with the earlier findings that the mean income of the respondents was ₦462,000 in Table 5.

The coefficient of information sources (0.0380) was found to be positive and statistically ($p \leq 0.05$) significant. This implies that information sources had a direct relationship with the adoption of the project's recommended production technologies. This result is confirmed by the earlier result which revealed that research institute constitute the major source of the respondents' sources of information (Table 3). Though information creates awareness and educate the farmers on application of technologies, consequences of wrong applications and the effect of timely applications. Such technical information is very useful during the trial stage of adoption process and are capable of leading to adoption of agricultural innovations. This could happen given the fact that cooperatives are among the strongest determinants that play important role in adoption of technologies. A similar finding was reported by Yigezu *et al*. (2015) on adoption of potato technology component.

The coefficient of extension contact (0.1570) was found to be positive and statistically ($p \leq 0.01$) significant. This implies that beneficiaries who have more access to extension services adopted more of the projects' recommended technologies than those with less access. Extension contacts enhances access to information on recommended practices, material inputs of the technologies such as fertilisers and credit for the purchase of inputs and payment of hired labour in addition to change in attitude. This finding is in consistent with the study of Deji *et al.* (2015), who found access to extension contact as a predictive factor of adoption behaviour of beneficiaries in developing countries.

Table 6: Factors influencing adoption of the project's recommended Irish potato production technologies

Variable (n=390)	Coefficients	Standard Error	T- value
Constant	18.301	2.559	7.1512***
Age	0.0012	0.0240	3.4167***
Marital status	0.1080	0.1700	0.6353NS
Education	0.0950	0.0530	1.7925*
Household size	0.0470	0.0220	2.1364**
Farm size	0.0920	0.0140	6.5714***
Year Farming experience	0.0320	0.0110	2.9091**
Capital (Naira)	0.0580	0.0270	2.1482**
Number of Information source	0.0380	0.0140	2.7143**
Membership of association	0.0260	0.0330	0.7878NS
Number of Extension contact	0.1570	0.0910	1.7253*
R square		0.817	
Adjusted R square		0.621	
F-value		12.3113***	
Standard error		0.001	

***** Significant at 1%, ** Significant at 5%, * Significant at 10%**

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that socio-economic factors significantly influence the adoption of Potato Value Chain Support Project (PS-PVCSP) technologies in Plateau State, Nigeria. Key factors such as age, education, household size, farming experience, capital, access to information, and extension contact positively impacted the adoption of promoted technologies, including fertiliser application, planting time, and improved planting materials. It is therefore recommended that; extension programmes should focus on training and educating farmers about the benefits and application of the recommended technologies, incentives such as subsidies for planting materials and fertilisers can encourage adoption among the age group while

ensuring long-term sustainability. There should be accessible credit schemes specifically tailored for potato farmers to ease the procurement of fertilisers, improved planting materials, and other necessary. Since access to information significantly affects adoption, government and project implementers should expand the reach of extension services. Regular field visits, community radio programmes, and farmer-to-farmer knowledge-sharing platforms can improve the flow of information about the technologies and farmers should be encourage to form and join cooperatives in other to enjoy economy of scale.

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SOCIOECONOMIC CHALLENGES AFFECTING FOOD SECURITY AMONG RURAL FARMERS IN DELTA STATE, NIGERIA

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ABSTRACT

The study looked at the socioeconomic challenges affecting food security among rural farmers in Delta State. Multistage sampling procedure was used to select two hundred and seventy-one (271) rural farmers. Structured interview schedule was used for data collection. Data were gathered on socioeconomic characteristics, types of conflicts, the problem of corruption on food security, and the extent of food security among farmers in the study area. The data were analysed using frequency counts, mean, percentages and PPMC. The result revealed that, conflict between farmers and herdsmen ($\bar{x}$ = 3.69) in the selected communities is very high. While corruption in government subsidies and aid programmes ($\bar{x}$ = 4.10) ranked highest corruption impeding the achievement of a food secured community, and the extent of food security among the farmers revealed that majority ($\bar{x}$= 1.92) don't have enough money sometimes to get healthy food. The result also revealed a significant negative relationship between conflict and food security (r (260) = -0.498, p <0.05). It was concluded that conflict and corruption contribute significantly to food insecurity. The study recommended that drastic reduction of conflict by government/community leaders in the selected communities will help improve farmer's livelihood and food security.

Keywords: Food security, conflict, corruption, rural farmers

INTRODUCTION

According to the Food and Agriculture Organisation (FAO), International Hunger, International Fund for Agricultural Development (IFAD), United Nations Children's Fund (UNICEF), World Food Programme (WFP), and World Health Organisation (WHO), 2018, one in nine people worldwide suffer from hunger. The number of food-insecure Nigerians increased significantly, from 66.2 million in Q1 2023 to 100 million in Q1 2024 (WFP, 2024), with 18.6 million facing acute hunger and 43.7 million Nigerians showing crisis-level or above crisis-level hunger coping strategies as of March 2024.

Nigeria is a country that pride-prides herself as the giant of Africa with a growing population of over 218.54,541,212 million with, a gross domestic product (GDP) of size (Constant 2015 $US $472.62 billion), a GDP per capita (Constant 2015 US $2162.6), and inflation rate 23.4 % (World bank, 2023). Yet, given these statistics by the World Bank, previous studies such as (Beyene, 2023), (Theodore *et al*., 2023), and Iwu (2020) agree that Nigeria still suffers from food insecurity.

Food security in Nigeria is suffering as a result of the substantial economic effects of conflict (Rockmore, 2015). Agricultural output is hampered by conflict, including many programs and support systems in place for the sector's expansion (Adelaja *et al*, 2019).

Conflicts around the world have been a main cause of a rise in global hunger in recent years, increasing food insecurity and limiting the livelihood options of rural populations (Da Silva & Fan, 2017). Despite the government effort to increase agricultural productivity and food production in Delta state, Nigeria, serious crises of conflicts have worsened the already existing challenges to production, such as conflict between farmers and herdsmen, communal conflict, political conflict, among many others as resulted to destruction of livestock, farmland and poor livelihood among rural farmers. Conflict can destroy agricultural production as well as increase unemployment, leading to food insecurity (George *et al*. 2019). Da Silva and Fan (2017) also explained that many conflicts are fought in rural areas, they target productive agricultural assets such as infrastructure, land, and livestock, and the economic impacts often hit agricultural sectors disproportionately hard.

Furthermore, corruption has also exacerbate food insecurity in a number of ways, which include decreasing the ability of small farmers to produce food or by forcing households to spend money on bribes that would otherwise go toward purchasing food. It is also anticipated that corruption would make the present food crisis worse. If corruption diverts public funds to private pockets, this leaves smaller budgets to fund social protection programmes that put food on tables and delivers worse services (Ben-Davies *et al*. 2014; Schmeer *et al*. 2015; Mutisya *et al*. 2016). Corruption can also be a driver of internal conflict, which in turn undermines a country's food security (Anser *et al*. 2021). Various corruption risks might arise at various stages along the food value chain. Land and water, two of the most vital resources for producing food, present many corruptions threats such as theft, land grabbing, and extortion. Government subsidies and aid programmes also have important corruption risks that can prevent them from reaching those in need.

Food insecurity has been fundamentally tied to a society's level of peacefulness and is a known driver of conflict. An adequate food supply is thus

widely acknowledged as a vital building block for stability. At the same time, this phenomenon is also observable in reverse; the presence of armed conflict has been shown to promote food insecurity through processes such as resource-rich areas being targeted by rebel groups; deterioration of land; redirection of resources; competition between groups, leading to food access challenges; disruptions to supply chains; recruitment of civilians to rebel groups; and disruptions to industry and economies (Mary *et al*., 2020; Eklund *et al*., 2017). According to Anser *et al*., (2021), in the West African sub-region, weak governance regarding food security enhancement mechanisms could decrease food security by 20 per cent.

Many research has been done on food security and other related studies but this research was conducted on socio-economic problems affecting food security among rural farmers in the study area. However, this study will be focusing on conflict and corruption as socioeconomic challenges affecting food security among rural farmers.

The general objective of this study was to examine the socio-economic challenges affecting food security among rural farmers in Delta state.

The specific objectives of the research were to;

i. determine the socio-economic characteristics of the rural farmers;
ii. examine the types of conflict among rural farmers;
iii. assess the problem of corruption on food security among rural farmers; and
iv. assess the extent of food security among farmers in the study area.

The research hypotheses tested:

$H_0$1: There is no significant relationship between conflict and food security among farmers in the rural communities of Delta State.

$H_0$2: There is no significant relationship between corruption and food security among farmers in the rural communities of Delta State.

METHODOLOGY

The study was conducted in Delta state. The state is known for economic activities in the Fish value chain, it is also known for production of yams, cassava, oil palm products and maize. It is a major exporter of petroleum, rubber, timber, palm oil and palm kernels. It has 17,698km^2 land area and a population of 4,112, 445 (2006 Pop. Census).

The Population of the study covers all the registered rural farmers in Delta State which are estimated to be 545,987; according to Delta State Agricultural and Rural Development Authority (DARDA).

The sample size for the study was determined using Raosoft (R) software. The sample size was based on a margin error of 5% with 90% level of confidence, based on the foregoing computation; the sample size of 271 was used in the study.

Furthermore, in order to draw the sample from the population, multi-stage sampling technique was used for this study. First stage involved the purposive selection of two Local Government Areas in each of the three (3) senatorial zones. They are Ethiope east and Uvwie LGAs (Delta Central), Ndokwa east and Aniocha North L.G.As (Delta North) and Isoko North and Isoko south (Delta South), making it a total of Six Local Government Areas for the study. For this research, this selection was premised on the result of recognizance survey and briefing from Agricultural Development Authority (DARDA) which revealed their comparative advantage in agricultural production and the consequences of conflict and food insecurity they experience during and after farming. Secondly, in each of the Local Government Area, random selection of two (2) communities per local government was selected making it 12 communities for the study.

Primary data was obtained by structured interview schedule based on the research objectives. Descriptive statistics involved the use of frequency, percentage, and mean score while the hypothesis was tested using Pearson Product Moment Correlation (PPMC).

The types of conflict among farmers were measured by a 4 points Likert-type scale of very High, High, Moderate and Very Low with weighted mean of 2.5 was considered as the cutoff point, which implied that any variable that is greater or equal the threshold (2.5) was considered to be very high in the community, while the variable that is less than the threshold (2.5) was considered very low. The responses were weighted on the level of occurrences (from very high to very low).

The extent of household food security among farmers was measured on a five-point scale of strongly agree, agree, undecided, disagree, strongly disagree. Fourteen negative questions were asked. They are based on farmers' anxiety over food, fluctuations in the quantity of food for adults and children, and anxiety over consequences of reductions in food intake for adults and children according to FANTA‟s Household Food Insecurity Access Scale (HFIAS) of the United States Agency for International Development (USDA) (2012).

Problem of Corruption among farmers was deduced from 5 points scale of strongly agree, agree, undecided, disagree, and strongly disagree, with a cutoff point of weighted mean of 3.0, which implied that any variable that is greater or equal the threshold (3.0) was considered to be a major problem of corruption in achieving food security among rural farmers in Delta State, while the variable that is less than the threshold (3.0) was considered not a problem. The responses were weighted on the level

of agreement of respondents to the question ranging from strongly agree to strongly disagree

RESULTS AND DISCUSSION

Socioeconomic characteristics

Table 1 shows that majority (56.5%) of the respondents were female; this indicates that there are more female farmers in agriculture than male in Delta state. This finding was consistent with Okonya (2014), which reported that, women in sub-Saharan Africa produce 70–75% of the agricultural food in rural regions.

The age distribution of the respondents revealed that, those aged 60 to 69 years had the highest percentage with 30.8, this indicated that respondents aged 60-69 participated more in faming activities in the study area, which is not appropriate because having more older farmers will reduce productivity and can increase food insecurity. This result is consistent with Ugwoke *et al*. (2005)'s findings, which indicated that since farmers' production is thought to decline with age, this is not a useful index to boost productivity.

The widows(er) participated more in the survey at 65.00%, this may be because of death or migration of spouse to the urban area which have brought about low labour. On the other hand, this may also increase food insecurity in the selected area. This is in consonance with the findings of Muller (2005); one of the impacts of epidemic at household level experienced is labour shortages and has an impact on people's labour at several levels like supply, productivity and opportunities.

The findings also showed that, those with no formal education were 41.9%, This indicate the level of illiteracy among rural farmers are higher as majority of the farmers can neither read nor write which can instigate food insecurity in terms of adoption of improved technology and proper handling of agricultural produce. This is consistent with Olayide *et al*. (2003), who suggested that one of the main causes of older farmers' poor adoption rates of technology is their low educational attainment.

The income frequency was also reported, higher proportion (33.5%) of the rural farmers earned between #31,000 - #40,000 per month. The outcome demonstrates that, in comparison to the usual poverty limit of one dollar per day, farmers' annual income is typically low. However, the data also demonstrate that inadequate capital and a lack of essential infrastructure have a negative impact on local farmers' incomes. The result conforms to the works of (Ibekwe *et al*., 2010) who also found a positive correlation between infrastructure and farmers income.

Table 1: Socio-economic characteristics of the Respondents

Variables		Percentage
Gender	Male	43.9
	Female	56.2
Age	20-29 years	2.7
	30-39 years	12.7
	40-49 years	13.1
	50-59 year	17.3
	60-69 years	30.8
	> 69 years	23.5
Marital Status	Single	6.5
	Married	23.1
	Divorced	5.4
	Widow(er)	65.0
Educational Qualification	Non-formal	41.9
	Primary school	30.0
	Secondary school	19.2
	Tertiary	8.9
Years of farming experience	< 10 years	6.9
	11-20 years	37.7
	21-30 years	45.4
	> 30 years	10.0
Income/month	<#10,000	7.3
	#11,000 - #20,000	13.5
	#21,000 - #30,000	21.2
	#31,000 - #40,000	33.5
	>#41,000	24.6

Source: Fieldwork, 2023

Types of conflict among rural farmers

The results in Table 2 reveals that the highest mean score ($\bar{x}$) of 3.69 indicated that conflict between farmers and herdsmen in the selected communities is very high, conflict over indebtedness of farmland ($\bar{x}$=3.59), communal conflict ($\bar{x}$=3.27), conflict arising over ownership of farmland ($\bar{x}$=3.27), political conflict ($\bar{x}$=3.22), conflict arising from spouse ($\bar{x}$=3.02), conflict among farmers ($\bar{x}$=2.62), and family conflict ($\bar{x}$=2.62). The grand mean score of 3.02 indicated that the respondents agreed to a very large extent that conflict have a significant effect on farming activities and it's one of the major challenges of food security. Hence, conflict in the selected communities has resulted to loss of agricultural produce, life, properties, reduce farmer's income and pose more treat to food security. This is consistent with (George *et al*., 2019) who stated that, conflict can destroy agricultural production as well as increase unemployment, leading to food insecurity.

Table 2: Types of conflict among rural farmers

Types of conflict	($\bar{x}$)
Conflict between farmers and herdsmen	3.69
Communal conflict	3.27
Family conflict	2.62
Conflict among farmers	2.62
Political conflict	3.22
Religious Conflict	1.87
Conflict arising from spouse	3.02
Conflict over indebtedness of farmland	3.59
Conflict arising over ownership of farmland	3.27

Source: Fieldwork, 2023

Problem of corruption on food security

The highest ($\bar{x}$=4.10) indicates that corruption in government subsidies and aid programmes has an effect on food security, embezzlement of funds allocated to farmers ($\bar{x}$=3.89), Theft of agricultural produce ($\bar{x}$=3.84), Bribery before getting irrigation technology ($\bar{x}$=3.82), bribery before acquiring the allocated incentive by the government ($\bar{x}$=3.75), bribery before getting land title and usage ($\bar{x}$=3.68), not given incentive to the targeted group (farmers) during empowerment programme ($\bar{x}$=3.66), undergoing any form of bribery to participate in empowerment programme ($\bar{x}$=3.65). The overall mean score of ($\bar{x}$=3.76) denotes the degree of agreement among rural farmers regarding the issue of corruption. They all agreed that corruption is one of the main factors affecting food security, and that the costs associated with securing other services (such as paying bribes for technologies, fertilisers, and participation in empowerment programs) put less money in the pockets of low-income families, which in turn reduces their ability to buy food. This is consistent with (Tacconi & Williams, 2020), who claimed that because they have less authority and are more likely to be required to pay bribes, impoverished farmers are more impacted by corruption.

More so, corruption deprive them of standard education, good standard of living and also divert public funds allocated for farmers to private pockets (embezzlement) this is as a result of weak governance and also have a serious effect on food security. This is in accordance with the findings of (Anser *et al*. 2021), which suggested that inadequate governance over methods for enhancing food security could reduce food security in the West African sub region.

Table 3: Respondents' responses on the problem of corruption among rural farmers

The problem of corruption among rural farmers	Mean ($\bar{x}$)
Corruption in government subsidies and aid programmes	4.10
Undergoing any form of bribery to participate in empowerment programme	3.65
Not given incentive to the targeted group (farmers) during empowerment programme	3.66
Bribery before acquiring the allocated incentive by the government	3.75
Sub-standard technology giving by government	3.57
Embezzlement of funds allocated to farmers	3.89
Theft of agricultural produce	3.84
Land grabbing by individual, companies and government	3.68
Bribery before getting land title and usage	3.68
Bribery before getting irrigation technology	3.82

Source: Fieldwork, 2023

Extent of food security

Table 4 shows the participants' responses on food security among rural farmers. The mean score of ($\bar{x}$=1.92) indicated that rural farmers don't have enough money sometimes to get healthy food, the mean score of ($\bar{x}$=1.89) indicated that farmers are not able to eat healthy and nutritious food, the mean score of 1.87 indicated that rural farmers Run out of food sometimes, thus, indicating that majority of the respondent are not food secure because a food secure person must have the four key point of food security which are, accessibility, affordability, stability and availability. This is in tandem with World Food Summit in 1996, who described Food security as, "a situation in which all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious foods that meet their dietary needs and food preferences for a healthy life.

Table 4: Respondents' responses on food security among rural farmers

Food insecurity situations	Mean
Worried about not eating to satisfaction	1.81
Not able to eat healthy and nutritious food	1.89
Run out of food sometimes	1.87
Spend a day Sometimes without eating	1.80
Don't have enough money sometimes to get healthy food	1.92
In some cases, you don't eat balance diet	1.59
Sometimes you reduce the portion of your meal because you don't have enough money to get more	1.72
Eating less than three times daily because you don't have enough money	1.80
Sometimes, you don't have access to healthy and nutritious food	1.83

Source: Fieldwork, 2023

Hypotheses of the study

Table 5 shows the Pearson Product Moment Correlation coefficient on the relationship between conflict and food security. It revealed that there is a significant negative relationship between conflict and food security such that an increase in conflict leads to a decrease in food security, r (260) = -.498, p<0.05). Therefore, hypothesis that there is no significant relationship between conflict and food security was not supported.

This finding is supported by empirical work both within and outside Nigeria, in the study conducted by Ujunwa *et al*., (2019) on armed conflict and food security in Africa, it was found that food security is largely affected by conflict that is happening in specific parts of West Africa which is in line with the result of this study. The result brings to the fore, the urgent need to reevaluate the conflicts across various regions (mostly in rural areas) in Nigeria. The result is also consistent with the study carried out by Sandra (2023), who found a close association between conflict and food security further supporting the results of the current study.

Table 5: Pearson Product Moment Correlation on the relationship between conflict and food security

Variables	*N*	*M*	*SD*	*Df*	*R*	*r2*	*P*
Conflict	260	3.02	.90				
				258	-.498	.25	.001
Food Security	260	1.80	.44				

Table 6: Pearson product moment correlation coefficient on the relationship between corruption and food security

The result revealed that there is a significant negative relationship between corruption and food security such that an increase in corruption leads to a decrease in food security, r(260) = -0.438, p< 0.05). Therefore, the hypothesis which states that there is no significant relationship between corruption and food security was not supported.

This implies that, as corruption increases in rural areas and the country at large, food security is likely to decrease. For example, the work of (Helal *et al*., 2016) on the relationship between corruption and food security at a global scale indicated that amongst diverse population demographics, the absence of corruption has a positive impact on food security while the increasing presence of corruption, reduces the level of food security. This is possible largely because corruption affects the livelihood and well-being of the people especially those living below the middle-class line. This notion was also supported by a recent study by (Olabiyi, 2022) that examined the effect of bureaucratic corruption on household food insecurity and found that corruption within public institutions and the country at large affects household food insecurity. Hence, further buttressing the point that corruption is contributing significantly to the levels of food security.

Table 6: Pearson Product Moment Correlation on the relationship between corruption and food security

Variables	*N*	*M*	*SD*	*Df*	*R*	*r2*	*P*
Corruption	260	3.76	.41				
				258	-.438	.19	.001
Food Security	260	1.80	.90				

CONCLUSIONS AND RECOMMENDATION

Some Socio-economic challenges affecting food security among rural farmers were brought to the fore in the study. Conflict and corruption also contribute significantly to food insecurity. The study recommended that drastic reduction of conflict by government/community leaders in the selected communities will help improve farmer's livelihood and food security. Additionally, the government should formulate policy that will guide the distribution of incentive/palliative among rural farmers during empowerment programmes.

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ACCESS TO PRODUCTIVE RESOURCES AND SERVICES AMONG AGRICULTURAL COOPERATIVES CROP FARMERS IN OKE-OGUN AREA OF OYO STATE, NIGERIA

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ABSTRACT
The need to access productive resources and services amid present dynamics and competing demands in production inform farmer's membership of agricultural cooperatives, however, this is not automatic. The study investigated access to productive resources and services among agricultural cooperatives crop farmers in Oke-Ogun area, of Oyo state, Nigeria. A total of 180 respondents served as sample subjects and were selected through multistage sampling procedure. Loan ($\bar{x}$ =1.41), farm equipment (non-mechanized) ($\bar{x}$ =1.40) and seeds/seedlings ($\bar{x}$ =1.34) ranked highest as productive resources/services accessed while loan ($\bar{x}$ =1.52), seeds/seedlings ($\bar{x}$ =1.41), herbicides and pesticides ($\bar{x}$ =1.40) ranked highest as productive resources/services available to the respondents. Primary among the challenges associated with operating agricultural cooperatives were low capital base ($\bar{x}$ =0.90) and poor management of the cooperative by its leaders ($\bar{x}$ =0.89). Significant relationship existed between benefits derived from agricultural cooperatives (r= 0.614, P= 0.049) and accessibility to productive resources in agricultural cooperatives. The study recommends an increase in the capital base of agricultural cooperatives and increased oversight by its regulators to enhance its operations and outcomes.
Keywords: Access to productive resources, agricultural services, agricultural cooperatives and Oke-Ogun region.

INTRODUCTION

Agriculture is a key activity for Nigeria's economy after oil. These activities provide a form of livelihood for many Nigerians, whereas the income generated by oil reaches a restricted share of the population. However, in rural areas more people engage in agricultural practices unlike in urban areas (Varrella, 2000). Despite the contribution to the economy, Nigeria's agricultural sector is faced with many challenges which affects its productivity. These challenges include poor access to land, low level of irrigation farming, climate change and land degradation, low technology, high production cost , limited financing, high post-harvest losses and poor access to markets among others . Agricultural cooperative society is defined as a business organisation in which a group of individuals who have common interest agreed to pool their resources together for production or to distribute goods and services for the purpose of making profit and maintaining the welfare of members. They play a key role in linking farmers to markets, providing a collective platform for negotiating with buyers, offering aggregating, marketing and processing services to their members (ADB, 2018).

A cooperative society is a voluntary association of individuals having common needs who join hands for the achievement of common economic interest. It aims to serve the interest of the poorer sections of the society through the principle of self-help and mutual help. The main objective is to provide support to its members. People come forward as a group, pool their individual resources, utilises them in the best possible way and derive some common benefit out of it. According to Chambo (2009), agricultural cooperatives create the ability for the supply of required agricultural inputs so that production of commodities is done timely to enhance productivity. They also provide an assured market for commodities produced by isolated small farmers in the rural areas. Agricultural cooperatives help in reducing production cost by organising bulk input purchase for their members (Olabisi, 2010). They are useful in overcoming barrier to access information, services and markets for high value products; they also assist small scale farmers in solving land, labour and capital problems.

The concept of agricultural cooperatives in Nigeria is rooted in the principles of cooperation, solidarity, and collective action. Agricultural cooperatives are formed by farmers who share common interests and objectives, such as accessing inputs, credit, technology, markets, and improving their overall agricultural productivity and profitability (Abdullahi & Ashraf, 2020). The formation of agricultural cooperatives allows farmers to pool their resources, knowledge, and skills, creating a platform for joint decision-making and coordinated efforts. A cooperative is a special type of corporation that is owned and controlled by those who use its service. In furtherance of the mutual benefits, members finance and operate the business. By working together members may be able to meet objectives that they could not meet as individuals. Hence, the financial returns to individual operators may be greater than they would without cooperative effort. Live any other corporation under state law, a cooperative has articles of incorporation and by-laws that govern its actions. It has a n elected board of directors and is usually managed on a day-to-day basis by professionals who function under policy set by the board (Oregon State University Extension Service, 2018).

Oke-Ogun area of Oyo state is given the appellation "food basket of the state", owing to its contribution to food production and food security in the state. However, owing to climate variations and its attendant adverse effects lately, crop farmers in the area were faced with the impact of climate change. This was occasioned by drought. this led to huge devastating effect on the crop output resulting to crop failure and loss. However, the need to pick-up production activities and bounce back to business led to the huge reliance on agricultural cooperatives by farmers for productive resources and services. It is envisaged that their patronage of agricultural cooperatives will bring a sigh of relief to the farmers and reduce the pressure on farmers demand for formal funding sources and other sources of productive resources/ services that are not agriculture oriented. It is against this background the study investigated the study investigated access to productive resources and services among agricultural cooperatives crop farmers in Oke-Ogun area, of Oyo state, Nigeria. The specific objectives are:

i. determine the accessibility to productive resources/services in the agricultural cooperatives:
ii. determine the availability of productive resources/services in the agricultural cooperatives;
iii. identify the benefits derived from the agricultural cooperatives;
iv. identify the challenges associated with operating the agricultural cooperatives.

Hypotheses of the study

$H_0$1: There is no significant relationship between benefits derived as members of agricultural cooperatives and accessibility to productive resources and /services in agricultural cooperatives crop farmers in the study area.

$H_0$2: There is no significant relationship between challenges associated with operating the agricultural cooperatives and accessibility to productive resources/services in agricultural cooperatives crop farmers in the study area.

METHODOLOGY

The study area is Oke-ogun in Oyo State. It is one of the five geo-political zones in Oyo State, they are Ibadan, Ibarapa, Ogbomosho, Oyo and Oke-Ogun. It covers an area of about 63% of the total landmass of the state. It covers an area of about sixty three percent of the total landmass of the state. It is located within latitude $7^0$70' and 9^0 N and longitude $2^0$60' E to $4^0$20' E. It has a total land area of 15, 193,320 km^2. It comprises of ten (10) local government areas i.e., Iseyin, kajola, Iwajowa, Itesiwaju, Atisbo, Saki East, Saki West, Oorelope, Irepo and Olorunsogo. The vegetation prominent is derived savanna with rainfall range between 25 ^{0}C – 37^{0}C. Dry season occurs from November to February when the dry dust laden blows from the Sahara Desert. The area is endowed with wide expanse of fertile land suitable for the cultivation of yam, millet, guinea corn, cassava, cowpea, maize, sorghum etc.

The target population of the study were all arable crop farmers that are members of agricultural cooperative in Oke-Ogun area of Oyo State. Multi-stage sampling procedure was used in the selection of sample subjects for this study. The first stage was the purposive sampling of fifty percent (50%) of the ten the Local Government Areas that make -up the Oke-Ogun region of Oyo State, these Local Government Areas have preponderance in arable crop production compared to other areas. In the second stage there was the random sampling of fifty percent (50%) of the total number of twenty four registered agricultural cooperatives across the five selected Local Government areas sampled, this gave a total of twelve agricultural cooperatives. The last stage involved the random sampling of 15 respondents each from the agricultural cooperatives initially sampled, having observed an almost equal membership population. This gave a total of 180 respondents who are members of the agricultural cooperatives.

Variables assessed include accessibility to productive resources and services and availability of productive resources and services. Accessibility of these productive resources/services was measured as frequently accessed, occasionally accessed and never accessed. These operational terms were assigned 2, 1 and 0 scores respectively. The weighted mean score for each item was computed and its average was used as decision to categorize the productive resources and services as either assessed or not accessed. The availability of productive resources/services was measured as always available, seldom available and unavailable, these operational measures were assigned scores of 2, 1 and 0 respectively. Furthermore, the weighted mean for each item was computed and its average was used as decision to categorize the productive resources and services as either available or unavailable. Other variables investigated were benefits derived from agricultural cooperatives and challenges associated with operating agricultural cooperatives. The benefits derived were measured as huge benefit, moderate benefit and not a benefit, scores of 2, 1 and 0 was assigned respectively. Challenges associated with operating agricultural cooperatives was measures with response options of not a challenge, mild challenge and not a challenge with scores of 2, 1 and 0 assigned respectively. In both cases the weighted mean average was used to rank and the indices in respect of benefits derived and severity of challenge. Data was analysed by

descriptive and inferential statistics. Statistical Package for social sciences (SPSS) 25 α = 0.05 level of significance.

RESULTS AND DISCUSSION

Accessibility to productive resources and services in agricultural cooperatives

Table 1 reveals that loan ($\bar{x} = 1.41$), farm equipment (non-mechanised) ($\bar{x} = 1.40$), seeds/seedlings ($\bar{x} = 1.34$) ranked highest as productive resources/services accessed by the respondents. The foregoing establishes the priorities of the agricultural cooperatives. It is tenable to posit that these productive resources and services are of primary concern to farmers. Loans provide vital launch pad for farmers to take advantage of the demand and supply dynamics along their production value chain. It is equally acknowledged that considering urgent need to support their scale of business and deface the utilisation of crude tools in carrying out their operations is of prime importance. It is also noted that the monetary demand for these productive resources are somewhat affordable hence its access by farmers and by extension fulfilling the objective of establishing the agricultural cooperative. This notion is consistent with the view of Oloyede *et al.* (2000) that small-scale farmers often face challenges in accessing essential resources, such as credit, inputs (seeds, fertilisers, pesticides), machinery, and technical knowledge .

Other productive resources/services accessed were extension services ($\bar{x} = 1.24$), Information and Communication Technologies ($\bar{x} = 1.09$), and fertiliser ($\bar{x} = 1.08$). Their access to these resources and services further attests to the quest of farmers for enhanced service delivery, hence the need to explore agricultural extension and advisory services for enhanced production outcome. Through this they are acquainted with requisite knowledge along their enterprise endeavour. Olayiwola and Sanusi (2020) attest that the benefit of agricultural cooperatives extends beyond resource access cooperatives foster innovation by creating a platform for knowledge sharing and collaboration among farmers. Their access to Information and Communication Technologies will further enable them to harness the numerous potentials available in the digital space. This includes but is not limited to deployment of its devices for personal communication, assessing the demand and supply of goods and services for their enterprise activity and other internet enabled ancillary services. Furthermore, the role of fertiliser as an important production resource in their enterprise would have informed the priority given by the agricultural cooperative hence accounting for the extent of access received.

Table 1: Distribution of respondents according to accessibility to productive resources and services in agricultural cooperatives

Productive Resources /Services	Always Available %	Seldom Available %	Unavailable %	Weighted Mean
Productive resources				
Loan	49.2	42.5	8.3	1.41
Farm equipment (mechanized)	12.5	42.5	45.0	0.67
Farm equipment (non-mechanized)	44.2	45.8	5.8	1.34
Seeds/Seedlings	44.2	51.7	4.2	1.40
Herbicides and Pesticides	36.7	57.5	5.8	1.30
Information and Communication Technologies	20.0	69.2	10.8	1.09
Fertiliser	21.7	65.0	13.3	1.08
Productive services				
Extension Expert Services	30.0	64.2	5.8	1.24
Irrigation Services	12.5	8.3	79.2	0.33

Source: Field survey, 2022.

Availability of productive resources and services in agricultural cooperatives

An assessment of availability of productive resources and/services reveals that loan ($\bar{x} = 1.52$), seeds/seedlings ($\bar{x} = 1.41$), herbicides and pesticides ($\bar{x} = 1.40$) ranked highest as productive resources available to the respondents (Table 2). The data reflects that these resources are some of the prime objectives for which these agricultural cooperatives are set up to achieve, hence the availability of these productive resources and services are the plausible deliverables expected of them. This view is consistent with Amaza and Oladeebo, (2018) who reported that by joining forces, agricultural cooperatives provide its members with improved access to credit, machinery, seeds, fertilisers and technical knowledge. Also available were Information and communication Technologies ($\bar{x} = 1.39$) and fertiliser ($\bar{x} = 1.29$). The growing concern, appreciation, application and advancement in the digitalization of agricultural activities are plausible reasons for embracing Information and Communication technologies as part of its productive resources by agricultural cooperatives.

The role of soil health and fertility cannot be overemphasized as a key component in the entire crop production process, hence the availability of fertiliser as a productive resource by agricultural cooperatives is also a notable priority.

Table 2: Distribution of respondents according to availability of productive resources in agricultural cooperatives

Productive Resources /Services	Always Available %	Seldom Available %	Unavailable %	Weighted Mean
Productive resources				
Loan	60.8	30.8	8.3	1.52
Farm equipment (mechanized)	20.0	65.0	15.0	1.05
Farm equipment (non-mechanized)	19.2	64.2	16.7	1.02
Seeds/Seedlings	49.2	42.5	8.3	1.41
Herbicides and Pesticides	52.5	24.2	23.3	1.40
Information and Communication Technologies	4.2	30.8	65.0	1.39
Fertiliser	52.5	24.2	23.3	1.29
Productive resources				
Extension Expert Services	15.0	56.7	28.3	0.86
Irrigation Services	12.5	56.7	28.3	0.32

Source: Field survey, 2022

Benefits derived from agricultural cooperatives

Result of analysis in Table 3 reveals that increased savings culture ($\bar{x}$ =0.71), protection of interest ($\bar{x}$ =0.70), acquisition of loan ($\bar{x}$ =0.65) were most prominent among the benefits derived from agricultural cooperatives. It is noted that one of the cardinal objectives of agricultural cooperatives is the harnessing of resources, hence the cooperative platform provides appropriate mechanism to increase their savings through increased savings culture. Owing to collective interest of its members, members of agricultural cooperatives come together to protect their interest, hence they are further driven to keep to the rules and regulations guiding the cooperatives in a bid to ensure its sustained existence. Also established is the pulling of resources (loans) from the cooperative. This is to boost their enterprise and livelihood activities.

Other benefits derived from the agricultural cooperatives as described were friendly interest on loans ($\bar{x}$ =0.64), increased productivity ($\bar{x}$ =0.61) and prompt access to farm inputs ($\bar{x}$ =0.61). The friendly interest charged on loans compared to other funding outlets assessed by the farmers is one of the plausible benefits of their membership of agricultural cooperative. Furthermore, increased productivity of their enterprise when compared to the inputs and time invested into the venture was also acknowledged as a benefit derived from the cooperative. The prompt access to farm inputs gives credence to the importance they place on these inputs, acknowledging the role these inputs play in carrying out their job function is established to be the derived from them.

Table 3: Distribution of respondents according to benefits derived from agricultural cooperatives

Benefits derived from agricultural cooperatives	Huge benefit %	Moderate benefit %	Not a benefit %	Weighted Mean
Acquisition of loan	10.0	45.8	44.2	0.65
Prompt access to farm inputs	15.0	31.7	53.3	0.61
Access to extension services	2.5	52.7	45.8	0.56
Increased productivity	15.8	30.8	53.3	0.62
Limited liability	12.5	43.3	50.8	0.61
Access to corporate power	12.5	29.2	58.3	0.54
Increased savings culture	25.0	21.7	53.3	0.71
Friendly interest on loan	16.7	30.8	52.5	0.64
Protection of interest	25.0	20.0	55.0	0.70

Source: Field survey, 2022

Challenges associated with operating agricultural cooperative

Data in Table 4 reveals some of the challenges associated with operating agricultural cooperatives as observed by the respondents. Primary among these challenges were low capital base ($\bar{x}$ =0.90) and poor management of the cooperative by its leaders ($\bar{x}$ =0.89). Considering the weak capital base of the cooperative, the cooperatives may not have the required finance to fund its operations. Hence members may not get the needed resources/services they request for and in cases

where they get them, they are not provided with the needed quantity requested for. Poor management of the cooperative by the its leaders may be as a result of inability of members to reconcile their interests and improper handling of human and , material and financial resources by its stakeholders. With this, the deliverables that is accruable to such cooperatives cum its members will not be achieved by them. This view is consistent with the submission of Moreira *et al*. (2016) advocating the need for cooperatives to balance their members' economic, social, and political interests

Also identified as challenges associated with agricultural cooperatives as revealed in Table 5 were poor response of members towards repayment ($\bar{x}$ =0.71) and bias when giving out productive resources by leaders of the cooperative ($\bar{x}$ =0.70). The poor response of members towards repayment of loan is a huge burden to agricultural cooperatives, with this other members will not be able to conveniently have access to the resources/services that is provided by the cooperative. It is acknowledged that the availability of these resources will make funds available to be ploughed back into the pool for disbursement and utilisation by the cooperatives. Introducing bias by leaders when giving out productive resources will weaken the interest of the members and their commitment to the operations and activities of the cooperative. Hence, the sustenance of this practice will further weaken members zeal. interest and participation in the activities that will uphold the operations of the cooperative. This view is consistent with the findings of Oyebode *et al*., (2022) that a common attribute attached to securing an agricultural loan includes the following but is not limited to huge collateral requirements, bureaucracies, untimely disbursement of funds and constraining conditions attached to repayment among others.

Table 4: Challenges associated with operating agricultural cooperatives

Identified challenges	Serious challenge %	Mild challenge %	Not a challenge %	Weighted Mean
Low capital base	37.5	15.0	47.5	0.90*
Poor management of the cooperative by its leaders	38.3	12.5	49.2	0.89*
Rigid rules and regulations	30.8	17.5	51.7	0.56
Corruption and sharp practices	43.3	30.8	53.3	0.62
Non prioritization of needs of cooperative members	12.5	43.3	50.8	0.61
Short repayment duration of loans	12.5	29.2	58.3	0.54
Poor response of members towards repayment	25.0	21.7	53.3	0.71*
Power tussle	16.7	30.8	52.5	0.64
Bias when giving out productive resources by leaders of the cooperative	25.0	20.0	55.0	0.70*

*** Challenges associated with operating agricultural cooperatives**
Source: Field survey, 2022

Hypotheses Testing

Table 5 reveals that there is association between the sex, highest educational attainment of the respondents and accessibility to productive resources and services in agricultural cooperatives, this is depicted by (χ^2 = 47.62, p= 0.002) and (χ^2 = 47.62, p= 0.002) respectively. The association between highest educational attainment and accessibility to productive resources and services in agricultural cooperatives suggests that the respondents will understand the operational dynamics of the agricultural cooperatives and deploy the resources/services to judicious use in their enterprise. Significant relationship existed between years of cooperative membership (r= 0.414, p= 0.018), average farm size (r= 0.338, p= 0.036), average monthly income (r= 0. 876, p= 0.026) benefits derived from agricultural cooperatives (r= 0.614, p= 0.049) and accessibility to productive resources and services in agricultural cooperatives. Considering the number of years the cooperative members have spent could be a criterion for accessing productive resources and services, older members will be more attuned to keeping to the terms and conditions set by the cooperatives compared to younger members. As farmers' income increases they are more attuned to make more investments into the cooperatives hence their accessibility to productive resources and services. It is also plausible to state that larger farm holders bear commercial interest hence they are more attuned to access productive resources and services provided by agricultural cooperatives. Considering the benefits derived from agricultural cooperatives, members will be willing to invest more into the cooperative to afford them the opportunity to access productive resources and services from the agricultural cooperatives.

Table 5: Results of hypotheses

Variables	r	p value
Benefits derived from agricultural cooperatives	0.614	0.049
Challenges associated with operating agricultural cooperatives.	-0.051	0.583

Source: Field survey, 2022

CONCLUSIONS AND RECOMMENDATIONS

The study concluded that productive resources/services regularly accessible were loan, farm equipment (non- mechanized) and seeds/seedlings. Prominent among the challenges associated with agricultural cooperatives were low capital base and poor management of the cooperative by its leaders. Association /relationship existed between sex, highest educational attainment, years of cooperative membership, average farm size, average monthly income, Relationship existed between benefits derived from agricultural cooperatives and accessibility to productive resources and services in agricultural cooperatives. The study recommends an increase in the capital base of agricultural cooperatives and increased oversight by its regulators to enhance its operations and outcomes.

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