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Drivers of Improved Agricultural Practices Uptake among Smallholder Farmers in Southern Taraba, Nigeria

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Abstract

This study examined the drivers of improved agricultural practices among rural farmers in Southern Taraba, Nigeria. A multistage sampling procedure was employed to select 320 rural farmers from twelve farming communities across four purposively selected Local Government Areas. Primary data were collected using a structured questionnaire and analyzed using descriptive statistics, an Improved Agricultural Practices Index (IAPI), and binary logistic regression analysis. The results revealed that 68.4% of the respondents were male, while 31.6% were female. The mean age of the farmers was 43.8 years, with 39.1% falling within the economically active age group of 41–50 years. The respondents had an average household size of 7.4 persons, farming experience of 18.7 years, and a mean farm size of 3.2 hectares. About 74.7% belonged to farmers' organizations, 82.8% had regular contact with extension agents, and 48.1% had access to agricultural credit. Improved crop varieties (94.4%), appropriate fertilizer application (92.8%), improved planting methods (89.7%), integrated pest management (88.1%), climate-smart agricultural practices (84.7%), soil conservation techniques (82.5%), and improved post-harvest storage technologies (80.3%) were the most widely practiced technologies. The Improved Agricultural Practices Index indicated that 71.9% of the respondents exhibited a high level of utilization of recommended agricultural practices, while 21.6% and 6.5% recorded moderate and low levels, respectively. The logistic regression model was statistically significant ($\chi^2 = 142.63$) with a Pseudo R^2 of 0.694, indicating good model fitness. Educational attainment ($\beta = 0.214$), farm size ($\beta = 0.186$), farming experience ($\beta = 0.147$), extension contact ($\beta = 0.382$), access to agricultural credit ($\beta = 0.271$), membership of farmers' organizations ($\beta = 0.194$), access to market information ($\beta = 0.168$), and participation in agricultural training ($\beta = 0.356$) positively influenced the use of improved agricultural practices. In contrast, age exerted a significant negative influence ($\beta = –0.128$). The study concluded that effective extension service delivery, institutional support, and improved access to productive resources remain the major drivers of improved agricultural practices among rural farmers in Southern Taraba. The study recommends strengthening extension systems, expanding farmers' access to affordable credit, and promoting continuous capacity-building programmes

Keywords: *Improved agricultural practices, rural farmers, extension services, technology utilization, agricultural development, Southern Taraba, Nigeria.*

Introduction

Agriculture remains the backbone of rural livelihoods in Nigeria, contributing substantially to employment generation, food production, poverty reduction, and national economic growth. Despite its strategic importance, agricultural productivity among rural farmers remains considerably below its potential due to low utilization of improved agricultural practices. Improved agricultural practices encompass a broad range of recommended technologies and management techniques designed to increase farm productivity, enhance resource-use

efficiency, improve resilience to climate variability, and promote environmental sustainability. These practices include the use of improved crop varieties, appropriate fertilizer application, integrated pest and disease management, conservation agriculture, climate-smart farming, mechanization, efficient water management, improved livestock husbandry, post-harvest management, and digital agricultural advisory services.

The promotion of improved agricultural practices has become central to agricultural transformation programmes across Sub-Saharan Africa. Governments, development agencies, research institutes, and extension organizations continue to invest substantial resources in generating and disseminating technologies capable of improving agricultural productivity and food security. However, the benefits of these technologies largely depend on farmers' willingness and capacity to integrate them into their production systems. Consequently, understanding the factors that drive farmers' utilization of recommended agricultural practices has become an important area of agricultural extension research. Agricultural extension plays a critical role in facilitating the diffusion of improved agricultural practices through farmer education, demonstrations, advisory services, and capacity building. Effective extension systems enhance farmers' knowledge, strengthen decision-making abilities, reduce information asymmetry, and encourage behavioural change toward improved farming practices. Recent advances in information and communication technologies have further expanded the scope of extension delivery through digital advisory platforms, mobile applications, radio programmes, and social media, thereby improving farmers' access to timely agricultural information (Alhassan et al., 2023). Beyond extension services, several interrelated factors influence farmers' decisions to use improved agricultural practices. Farmer education improves the ability to understand technical recommendations, while farming experience enhances practical knowledge required for evaluating new practices. Farm size influences investment capacity and risk-bearing ability, whereas access to agricultural credit enables farmers to acquire improved inputs and technologies. Membership of farmers' organizations facilitates collective learning, access to extension services, and market opportunities. Likewise, participation in agricultural training programmes strengthens farmers' technical competence and confidence in implementing recommended practices (Akinola et al., 2022).

Statement of the problem

Although numerous agricultural programs have been implemented to improve rural livelihoods in Nigeria, productivity among smallholder farmers remains below expected levels. The challenge is no longer simply the availability of improved technologies but the extent to which farmers consistently integrate recommended agricultural practices into their operations. Many rural farmers continue to rely on traditional production methods characterized by low input use, poor soil fertility management, inadequate pest and disease control, inefficient post-harvest handling, and limited climate adaptation strategies. These practices contribute to low crop yields, declining soil productivity, increased vulnerability to climate variability, and persistent rural poverty. Previous studies have predominantly focused on the adoption of individual agricultural technologies or on socioeconomic and institutional determinants of adoption. While these studies have contributed significantly to the literature, they often overlook the broader concept of improved agricultural practices, which reflects farmers' comprehensive use of multiple recommended production and management techniques. Furthermore, the dynamic interactions among extension services, farmer organizations, agricultural training, access to market information, financial services, and farm characteristics require renewed empirical investigation within the context of Southern Taraba.

Despite continuous investment in agricultural extension programmes by federal and state governments, empirical evidence on the principal drivers of improved agricultural practices among rural farmers in Southern Taraba remains limited. This knowledge gap constrains evidence-based policy formulation and the design of effective extension interventions tailored to local farming conditions. Therefore, this study was undertaken to identify the major drivers influencing the utilization of improved agricultural practices among rural farmers in Southern Taraba, Nigeria, with the aim of providing empirical evidence to support sustainable agricultural development and improved extension service delivery.

Objectives of the Study

The broad objective of this study was to examine the drivers of uptake of improved agricultural practices among rural farmers in Southern Taraba, Nigeria. The specific objectives were to:

1. describe the socioeconomic characteristics of rural farmers in the study area;
2. identify the major improved agricultural practices used by rural farmers;
3. assess the level of use of improved agricultural practices among rural farmers;
4. examine the drivers influencing the use of improved agricultural practices among rural farmers; and

Methodology

Study Area

The study was conducted in Southern Taraba, Nigeria. The area comprises five Local Government Areas (LGAs), namely Donga, Ibi, Takum, Ussa, and Wukari. Geographically, Southern Taraba lies between latitudes 8°30′N and 10°30′N and longitudes 9°00′E and 11°30′E. The zone covers approximately 14,099 km² and has a tropical wet-and-dry climate with distinct rainy (April–October) and dry (November–March) seasons. Annual rainfall ranges from 1,500 to 2,000 mm, and temperatures vary between 24°C and 34°C, creating favorable conditions for crop and livestock production. The area is endowed with fertile soils and abundant agricultural resources suitable for cultivating maize, rice, yam, cassava, sorghum, millet, soybean, cowpea, groundnut, benniseed (sesame), vegetables, and fruits. Livestock enterprises, including cattle, sheep, goats, pigs, and poultry, are also widely practiced. Fishing is common in communities along the Benue and Donga Rivers. The major ethnic groups include the Jukun, Kuteb, Tiv, Chamba, Hausa/Fulani, Ichen, and several minority groups whose primary occupation is agriculture.

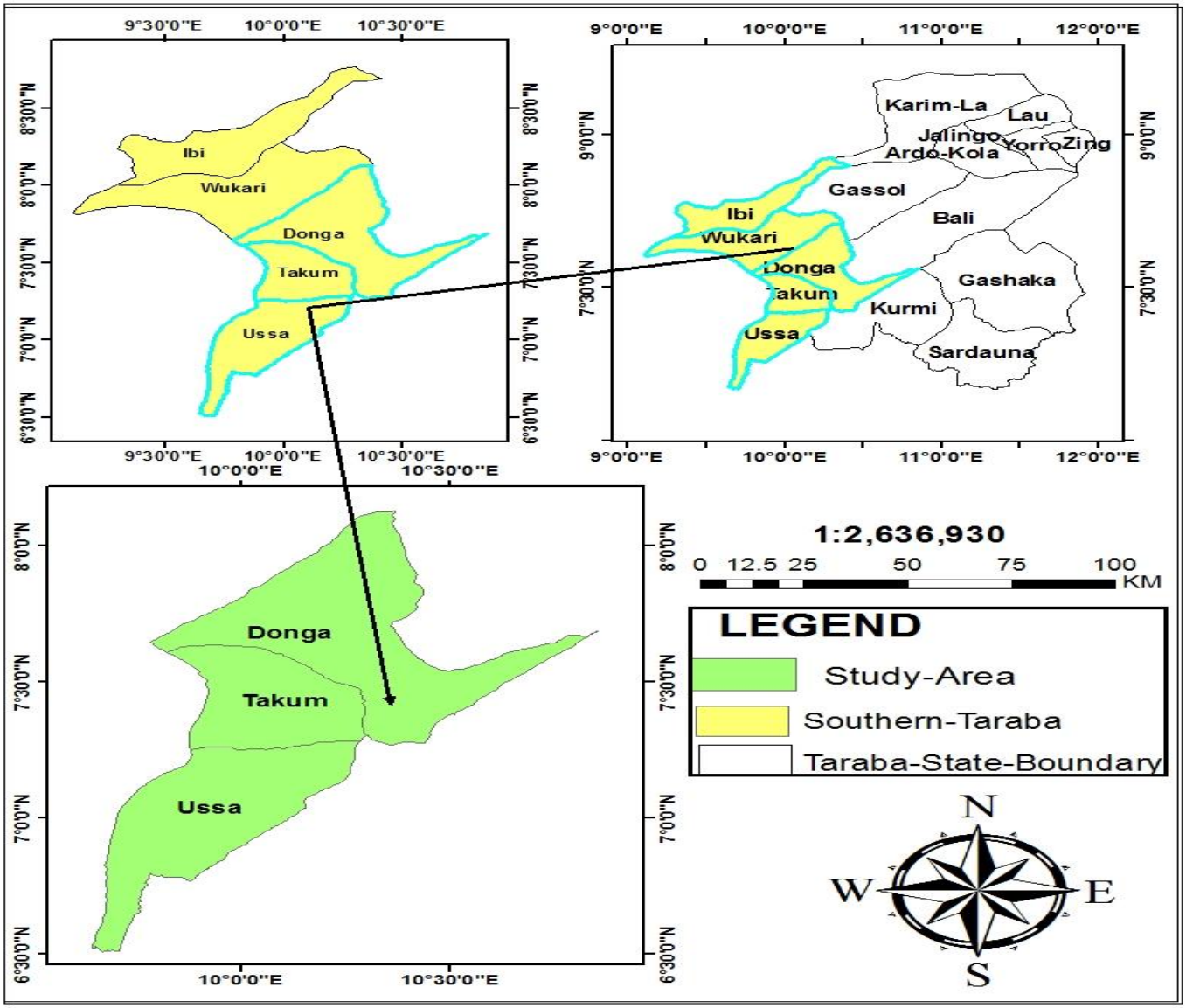

Figure 1: Map of Taraba State showing the study Area

Sampling Procedure and Sample Size

A multistage sampling procedure was adopted. In the first stage, four Local Government Areas (Takum, Donga, Ussa and Wukari) were purposively selected because of their high agricultural production potential and active extension programmes. The second stage involved the random selection of three farming communities from each selected Local Government Area, resulting in twelve communities. In the third stage, proportionate sampling was used to allocate the sample to each community based on the number of registered farming households. Finally, proportionate sampling was employed to select individual respondents from the sampling frame. A total sample size of 320 rural farmers was selected for the study.

Table 1: Sample Size Distribution of Respondents (N = 320)

Local Government Area	Selected Community	Sampling Frame	Sample
Donga	Nyita	2,208	42
	Tor-Damisa	2,420	46
	Ananum	1,960	37
Takum	Tampa	995	19
	Rogo	1,222	23
	Tati	1,101	21
Ussa	Fikyu	1,345	26
	Kpambo	1,570	30
	Kwesati	1,156	22
Wukari	Avyi	1,720	33
	Tsokundi	1,412	27
	Chonku	1,960	34
Total		**19,069**	**320**

Source: Taraba State Ministry of Agriculture and Food Security (2026).

Sources and Methods of Data Collection

Primary data were collected using a structured questionnaire designed specifically for the objectives of the study. Prior to data collection, the instrument was validated by experts in Agricultural Extension. Necessary corrections were incorporated before the final administration of the questionnaire. The questionnaire consisted of five sections: Section A: Socioeconomic characteristics of respondents. Section B: Improved agricultural practices utilized by farmers. Section C: Level of utilization of improved agricultural practices. Section D: Drivers influencing utilization of improved agricultural practices.

Improved Agricultural Practices Index (IAPI)

To assess the level of utilization of improved agricultural practices among rural farmers, an Improved Agricultural Practices Index (IAPI) was developed. The index measured the extent to which respondents regularly utilized the recommended agricultural practices identified in the study. Each respondent was asked to indicate whether he or she regularly practiced each of the identified improved agricultural practices. The responses were scored as follows:

- Practiced = 1
- Not Practiced = 0

The Improved Agricultural Practices Index (IAPI) for each respondent was computed using the following formula:

$IAPI = \Sigma Xi / N$

Where:

IAPI = Improved Agricultural Practices Index

ΣXi = Total score obtained by a respondent on all improved agricultural practices

N = Total number of improved agricultural practices considered in the study

The computed index ranged from 0 to 1, with higher values indicating a greater level of utilization of improved agricultural practices. Respondents were classified into three categories as follows:

IAPI Score Level of Utilization

0.00 – 0.33 Low utilization

0.34 – 0.66 Moderate utilization

0.67 – 1.00 High utilization

Decision Rule: Respondents with an IAPI score between 0.00 and 0.33 were classified as having a low level of utilization of improved agricultural practices. Those with scores ranging from 0.34 to 0.66 were regarded as having a moderate level of utilization, while respondents with scores between 0.67 and 1.00 were considered to have a high level of utilization of improved agricultural practices.

Logit Regression Model Specification

The Binary Logistic Regression model was used to examine the drivers of improved agricultural practices among rural farmers in Southern Taraba, Nigeria. The model is specified as:

$$\text{Logit}(Pi) = \ln[Pi/(1 - Pi)] = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \varepsilon_i$$

Where:

P_i = Probability that a farmer utilizes improved agricultural practices

β_0 = Constant

β_1–β_{11} = Estimated regression coefficients

ε_i = Error term

Independent Variables

X_1 = Age (years)

X_2 = Gender (Male = 1; Female = 0)

X_3 = Educational level (years of formal education)

X_4 = Household size (number of persons)

X_5 = Farm size (hectares)

X_6 = Farming experience (years)

X_7 = Extension contact (1 = Contact; 0 = No contact)

X_8 = Access to agricultural credit (1 = Access; 0 = No access)

X_9 = Membership of farmers' organization (1 = Member; 0 = non-member)

X_{10} = Access to market information (1 = Access; 0 = No access)

X_{11} = Participation in agricultural training (1 = Participated; 0 = Did not participate)

Results And Discussion

Table 2: Distribution of Respondents According to Socioeconomic Characteristics (N = 320)

Variable	Category	Frequency (n)	Percentage (%)	Mean
Gender	Male	219	68.4	-
	Female	101	31.6	-
Age (Years)	20–30	34	10.6	**43.8 years**
	31–40	87	27.2	
	41–50	125	39.1	
	51–60	56	17.5	
	Above 60	18	5.6	
Marital Status	Single	39	12.2	-
	Married	224	70.0	
	Widowed	36	11.3	
	Divorced	21	6.5	
Educational Level	No Formal Education	79	24.7	-
	Primary Education	92	28.8	
	Secondary Education	98	30.6	
	Tertiary Education	51	15.9	
Household Size (Persons)	1–5	71	22.2	**7.4 persons**
	6–10	178	55.6	
	Above 10	71	22.2	
Farming Experience (Years)	1–10	62	19.4	**18.7 years**
	11–20	133	41.6	
	21–30	91	28.4	
	Above 30	34	10.6	
Membership of Farmers' Organization	Yes	239	74.7	-
	No	81	25.3	
Access to Extension Services	Yes	265	82.8	-
	No	55	17.2	
Access to Agricultural Credit	Yes	154	48.1	-
	No	166	51.9	

Source: *Field Survey, 2026.*

The socioeconomic characteristics presented in Table 2 provide insight into the demographic and farm-level attributes of rural farmers that influence the utilization of improved agricultural practices in Southern Taraba. The findings show that 68.4% of the respondents were male, while 31.6% were female, indicating that farming activities in the study area continue to be dominated by men. This pattern reflects the prevailing socio-cultural norms in rural Nigeria where men generally have greater access to land, productive resources, agricultural information, and financial services than women. Similar observations have been reported by the Food and Agriculture Organization (FAO, 2024), which noted that male farmers constitute the majority of agricultural producers in many parts of Sub-Saharan Africa due to gender disparities in access to agricultural resources.

The age distribution indicates that 39.1% of the respondents were between 41 and 50 years, with a mean age of 43.8 years. This suggests that the majority of farmers are within the economically active age bracket and possess the physical strength and decision-making capacity required to implement improved agricultural practices. Farmers within this age group are generally more receptive to extension messages while still possessing considerable farming experience. This finding agrees with Akinola et al. (2022), who reported that middle-aged farmers are more likely to embrace improved farming practices because they balance experience with willingness to innovate.

The marital status distribution shows that 70.0% of the respondents were married. Marriage often provides access to family labour, which is an important resource for smallholder agriculture where household members contribute significantly to farm operations. Larger family labour availability reduces dependence on hired labour and facilitates the implementation of labour-intensive agricultural practices such as mulching, row planting, integrated pest management, and soil conservation. Similar findings were reported by IFAD (2023), which emphasized that household labour availability positively influences agricultural productivity among rural farming households. Educational attainment revealed that 30.6% of the respondents completed secondary education, while 15.9% attained tertiary education. Overall, more than three-quarters of the respondents had some form of formal education. Education enhances farmers' ability to understand technical recommendations, interpret extension messages, and make informed management decisions. Educated farmers are generally more capable of evaluating the economic benefits associated with improved agricultural practices. This finding corroborates the work of the World Bank (2024), which identified education as one of the strongest determinants of technology utilization in developing countries.

The average household size was 7.4 persons, with more than half (55.6%) of the respondents having between six and ten household members. Large households provide readily available family labour required for timely farm operations including land preparation, planting, weeding, fertilizer application, harvesting, and post-harvest handling. However, they may also increase household consumption requirements, thereby influencing production decisions. The respondents possessed substantial farming experience, averaging 18.7 years, with 41.6% having farmed for between 11 and 20 years. This demonstrates that farmers have accumulated considerable indigenous knowledge and practical skills that can complement extension recommendations. Experience enables farmers to compare existing and improved production methods before making adoption decisions. Similar observations were reported by Akinwumi (2020), who found that farming experience significantly improves farmers' confidence in implementing improved agricultural technologies.

The study further revealed that 74.7% of the respondents belonged to farmers' organizations. Membership in farmer groups promotes collective action, facilitates access to extension information, enhances bargaining power, improves access to agricultural inputs and credit, and encourages knowledge sharing among farmers. Similarly, 82.8% of the respondents had regular contact with extension agents, demonstrating a relatively strong extension presence within the study area. Frequent interaction with extension personnel enhances awareness, knowledge acquisition, and implementation of recommended agricultural practices. This finding agrees with Adebayo and Oladele (2021), who concluded that regular extension contact significantly improves farmers' utilization of improved agricultural practices. Access to agricultural credit remained relatively low, with only 48.1% of the respondents reporting access to formal or informal credit facilities. Limited financial resources continue to constrain farmers' ability to purchase improved seeds, fertilizers, agrochemicals, machinery, and other essential farm inputs required for modern agricultural production. Consequently, expanding agricultural finance remains essential for improving the utilization of improved agricultural practices among rural farmers.

Table 3: Improved Agricultural Practices Utilized by Rural Farmers (N = 320)

S/N	Improved Agricultural Practice	Frequency	Percentage (%)	Rank
1	Improved crop varieties	302	94.4	1st
2	Appropriate fertilizer application	297	92.8	2nd
3	Improved planting methods and spacing	287	89.7	3rd
4	Integrated pest and disease management	282	88.1	4th
5	Climate-smart agricultural practices	271	84.7	5th
6	Soil conservation techniques	264	82.5	6th
7	Improved post-harvest storage technologies	257	80.3	7th
8	Agroforestry practices	246	76.9	8th
9	Mechanized farm operations	231	72.2	9th
10	Livestock health management	218	68.1	10th
11	Water management and irrigation	203	63.4	11th
12	Value addition and processing	192	60.0	12th
13	Digital agricultural advisory services	176	55.0	13th

Source: Field Survey, 2026. *Multiple responses were allowed.*

The results in Table 3 indicate that farmers in Southern Taraba utilize a wide range of improved agricultural practices. Improved crop varieties (94.4%), appropriate fertilizer application (92.8%), and improved planting methods (89.7%) ranked as the three most widely utilized practices, suggesting that extension interventions have been particularly effective in promoting crop production technologies. In contrast, digital agricultural advisory services (55.0%) recorded the lowest utilization level, reflecting persistent challenges related to digital literacy, internet connectivity, smartphone ownership, and rural ICT infrastructure. These findings are consistent with recent studies indicating that while conventional extension recommendations are widely accepted, the adoption of digital extension platforms among rural farmers remains comparatively low in many developing countries (Abioye et al., 2024; Ben-Enukora et al., 2023).

Table 4: Level of Utilization of Improved Agricultural Practices among Rural Farmers (N = 320)

IAPI Score	Level of Utilization	Frequency (n)	Percentage (%)
0.00–0.33	Low	21	6.5
0.34–0.66	Moderate	69	21.6
0.67–1.00	High	230	71.9
Total		**320**	**100.0**

Mean IAPI = 0.73 ***Source:*** *Computed from Field Survey Data, 2026.*

The findings presented in Table 4 indicate that the majority of rural farmers (71.9%) exhibited a high level of utilization of improved agricultural practices. Furthermore, 21.6% demonstrated a moderate level of utilization, whereas only 6.5% recorded a low level. The overall mean Improved Agricultural Practices Index (IAPI) of 0.73 indicates that farmers generally make substantial use of recommended agricultural practices.

The high utilization level may be attributed to increased extension contact, participation in farmers' organizations, exposure to agricultural training programmes, and improved access to agricultural information. These factors enhance farmers' awareness, technical knowledge, and confidence in implementing recommended production practices. The findings suggest that extension interventions in Southern Taraba have contributed significantly to promoting sustainable farming practices. This finding is consistent with Aremu and Reynolds (2024), who reported that frequent extension interactions significantly improve farmers' utilization of recommended agricultural practices. Similarly, Adenuga and Jack (2025) observed that participation in farmer groups promotes peer learning and encourages wider utilization of sustainable agricultural practices.

Table 5: Binary Logistic Regression Estimates of the Drivers of Improved Agricultural Practices (N = 320)

Variables	Coefficient (β)	Std. Error	z-value	p-value
Constant	-1.286	0.482	-2.67	0.008***
Age	-0.128	0.052	-2.46	0.014**
Gender	0.081	0.098	0.83	0.408NS
Educational Level	0.214	0.061	3.51	0.000***
Household Size	0.073	0.034	2.15	0.032**
Farm Size	0.186	0.079	2.35	0.019**
Farming Experience	0.147	0.058	2.53	0.011**
Extension Contact	0.382	0.094	4.06	0.000***
Access to Agricultural Credit	0.271	0.087	3.11	0.002***
Membership of Farmers' Organization	0.194	0.081	2.39	0.017**
Access to Market Information	0.168	0.072	2.33	0.020**
Participation in Agricultural Training	0.356	0.089	4.00	0.000***
Log Likelihood	-109.84			
Chi-square (χ^2)	142.63***			
Prob > χ^2	0.0000			
Pseudo R^2	0.694			
Number of Observations	320			

**** Significant at 1%; ** Significant at 5%; * Significant at 10%; NS = Not Significant.*

Source: *Field Survey, 2026.*

The Binary Logistic Regression results presented in Table 5 reveal that the model is statistically significant at the 1% probability level, with a likelihood ratio Chi-square value of 142.63 and a Pseudo R^2 of 0.694. This indicates that approximately 69.4% of the variation in the utilization of improved agricultural practices is explained by the explanatory variables included in the model. The goodness-of-fit statistics suggest that the model adequately explains farmers' utilization behaviour. Age exerted a negative and statistically significant influence ($\beta = -0.128$; $p < 0.05$), indicating that younger farmers were more likely to utilize improved agricultural practices than older farmers. Younger farmers are generally more receptive to new ideas, possess greater physical capacity, and are more willing to experiment with modern farming methods. This finding supports the Diffusion of Innovations Theory (Rogers, 2003), which suggests that younger individuals tend to adopt innovations more readily than older individuals.

Educational level had a positive and highly significant influence ($\beta = 0.214$; $p < 0.01$). Farmers with higher levels of formal education were more likely to understand technical recommendations, evaluate production risks, and implement recommended farming practices. Education improves analytical skills, enhances information processing, and facilitates informed decision-making. This result agrees with Akinola et al. (2022), who identified education as one of the strongest predictors of improved agricultural technology utilization in Sub-Saharan Africa. Household size also positively influenced utilization ($\beta = 0.073$; $p < 0.05$). Larger households provide readily available family labour required for implementing labour-intensive agricultural practices such as mulching, integrated pest management, soil conservation, and post-harvest handling. Similar findings were reported by IFAD (2023), which emphasized the importance of household labour availability in improving agricultural productivity.

Farm size significantly influenced utilization ($\beta = 0.186$; $p < 0.05$), suggesting that farmers cultivating larger landholdings were more willing to invest in improved agricultural practices. Larger farms generally generate higher incomes and enable farmers to spread production risks across different enterprises. Likewise, farming experience positively influenced utilization ($\beta = 0.147$; $p < 0.05$), indicating that accumulated knowledge enables farmers to evaluate and implement improved practices more effectively. Extension contact emerged as one of the strongest drivers of improved agricultural practices ($\beta = 0.382$; $p < 0.01$). Regular interaction with extension agents improves farmers' technical knowledge, enhances confidence in implementing recommended practices, and provides continuous advisory support. This finding corroborates Adebayo and Oladele (2021), who reported

that effective extension services significantly increase farmers' use of improved agricultural practices.

Access to agricultural credit also exerted a strong positive influence ($\beta = 0.271$; $p < 0.01$). Credit enables farmers to purchase improved seeds, fertilizers, agrochemicals, machinery, and other production inputs required for implementing recommended technologies. Financial constraints remain one of the major barriers to agricultural modernization in rural communities. Membership of farmers' organizations significantly enhanced utilization ($\beta = 0.194$; $p < 0.05$). Farmer organizations facilitate collective learning, improve access to extension services, strengthen bargaining power, and enhance access to agricultural inputs and markets. Similarly, access to market information ($\beta = 0.168$; $p < 0.05$) positively influenced utilization because informed farmers are better able to align production decisions with market opportunities.

Participation in agricultural training programmes was another major driver ($\beta = 0.356$; $p < 0.01$). Training enhances farmers' technical competence, improves practical skills, and increases confidence in applying recommended agricultural practices. The result underscores the importance of continuous capacity-building programmes in promoting sustainable agricultural development. Gender was positive but statistically insignificant ($\beta = 0.081$; $p > 0.05$), suggesting that male and female farmers utilized improved agricultural practices at comparable levels when other explanatory variables were controlled.

Conclusion

This study examined the drivers of improved agricultural practices among rural farmers in Southern Taraba, Nigeria using data obtained from 320 respondents selected through a multistage sampling procedure. The findings revealed that the majority of the respondents were economically active, experienced smallholder farmers with relatively large household sizes. Although access to extension services and membership of farmers' organizations was high, access to agricultural credit remained relatively low. The study further established that rural farmers utilized a wide range of improved agricultural practices, particularly improved crop varieties, appropriate fertilizer application, improved planting methods, integrated pest and disease management, climate-smart agricultural practices, and improved post-harvest storage technologies. The Improved Agricultural Practices Index (IAPI) indicated that most respondents exhibited a high level of utilization of recommended agricultural practices, suggesting that agricultural extension programmes have made appreciable progress in promoting modern farming practices within the study area. The Binary Logistic Regression analysis identified educational level, household size, farm size, farming experience, extension contact, access to agricultural credit, membership of farmers' organizations, access to market information, and participation in agricultural training as significant positive drivers of improved agricultural practices

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Government at the federal, state, and local levels should strengthen agricultural extension services through increased funding, recruitment of qualified extension personnel, regular training, and provision of logistics to ensure timely dissemination of improved agricultural practices to rural farmers.
2. Financial institutions and agricultural development programmes should expand access to affordable agricultural credit through low-interest loan schemes and farmer-friendly financing mechanisms to enable rural farmers to purchase improved farm inputs and adopt recommended agricultural practices.
3. Farmers should be encouraged to join and actively participate in farmers' organizations and cooperative societies to improve access to agricultural information, credit facilities, production inputs, training opportunities, and collective marketing.

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