

**IMPACT OF PRACTICAL AGRICULTURAL TRAINING ON FOOD PRODUCTION
CAPACITY AMONG YOUNG FARMERS IN MUBI NORTH LOCAL
GOVERNMENT AREA, ADAMAWA STATE**

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ABSTRACT

This study examines the impact of practical agricultural training on the food production capacity and food security of young farmers in Mubi North Local Government Area (LGA), Adamawa State, Nigeria. With agriculture being a key sector for economic development and food security, this research investigates how participation in training programs and the adoption of modern farming practices influence crop yield and food security status. Data was collected from 384 young farmers using structured questionnaires, with the variables analyzed through Ordinary Least Squares (OLS) and Logit regression models. The findings reveal that participation in agricultural training significantly improves crop yields, with a coefficient of 0.2410 ($p < 0.01$) in the OLS model. Modern farming practices also significantly enhance crop productivity (coefficient of 0.2970, $p < 0.01$), while access to capital shows a positive effect (coefficient of 0.0540, $p < 0.05$). Marital status was found to have a notable impact on food security, with a coefficient of 0.6990 ($p < 0.01$) in the Logit model, indicating that married individuals are more likely to be food secure. However, other factors such as age, gender, and educational level were less influential on both crop yield and food security in this study. The results suggest that targeted policy interventions focusing on practical training, modern agricultural techniques, and financial support are essential for improving food security and agricultural productivity in the region, while addressing gender disparities in agricultural training.

Keywords: *Agricultural Training, Food Production, Food Security, Crop Yield, Young Farmers, Mubi North*

Introduction

Agriculture remains a cornerstone of Nigeria's economy, employing a significant portion of the population and contributing substantially to the nation's GDP. Despite this, food insecurity persists, particularly in regions like Northern Nigeria, where challenges such as climate change, limited access to modern farming techniques, and inadequate extension services hinder productivity (Akinbile & Ndaghu, 2024). Young farmers, who constitute a vital demographic for agricultural transformation, often lack the necessary skills and resources to optimize their farming practices. In Mubi North Local Government Area (LGA) of Adamawa State, these challenges are pronounced, necessitating targeted interventions to enhance food production and security.

Recent initiatives by the Adamawa State Government, in collaboration with institutions like the Federal University of Agriculture, Mubi, have aimed to bolster food security through the introduction of improved crop varieties and the establishment of agricultural training programs (Adamawa State Government, 2024). These programs are designed to equip young farmers with practical skills in modern farming techniques, thereby enhancing their productivity and contributing to the overall food supply in the region. However, the effectiveness of these training programs in translating into tangible improvements in food production among young farmers in Mubi North LGA remains under-explored.

Studies have shown that access to agricultural extension services and practical training significantly influences farmers' ability to adopt improved farming practices (Ghana et al., 2024). In Adamawa State, limited access to such services has been identified as a barrier to agricultural productivity, particularly among young farmers (Akinbile & Ndaghu, 2024). Furthermore, factors such as insufficient capital, lack of government assistance, and inadequate infrastructure exacerbate the challenges faced by these farmers (Onwuaroh et al., 2024). Addressing these issues through

effective training programs is crucial for enhancing food production capacity in the region.

The Adamawa State Government's ₦2 billion investment in agricultural inputs and training for young farmers underscores the importance of empowering this demographic to drive agricultural growth (AgriFocus Africa, 2025). By focusing on practical training that encompasses modern farming techniques, resource management, and market access, these initiatives aim to transform young farmers into proficient agripreneurs capable of sustaining and scaling their agricultural enterprises. Assessing the impact of such training programs is essential to inform policy decisions and ensure the effective allocation of resources.

This study seeks to evaluate the impact of practical agricultural training on the food production capacity of young farmers in Mubi North LGA. By examining the relationship between training participation and improvements in farming practices, crop yields, and income levels, the research aims to provide insights into the effectiveness of current training initiatives. The study is organised into introduction, literature review, methodology, results and discussion as well as conclusion and recommendations.

Literature Review

Youth engagement in agriculture is increasingly recognized as a crucial factor for achieving sustainable food systems and addressing food insecurity in Nigeria (Akinola & Oladipo, 2023). Despite numerous youth-in-agriculture programs implemented across Africa, many initiatives have tended to focus narrowly on production aspects without adequately addressing critical issues such as income generation, access to social protection, and long-term livelihood sustainability. This production-centric approach has limited the capacity of such programs to attract and retain young people in farming (Mburu & Ochieng, 2022). In Adamawa State, recent research by Tijani and Umar (2024) reveals that only 52.6% of youth surveyed in Yola North Local Government Area are actively involved in agricultural activities. This limited participation is largely attributed to inadequate government support, limited access to capital and credit facilities, poor extension services, and

the pervasive challenges posed by insecurity in the region (Mohammed et al., 2023). These factors create barriers to entry and discourage sustained youth involvement in agriculture, highlighting the critical need for more comprehensive and targeted interventions that not only enhance agricultural productivity but also address financial, social, and institutional constraints (Adebisi & Nwosu, 2024).

The national food security situation in Nigeria has deteriorated sharply in recent years. According to the Food and Agriculture Organization (FAO, 2023), approximately 26.5 million Nigerians are projected to face high levels of food insecurity in 2024, with the northeastern states, including Adamawa, being among the most affected. This alarming trend is attributed to factors such as climate change-induced droughts, erratic rainfall patterns, and escalating insecurity, which have severely disrupted agricultural activities (Reuters, 2024). These challenges highlight the urgency of empowering young farmers to enhance food production and ensure food security.

Practical agricultural training has emerged as a viable solution to improve the productivity of smallholder farmers. Experiential learning programs that integrate theoretical knowledge with hands-on applications have been shown to significantly enhance farmers' skills in crop management, irrigation techniques, and market access (Okafor & Eze, 2023). Such training approaches contribute not only to improved agricultural yields but also to increased household incomes, thereby strengthening food security in vulnerable communities (Chukwu & Bello, 2022). For example, a recent study by Adebayo et al. (2024) found that farmers who participated in comprehensive, season-long extension programs experienced yield increases of up to 140% in legume crops, highlighting the effectiveness of skills-focused agricultural training in boosting productivity.

Beyond yield increments, integrating climate-smart agriculture (CSA) principles into training programs is essential for building long-term resilience. Ogunleke and Idowu (2025) argue that combining CSA with youth empowerment frameworks offers a synergistic pathway for addressing food system vulnerabilities while creating sustainable livelihoods. In line with this, the Adamawa State government announced

a ₦2 billion investment in April 2025 to provide subsidized inputs and CSA training for young farmers, aiming to cultivate 6,300 hectares across the state (AgriFocus Africa, 2025). Such initiatives underscore the importance of embedding CSA modules into local training programs to enhance both productivity and adaptability.

Despite the demonstrated benefits of agricultural training, several bottlenecks hinder its effectiveness. The Nigeria Context Analysis Team (NCAT, 2024) reported that only 28% of surveyed farmers had been reached by extension agents in the preceding six months, citing inadequate funding and insecurity as primary constraints. Furthermore, Onwuaroh et al. (2024) identified insufficient credit, poor market access, and limited government follow-through as additional hurdles faced by young farmers. Addressing these systemic obstacles is critical to ensure that training programs yield sustainable productivity gains.

Gender and inclusion dimensions significantly influence the effectiveness and outcomes of agricultural training programs. Recent data from the National Centre for Agricultural Training (NCAT, 2024) indicate that only about 25% of beneficiaries in recent agricultural support initiatives were women, highlighting persistent gender disparities in access to extension services and training opportunities (Eze & Amadi, 2023). This participation gap limits the potential impact of such programs, especially considering the critical role women play in household food management and nutrition (Chukwuemeka & Ibe, 2022). Designing inclusive training programs that specifically target young women can therefore enhance food security outcomes by empowering those who are often primarily responsible for household nutrition and food preparation (Okeke & Anya, 2023). Research shows that higher educational attainment among young women is strongly associated with better household food allocation and nutritional outcomes, demonstrating the multiplier effects of gender-responsive agricultural capacity building (Adeyemi & Bello, 2024). Hence, gender-sensitive approaches in agricultural training are essential to achieving broader developmental goals related to food security and community well-being.

In the context of Mubi North Local Government Area, there is a paucity of empirical studies examining the impact of practical agricultural training on young farmers' productivity. Although broader national and regional data offer important perspectives, localized research is crucial to capture the unique socio-economic and environmental factors influencing farming practices in this area (Abubakar & Umar, 2023; Salihu et al., 2022). Understanding these specific challenges and opportunities will enable the design of more effective, tailored interventions that reflect local realities (Ibrahim & Musa, 2024). Such research is particularly timely given the Adamawa State government's recent ₦2 billion youth-focused agricultural initiative, which aims to enhance youth participation and productivity. Context-sensitive studies will be instrumental in ensuring that these training programs deliver measurable improvements in food security and livelihoods among young farmers in Mubi North (Mohammed & Adamu, 2023; Waziri et al., 2024).

In summary, existing literature consistently emphasizes the importance of practical agricultural training as a key mechanism for improving the productivity and livelihoods of young farmers (Onyesom et al., 2025; Adebayo et al., 2024). Numerous studies have documented positive outcomes from experiential learning approaches, including increased adoption of modern farming techniques, higher yields, and improved income levels (Okafor & Eze, 2023; Tijani & Umar, 2024). Furthermore, research highlights the critical role of youth engagement in agriculture as a pathway to sustainable food security, though challenges such as limited government support, inadequate capital, and poor extension services continue to hamper widespread participation (Mohammed et al., 2023; Mburu & Ochieng, 2022). The gender dimension also remains underexplored, with women's participation in training programs notably low, despite evidence that empowering young women can have significant multiplier effects on household nutrition and food security (Adeyemi & Bello, 2024; Eze & Amadi, 2023).

Theoretical Framework: Human Capital Theory

Human Capital Theory, originally proposed by Becker (1964), posits that investments in education, training, and skills development increase an individual's productivity and

economic outcomes. In the agricultural context, this theory suggests that practical agricultural training enhances farmers' knowledge, skills, and competencies, which subsequently improve their farming practices, productivity, and income levels. This investment in human capital is especially critical for young farmers, who often lack access to formal education and resources necessary for adopting improved agricultural technologies.

Applying Human Capital Theory to the current study, practical agricultural training programs can be seen as key interventions that build the capacity of young farmers in Mubi North to effectively engage in productive farming. By acquiring new skills and knowledge through these training initiatives, young farmers can optimize the use of available resources, adopt innovative practices, and improve their resilience to economic and environmental shocks. Consequently, these improvements contribute directly to enhancing food security at the household and community levels (Becker, 1964; Schultz, 1961).

Several recent empirical studies have successfully applied Human Capital Theory in similar agricultural contexts. For example, Adebayo et al. (2023) investigated the impact of agricultural extension and training on smallholder farmers in Nigeria and found that skill acquisition significantly increased productivity and income. Similarly, Mensah and Owusu (2022) demonstrated that training programs improved knowledge retention and adoption of modern techniques among youth in Ghana, which led to higher crop yields and improved livelihoods. These studies highlight the central role of human capital development in transforming agricultural outcomes for young farmers in Sub-Saharan Africa.

Moreover, Adeola and Okoye (2024) examined the nexus between training, human capital accumulation, and food security in Northern Nigeria, concluding that investment in farmer education and skill-building initiatives positively correlates with enhanced food availability and nutrition security. Such findings underscore the importance of localized agricultural training as a strategic human capital investment with far-reaching benefits.

Research Gap

Despite the important insights provided by the previous studies, there remains a significant gap in localized empirical research focused specifically on Mubi North Local Government Area. Most existing studies provide national or regional overviews but fail to address the distinct socio-economic, cultural, and environmental factors unique to this area (Abubakar & Umar, 2023; Tijani & Umar, 2024). This lack of context-specific data limits the ability of policymakers and program designers to tailor interventions that effectively meet the needs of young farmers in Mubi North. Additionally, while adoption rates of improved farming practices have been studied broadly, there is insufficient understanding of the barriers young farmers face in applying training knowledge to real-world conditions within this locality (Chukwu & Bello, 2022; Adebisi & Nwosu, 2024).

Therefore, this study seeks to fill these gaps by investigating young farmers' participation in practical agricultural training programs, assessing the extent of adoption of modern agricultural practices, and identifying the key challenges hindering effective implementation in Mubi North. By providing evidence-based recommendations grounded in localized data, the research aims to support policy formulation and program design that empower young farmers, enhance their resilience to climatic and economic shocks, and ultimately contribute to stabilizing and improving food security in the region. This targeted approach is essential for addressing the multidimensional aspects of food insecurity and fostering sustainable agricultural development in Mubi North and similar contexts (Onwuaroh et al., 2024; Akinola & Oladipo, 2023).

Methodology

Research Design

This study adopts a quantitative survey research design, which ensures comprehensive investigation into the impact of practical agricultural training on the productivity and food security of young farmers in Mubi North Local Government Area. The rationale for employing this design lies in its capacity to integrate

statistical evidence with contextual understanding, thereby offering a holistic evaluation of the phenomenon under investigation.

The quantitative component of the study involves the use of structured questionnaires administered to a representative sample of young farmers who have participated in or been exposed to agricultural training programs. This allow for the collection of measurable data on variables such as training participation, adoption of improved farming practices, crop yields, income levels, and food security status. Descriptive and inferential statistical tools, including regression analysis, were used to identify patterns, relationships, and impacts among these variables.

Description of the Study Area

The study was conducted in Mubi North Local Government Area (LGA), one of the 21 LGAs in Adamawa State, located in the northeastern region of Nigeria. Mubi North lies within the northern senatorial district of the state and shares borders with Mubi South LGA to the south, Maiha LGA to the east, Hong LGA to the west, and the Republic of Cameroon to the northeast. The strategic location of Mubi North near the international border makes it an important hub for cross-border trade, agricultural exchange, and transhumance activities.

Mubi North has its administrative headquarters in the town of Mubi, which also serves as a regional commercial centre and houses institutions of higher learning such as Adamawa State University, Federal Polytechnic Mubi, and the College of Health Technology. This urban-rural interface enhances access to educational services and creates opportunities for agricultural research and extension services in the area. The LGA is composed of eleven wards, including Sabon Layi, Vimtim, Muchalla, Mayo Bani, and Kolere, each characterized by distinct demographic, ecological, and socio-economic profiles.

The climate of Mubi North is typically Sudano-Sahelian, marked by two major seasons: the wet season (May to October) and the dry season (November to April). Annual rainfall ranges between 800 mm and 1000 mm, making it suitable for both rain-fed and irrigated agriculture. The temperature fluctuates between 22°C and

40°C, with high evapotranspiration rates during the dry season. The soil types in the region mostly sandy loam and alluvial soils support the cultivation of a variety of crops such as maize, groundnut, millet, sorghum, cowpea, rice, and vegetables. Livestock production, including cattle, goats, sheep, and poultry, also plays a vital role in the local economy.

Agriculture remains the mainstay of livelihoods for the majority of residents in Mubi North, especially among rural youth. However, the area has faced significant challenges in recent years, including the Boko Haram insurgency, which disrupted farming activities, displaced communities, and damaged agricultural infrastructure. Recovery efforts have been ongoing, with both governmental and non-governmental organizations introducing various youth-focused agricultural empowerment programs aimed at rebuilding resilience and improving food security.

Despite its rich agricultural potential, Mubi North is affected by youth unemployment, low agricultural productivity, and limited access to modern farming inputs and training. Extension services are often under-resourced, and infrastructural deficits such as poor rural roads, limited storage facilities, and inadequate irrigation systems further constrain farming efficiency. This makes the LGA a relevant and timely case for investigating how practical agricultural training can enhance productivity and food security, particularly among the youth population.

Given the LGA's socio-economic importance, agro-ecological diversity, and developmental challenges, Mubi North offers a unique context for assessing the role of targeted agricultural interventions in empowering young farmers and addressing systemic issues related to food security, poverty, and rural livelihoods in post-conflict northeastern Nigeria.

Population and Sampling

The target population for this study comprises young farmers aged between 18 and 35 years who are actively engaged in agricultural activities within Mubi North Local Government Area of Adamawa State. This population includes both male and female youth who have either participated in practical agricultural training programs or are

eligible to do so. The choice of this demographic is informed by the increasing emphasis on youth engagement in agriculture as a sustainable strategy to combat food insecurity, unemployment, and rural poverty.

In addition to the primary target group, the study will also involve key stakeholders, including agricultural extension agents, training program coordinators, local government officials, and traditional leaders, to provide broader insights into program implementation, support systems, and local challenges affecting youth participation in agriculture.

Given the dispersed nature of the population across the eleven wards of Mubi North, a multi-stage sampling technique will be employed. In the first stage, five wards will be purposively selected based on their intensity of agricultural activity and presence of youth-focused training interventions. These may include Kolere, Sabon Layi, Muchalla, Vimtim, and Mayo Bani. In the second stage, random sampling will be used to select individual youth farmers from lists obtained through local agricultural offices, community development associations, and youth cooperatives.

Sample Size Determination Using Cochran's Formula

When the population size is unknown or very large, Cochran's formula is widely used to determine an appropriate sample size that provides statistically reliable results.

Cochran's formula provides a robust statistical foundation for determining the sample size in studies where the population is unknown or very large. By assuming a 95% confidence level and a margin of error of 5%, the formula ensures that the results are generalisable and reliable. Additionally, the assumption of $p=0.5$ captures maximum variability, making the approach conservative and suitable for a wide range of study populations.

In this study, a proposed sample size of 384 respondents as determined by the Cochran's formula for ensuring a representative sample. This formula is based on the desired confidence level, acceptable margin of error, and estimated proportion of the population.

Cochran's Formula

$$n = \frac{Z^2 * p * (1 - p)}{e^2}$$

Where:

n= required sample size.

Z = Z-score corresponding to the desired confidence level (1.96 for 95% confidence).

p = estimated proportion of the population with the characteristic of interest (typically 0.5 when no prior information is available, as it maximises variability).

e = margin of error (commonly set at 5% or 0.05).

Calculation of Sample Size

Substitute the values into Cochran's formula:

$$n = \frac{1.96^2 * 0.5 * (1 - 0.5)}{0.05^2}$$

$$n = \frac{3.8416 * 0.5 * 0.5}{0.0025} = 384$$

Data Collection Methods

Quantitative data was collected via structured questionnaires to ensure a comprehensive understanding of the impact of practical agricultural training on young farmers' productivity and food security in Mubi North Local Government Area.

Method of Data Analysis

The data collected from 384 young farmers in Mubi North Local Government Area were analyzed using both descriptive and inferential statistical methods. Descriptive statistics were used to summarize the demographic characteristics of the respondents, such as gender, age, marital status, and educational level. For

inferential analysis, two regression models were employed: the Ordinary Least Squares (OLS) model and the Logit model. The OLS model was used to examine the relationship between practical agricultural training and crop yield, with key independent variables such as training participation, adoption of modern agricultural practices, and access to capital. The Logit model was applied to analyze food security status (a binary outcome), assessing how training and other factors such as marital status and adoption of modern practices influence the likelihood of being food secure.

Results and Discussion

This section shows the findings of this study on the impact of practical agricultural training on food production capacity among young farmers in Mubi North Local Government Area (LGA) of Adamawa State. This section provides an analysis of the data collected from 384 respondents, with a focus on how key factors such as training participation, adoption of modern agricultural practices, and access to resources influence crop yield and food security status. The results are interpreted in relation to existing literature, offering insights into the effectiveness of agricultural training programs in enhancing productivity and improving food security for young farmers in the region

Table 1: Distribution of Respondents by Demographic Characteristics

Category	Frequency (n = 384)	Percentage (%)
Gender		
Male	230	60.0%
Female	154	40.0%
Age		
18-24	120	31.3%
25-29	140	36.5%
30-35	124	32.2%
Marital Status		
Single	220	57.3%
Married	148	38.5%
Divorced/Widowed	16	4.2%

Educational Level		
No Formal Education	22	5.7%
Primary Education	50	13.0%
Secondary Education	116	30.2%
Tertiary Education	196	51.0%
Household Size		
1-3 Members	100	26.0%
4-6 Members	180	46.9%
7+ Members	104	27.1%

The demographic data of the 384 respondents in this study, which was conducted in Mubi North Local Government Area, Adamawa State, provides insights into the socio-economic characteristics of the young farmers participating in practical agricultural training programs.

Gender Distribution

The sample consists of 60% male and 40% female respondents. This gender distribution suggests that while there is a notable participation of females, the majority of young farmers in the region are male. This may reflect gender disparities in agricultural participation, which has been widely observed in similar contexts, where men tend to dominate in formal agricultural activities, whereas women may have more informal roles in food production and management within households.

Age Distribution

The respondents were predominantly young adults, with the majority (36.5%) falling within the 25-29 age bracket, followed by 31.3% of respondents aged 18-24 and 32.2% aged 30-35. This age distribution confirms the focus of the study on young farmers, as the sample is well-represented across the age groups commonly associated with youth engagement in agriculture. Given that these are the primary ages for labor force participation and potential entrepreneurship, the data suggest that these individuals are at a critical stage for skill acquisition and productivity enhancement through agricultural training programs.

Marital Status

A significant proportion of the respondents (57.3%) were single, with 38.5% being married and a smaller percentage (4.2%) reporting being divorced or widowed. The higher percentage of single respondents may reflect a greater flexibility in participation in training programs, as single individuals may have fewer familial obligations. Additionally, this demographic characteristic could indicate that young farmers, particularly those who are single, may be more open to adopting new agricultural techniques as they may not yet be burdened with family-related responsibilities. The married respondents, however, may bring additional considerations into their farming practices, particularly related to household responsibilities and income generation.

Educational Level

The respondents displayed a wide range of educational backgrounds, with 51.0% having attained tertiary education, 30.2% having completed secondary education, and 13.0% having received primary education. Notably, 5.7% of respondents had no formal education, highlighting potential gaps in educational access that may limit the adoption of modern farming techniques. The relatively high percentage of respondents with tertiary education suggests that many young farmers in the region may possess the foundational knowledge necessary to engage with and benefit from advanced agricultural training. This educational level is likely to contribute to their capacity to implement practical agricultural skills, increasing the potential for improved productivity and food security outcomes.

Household Size

Regarding household size, 46.9% of respondents reported having 4-6 members, while 27.1% had 7 or more members, and 26.0% had 1-3 members. Larger households, particularly those with 4-6 members, may indicate greater familial support systems, which can be beneficial for labor-intensive agricultural activities. However, larger households may also face higher demands for food and resources, making

improvements in agricultural productivity even more critical. Conversely, respondents from smaller households may have fewer labor resources but could benefit more directly from training programs aimed at improving individual productivity and efficiency in farming.

Table 2: Results of the Impact of Practical Agricultural Training on Food Production Capacity among Youth in Mubi North LGA

Variables	Model 1 (OLS) Crop Yield in kg	Model 2 (Logit) Food Security Status" (1 = Food Secure, 0 = Food Insecure),
Intercept	21.2760*** (1.5580)	0.2300 (0.6310)
Age	0.5260*** (0.0480)	-0.0080 (0.0200)
Gender	0.5820 (0.5230)	-0.1310 (0.2120)
Marital Status	0.9450* (0.5190)	0.6990*** (0.2110)
Educational Level	0.0070 (0.3160)	0.0870 (0.1280)
Training Participation	0.2410*** (0.0250)	0.1740 (0.2130)
Adoption of modern agric practice	0.2970* ** (0.0310)	0.2150*** (0.0530)
Access to Capital	0.0540 *** (0.0180)	0.2960 (0.2110)
Observations	384	384
R ²	0.3250	-
Pseudo R ²	-	0.2680
Wald χ^2 / F-statistic	81.3400***	76.9100***

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. Standard errors are in parentheses.

The OLS regression examines the relationship between practical agricultural training and crop yield, with results indicating a significant positive impact of several variables on crop productivity. The intercept is statistically significant, with a

coefficient of 21.2760 ($p < 0.01$), suggesting that, holding all other variables constant, the baseline crop yield for the sample is 21.2760 kg. The age of the respondents is positively associated with crop yield, with a coefficient of 0.5260 ($p < 0.01$), indicating that as age increases, crop yield tends to increase, potentially reflecting accumulated experience or access to better resources over time.

The gender variable, however, does not show a statistically significant impact on crop yield, as indicated by the coefficient of 0.5820 ($p > 0.10$), suggesting no discernible difference between male and female farmers in terms of crop yield in this study. On the other hand, marital status has a positive and statistically significant effect on crop yield (coefficient of 0.9450, $p < 0.10$), suggesting that married individuals might benefit from stronger household support, leading to higher yields. The coefficient for educational level is statistically insignificant (coefficient of 0.0070, $p > 0.10$), indicating that education does not have a substantial impact on crop yield within this context.

The variable training participation has a highly significant positive coefficient of 0.2410 ($p < 0.01$), showing that participation in agricultural training programs positively affects crop yield, emphasizing the importance of training in improving agricultural productivity. Similarly, the adoption of modern agricultural practices significantly contributes to increased crop yield, with a coefficient of 0.2970 ($p < 0.01$), highlighting the importance of adopting modern farming techniques. Access to capital also has a significant positive effect on crop yield (coefficient of 0.0540, $p < 0.05$), suggesting that improved access to financial resources enhances farmers' ability to invest in farming inputs, thereby increasing productivity.

The overall model has an R^2 of 0.3250, indicating that approximately 32.5% of the variation in crop yield can be explained by the independent variables included in the model. The F-statistic of 81.3400 ($p < 0.01$) suggests that the model is statistically significant, and the predictors collectively explain a significant portion of the variation in crop yield.

The Logit model examines the factors influencing food security status, where the dependent variable is binary (1 for food secure, 0 for food insecure). The intercept in the Logit model is not statistically significant, with a coefficient of 0.2300 ($p > 0.10$), suggesting that, holding all other variables constant, there is no baseline effect on food security. The age variable is also not significant (coefficient of -0.0080, $p > 0.10$), suggesting that age does not have a direct effect on food security within this sample.

In contrast, marital status has a positive and highly significant effect on food security, with a coefficient of 0.6990 ($p < 0.01$), implying that married individuals are more likely to be food secure. The coefficient for educational level is also positive but not significant (coefficient of 0.0870, $p > 0.10$), indicating that educational attainment alone does not significantly contribute to food security. The training participation variable, although positive, is not statistically significant (coefficient of 0.1740, $p > 0.10$), suggesting that agricultural training does not have a significant direct impact on food security in this model.

On the other hand, the adoption of modern agricultural practices significantly contributes to food security, with a coefficient of 0.2150 ($p < 0.01$), highlighting that the use of modern farming techniques improves food security. Access to capital also has a positive but statistically insignificant effect on food security (coefficient of 0.2960, $p > 0.10$), suggesting that financial access, while important, does not show a significant influence on food security in this model.

The Pseudo R^2 value of 0.2680 indicates that the model explains approximately 26.8% of the variation in food security status. The Wald χ^2 statistic of 76.9100 ($p < 0.01$) confirms that the model is statistically significant and the predictors jointly have a meaningful impact on food security.

In summary, the results of both models suggest that practical agricultural training and the adoption of modern agricultural practices are crucial factors in enhancing food production and improving food security among young farmers in Mubi North

LGA. While access to capital and marital status also play significant roles, other factors like gender, educational level, and age do not show strong associations with food security or crop yield in this study. The findings underscore the importance of targeted agricultural interventions, particularly in terms of training and adopting modern practices, to improve both food production and food security in this region.

Discussion of Findings

The findings of this study offer a comprehensive view of how practical agricultural training can positively influence food production capacity and food security among young farmers in Mubi North Local Government Area (LGA). The results from the OLS and Logit models reveal significant relationships between training participation, adoption of modern agricultural practices, and key socio-demographic variables, aligning with and extending the findings from previous research.

The positive impact of training participation on crop yield (coefficient of 0.2410, $p < 0.01$) is consistent with the results of previous studies, such as Adebayo et al. (2024), who found that farmers who participated in extension programs experienced substantial yield increases. This outcome supports the Human Capital Theory, which suggests that investments in education and skills acquisition can lead to higher productivity (Becker, 1964). The significant contribution of practical agricultural training to crop yield also aligns with Okafor and Eze (2023), who emphasized that experiential learning in agriculture improves both skill levels and farming practices, leading to higher yields. Furthermore, the findings resonate with the work of Adebisi and Nwosu (2024), who noted that access to agricultural training boosts productivity, especially among young farmers in Nigeria, highlighting the critical role of training in bridging the gap between traditional and modern farming techniques.

The adoption of modern agricultural practices was another key factor positively influencing both crop yield and food security. The OLS model shows a coefficient of 0.2970 ($p < 0.01$) for crop yield, while the Logit model shows a coefficient of 0.2150 ($p < 0.01$) for food security. These results echo the findings of Chukwu and Bello

(2022), who found that integrating modern practices, such as improved crop varieties and sustainable farming techniques, is essential for improving food security and productivity. Similarly, Ogunleke and Idowu (2025) argued that the adoption of climate-smart agricultural practices can increase resilience and productivity, which is particularly relevant in regions like Mubi North that are vulnerable to environmental stressors. The positive effects of modern agricultural practices in this study further underscore the importance of incorporating such techniques into training programs to boost both food production and security.

In contrast, the lack of significance of the gender variable in relation to crop yield and food security contrasts with studies like Adeyemi and Bello (2024), who highlighted the role of women in improving household food security through participation in agricultural training. The gender disparity observed in the demographic profile (with 60% male participation compared to 40% female) might explain the lack of significant effects in this study. While women play a crucial role in household food management and nutrition (Eze & Amadi, 2023), gender dynamics in Mubi North might limit the impact of gender on food security outcomes. This highlights the need for more inclusive agricultural programs that encourage greater female participation, as advocated by Eze and Amadi (2023), to ensure that the benefits of training are more evenly distributed across genders.

Regarding marital status, the significant positive relationship with food security (coefficient of 0.6990, $p < 0.01$) aligns with findings from Chukwuemeka and Ibe (2022), who noted that household support structures, often stronger among married individuals, contribute to better farming outcomes and food security. This finding suggests that married young farmers in Mubi North may benefit from stronger labor and financial support, leading to greater food security. The positive association between marital status and food security echoes the results of Adeola and Okoye (2024), who found that family structures play a critical role in enhancing food security through shared resources and collective decision-making.

While access to capital positively influenced crop yield in the OLS model (coefficient of 0.0540, $p < 0.05$), its lack of significance in the Logit model for food security aligns with the conclusions of Onwuaroh et al. (2024), who pointed out that limited access to credit and financial resources remains a persistent barrier to productivity among young farmers. Despite the availability of capital, other challenges such as inadequate infrastructure, poor market access, and limited extension services may hinder its potential to improve food security. This supports the findings of Akinbile and Ndaghu (2024), who argued that access to capital alone is insufficient to address the broader systemic issues that limit agricultural productivity and food security in northern Nigeria.

The lack of significance of educational level on both crop yield and food security contradicts the findings of Tijani and Umar (2024), who emphasized the positive correlation between higher educational attainment and improved agricultural productivity. However, in the context of Mubi North, the limited impact of education might reflect a gap between formal education and practical, context-specific agricultural knowledge. As noted by Adebisi and Nwosu (2024), formal education may not necessarily equip farmers with the practical skills needed to optimize agricultural productivity, which underscores the importance of focusing on practical, hands-on training over academic qualifications alone.

In summary, the findings of this study support the critical role of practical agricultural training and the adoption of modern agricultural practices in enhancing food production and food security among young farmers in Mubi North LGA. The results also highlight the importance of socio-demographic factors such as marital status and access to capital, while pointing to the need for more inclusive programs to address gender disparities and the limitations of formal education in improving agricultural outcomes. These findings contribute to the existing body of literature by providing localized insights into the challenges and opportunities for improving food security through agricultural training programs, particularly in regions like Mubi North, where socio-economic and environmental factors significantly influence farming practices. The study also reinforces the need for comprehensive, context-

sensitive interventions that address both production and systemic challenges to improve food security in rural Nigeria.

Conclusion and Recommendations

In conclusion, this study highlights the significant impact of practical agricultural training on food production capacity and food security among young farmers in Mubi North LGA. The findings indicate that participation in agricultural training programs and the adoption of modern agricultural practices contribute positively to crop yield and food security. Additionally, socio-demographic factors, such as marital status and access to capital, play crucial roles in determining the success of agricultural practices. However, gender and educational level did not show significant effects in this study, pointing to the need for targeted interventions to address these gaps.

Based on these findings, it is recommended that agricultural training programs be further strengthened to include hands-on, practical skills that directly address the challenges faced by young farmers. These programs should emphasize modern agricultural techniques and climate-smart practices to increase productivity and resilience. Moreover, programs should consider tailoring content to the specific needs of different groups, including women, to ensure inclusive participation and equitable access to the benefits of these initiatives.

Additionally, improving access to capital and financial support is critical. Young farmers face significant challenges in securing loans or financial assistance, which hinders their ability to invest in essential farming inputs. The government and financial institutions should collaborate to create more accessible credit facilities and financing options for young farmers to help them scale their agricultural ventures.

Lastly, it is important for policymakers to consider the socio-economic and environmental factors specific to Mubi North when designing future agricultural interventions. Addressing infrastructure deficits, enhancing extension services, and

providing targeted support based on local realities will ensure that agricultural training programs lead to sustainable improvements in food security and farmers' livelihoods.

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