

Effects of FADAMA III Development Project on Livestock Farmers' Productivity and Food Security Status in Abuja, Nigeria

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Abstract: This research aimed to evaluate the impact of the FADAMA III Development Project on the productivity and food security of livestock farmers in Abuja, Nigeria. Using a multi-stage sampling approach, which included both purposive as well as simple random sampling techniques, 250 livestock farmers were selected. Primary data were collected and analyzed with descriptive and inferential statistics to meet the research objectives. The findings indicated that the average ages of livestock farmers who took part in the project and the age of those who didn't was 40 and 41, respectively. Approximately 45.8% of participants and 52.3% of non-participants had 10-17 years of farming experience. Additionally, the majority—75.8% of participants and 66.2% of non-participants—had received some level of formal education, which includes elementary to tertiary. Extension agents were crucial, serving as the main source of information about the FADAMA III Development Project for 72% of the participants. Logit regression analysis identified gender, farm size, marital status, association membership, access to inputs, and awareness level as significant factors influencing participation in the project at a 1% significance level. Moreover, the analysis showed that FADAMA III project's participants exhibited noticeably more productivity than non-participants, with a favorable effect of 234.971 kg/ha at a 1% significance level. Regarding food security, participants experienced lower levels of inadequate access to food compared to non-participants. Lastly, absence of capital was identified as the main challenge for livestock farmers in joining the project. According to the survey, farmers should diversify their sources of income by taking up non-farming endeavors to boost their income and overall productivity.

Keywords: FADAMA III, livestock, farmers, food security, extension, productivity.

INTRODUCTION

Agriculture is a key component of the Nigerian economy, playing a crucial role in providing employment, ensuring a sufficient and nutritious food supply essential for human development, and supplying raw materials to industries (Abubakar, 2021). It stands as the most significant non-oil economic sector and is the largest employer, accounting for about 70% of the labour force and contributing 40-70% of the Gross Domestic Product (GDP) in 2010, according to the National Bureau of Statistics (NBS, 2022). However, the

agricultural sector has encountered challenges due to the revelation of commercial oil, which led to a reduction in agriculture's contribution to national economic growth for over thirty years (Adeyemi and Balogun, 2023; Sennuga *et al.*, 2024a). This decline is mainly attributed to the increase in crude oil revenues. Before the year 1970, less than half of Nigeria's arable land was being cultivated (FMARD, 2023).

The oil boom era resulted in substantial food imports, with significant foreign exchange being spent on bringing in food products. Despite these imports,

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Food costs stayed high due to rural farmers lacked the technological means to participate in the international market and produce sufficient quantities (Adeyemi and Balogun, 2023). In response, several nationwide campaigns have been undertaken to increase production and decrease food imports. Various Nigerian administrations have launched several programs and policies to rejuvenate the agricultural sector (Salisu, 2016). These initiatives encompass the National Programme for Food Security, the National Fadama Programme and the Agricultural Transformation Agenda.

The implementation of commercial agriculture in Nigeria aims to get to the Millennium Development Goal (MDG) of food security, supported by the National Food Security Programme. This initiative focuses on ensuring food availability and sufficiency for the nation's population, including the export of surplus produce. It also provides rural residents and farmers with extension services, agricultural support, and rural development services. The transition from subsistence farming to commercial agriculture is crucial to guarantee the provision of food for Nigeria's growing population. Food security, defined by Ogundele (2023), means that individuals have physical, social, and economic access to adequate, safe, and nutritious food to meet their nutritional needs for a healthy and active life. Security of food in the home broadens this idea to highlight the well-being of individuals within families (Ameh *et al.*, 2023).

The FADAMA III Development Project aims to enhance agricultural production in Nigeria by promoting agriculture products being sold commercially, including production, processing, and marketing, particularly among small and medium-scale crop and livestock farmers. Funded by the African Development Bank, World Bank, and both Federal and State Governments, FADAMA III adopts a demanding approach where Commodity Interest Groups (CIGs) identify priority needs addressed through socially inclusive strategies. Capacity-building training is supported to ensuring FADAMA III project's successful implementation (World Bank, 2021). Abuja is among the states actively participating in the FADAMA III Development Project.

Nigeria is richly endowed with agricultural resources, yet the country struggles with low productivity and food security issues, particularly in livestock production. Challenges include limited access to modern inputs and the predominantly subsistence nature of rural farming systems (Ogundele, 2023). In response, the Nigerian Government has carried out a number of initiatives and policies aimed at boosting agricultural production (Abdulahi *et al.*, 2023). These initiatives encompass a wide range of efforts, such as the Marketing and Commodity Boards, the National Accelerated Livestock Production Programme (NAFFP), the Farm Settlement Scheme (FSS), Agricultural Development Projects (ADPs), the

Agricultural Credit and Guarantee Scheme Fund (ACGSF), the National Seed Service (NSS), the Directorate for Food, Roads and Rural Infrastructure (DFRRI), the National Agricultural Cooperative and Rural Development Bank (NACRDB), the Green Revolution (GR), the National Economic Empowerment and Development Strategies (NEEDS I and II), and the Comprehensive African Agricultural Development Programme (CAADP) (Bello, 2022; Odoh *et al.*, 2024).

Despite these efforts, achieving self-sufficiency in livestock production has proven challenging. Failures are attributed to the policy approaches that did not include beneficiaries in the project's design and implementation, and the appointment of extension staff based on political rather than professional criteria (Sennuga 2023). Moreover, delays in contributions from the World Bank, Federal Government, and State Government of Nigeria have been a recurring issue (Asiabaka, 2002). Leadership changes and inadequate monitoring and evaluation mechanisms have further hindered the effectiveness and objectives of these agricultural programs (Bello, 2022; Iiyasu *et al.*, 2023).

To boost productivity and income among Nigerian farmers and attain food security objectives, the Federal Government, in partnership with the World Bank, launched the FADAMA III Development Project. This strategy aims to give a better and conducive business environment for agriculture, promoting the shift transitioning from industrial agricultural to subsistence farming (Sennuga *et al.*, 2023). It focuses on improving access to advanced technology, infrastructure, finance, and output markets for small and medium-scale livestock farmers. Despite FADAMA III project's introduction in 2009, not much has changed in the productivity and living standards of livestock farmers, highlighting a notable gap that requires additional exploration. This study aims to evaluate the effect of FADAMA III Development Project regarding the efficiency and dietary stability of livestock farmers in Abuja. To accomplish this, the following objectives are put forward:

- i. describe the socio-economic characteristics of the FADAMA III Development Project's participants and non-participants in the study area.
- ii. identify the sources of information by participants of the FADAMA III Development Project's operations and activities in the study area.
- iii. determine the factors influencing livestock farmers' participation in the FADAMA III Development Project in the study area.
- iv. determine the impact of the FADAMA III Development Project on the food Security and productivity of livestock farmers in the study area.

- v. identify the constraints to livestock farmers' engagement in the FADAMA III Development Project in the study area.

Thus, it is pertinent to clarify and improve the understanding of involvement and its effects as highlighted by the study.

LITERATURE REVIEW

Theoretical Framework

Impact Assessment Theory

Impact encompasses the extensive, enduring consequences on the economy, society, and environment stemming from project initiatives. Evaluating a program's impact involves determining if the services offered have positively influenced those who are given them. As noted by Adamu and Yusuf (2021), impact evaluation includes forecasting the future results of existing or planned actions. Its goal is to guarantee that projects, programs, and policies are economically feasible, socially equitable, and environmentally sound (Bello and Ajayi, 2023). Regularly assessing the effects of agricultural development initiatives is essential, and it is advised to consider both participant and non-participant viewpoints for a thorough evaluation (Alabi, 2022).

Conceptual Framework

The engagement of livestock farmers is vital for boosting productivity and ensuring food security in the region studied. Their active involvement is necessary for FADAMA III Development Project's effective execution.

According to Adedoyin (2021), participation is characterized as the inclusive and voluntary participation of all parties involved in formulating, developing policies and strategies, analyzing problems, identifying solutions, planning, implementing, and evaluating agricultural extension activities. Bello and Musa (2022) describe participation as the full commitment of both initiators and beneficiaries in jointly planned projects, involving multiple sectors, where farmers actively engage in decision-making processes. Umar and Ibrahim (2023) define participation as participating in activities, often with other farmers. It also involves individuals and groups participating in the agricultural development process to achieve self-reliance and improve living standards (Alabi, 2022).

The study's independent variables include age, contact with household size, extension services, level of education, years of farming experience, membership in social organizations, and access to inputs. These variables are expected to influence participation in the FADAMA III Development Project. It is anticipated that increased participation will positively impact productivity and food security, ultimately enhancing overall living standards.

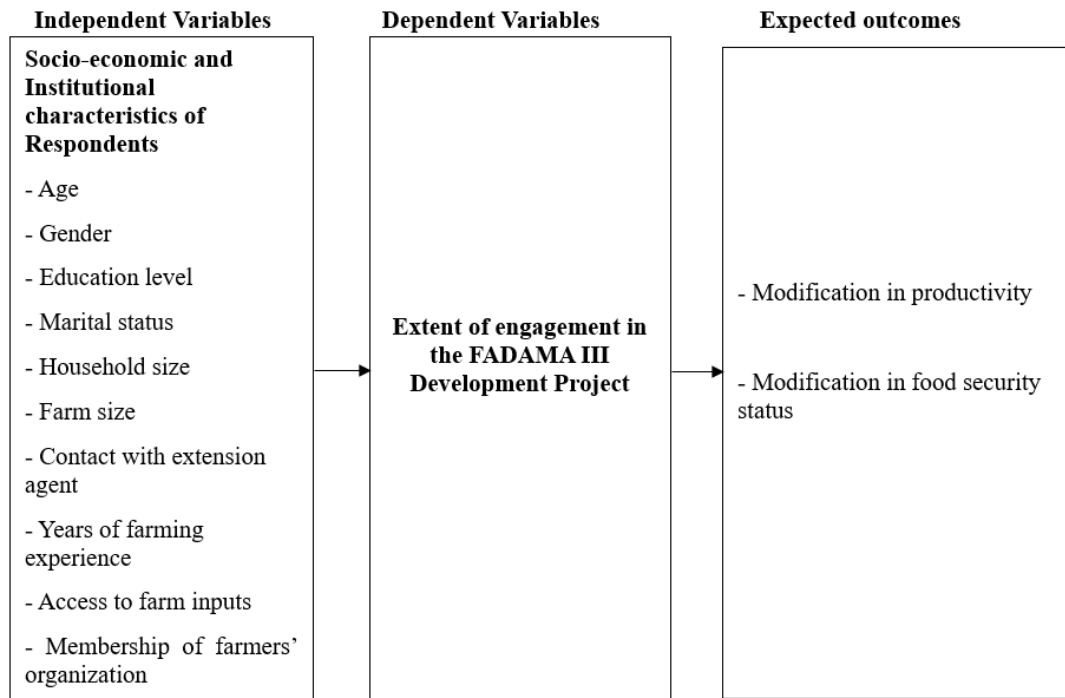


Fig 1: Conceptual framework of the study

MATERIALS AND METHODS

The research was done in Abuja, the Federal Capital Territory of Nigeria, situated in the Northern-Central region of the country. Abuja spans from approximately 60°45' to 70°45' east longitude and 80°25'

north latitude. It covers an area exceeding 8,000 square kilometers, with an elevation of about 536 meters above sea level. As of the 2006 census, Abuja had a population of 776,298. It shares borders with four states: Abuja Municipal Area Council (AMAC), Nasarawa, Niger,

Kogi, and Kaduna. Abuja comprises six district councils: Abaji, Kuje, Bwari, Kwali, and the Gwagwalada. The region features northern Guinea Savannah Grassland and Middle Belt characteristics, with a tropical southern forest climate. Abuja benefits from fertile agricultural land due to favourable environmental circumstances, with a range of 1524 to 1635 millimetres of precipitation each year.

The harmattan season in Abuja typically begins in October and continues to April, with the rainy season lasting from April to October. The average temperature hovers around 29°C. Abuja's elevated position and varied landscape contribute to its moderate climate. Agriculture is the primary occupation in the region, characterized by livestock production and mixed cropping of crops such as sorghum, millet, rice, cassava, tomatoes, peppers, and potatoes. The area is equipped with essential infrastructure including water, electricity, healthcare, transportation, communication, and educational facilities (Salisu, 2016).

Population of the Study and Research Design

The primary population targeted by the study would be livestock farmers operating in the Abuja region. This includes both small-scale and possibly large-scale farmers that have been influenced by the FADAMA III Development Project. In particular, farmers who gain directly from the FADAMA III Development Project are essential, as their experiences and results will provide important insights into the project's effectiveness.

The study uses a quasi-experimental design to evaluate the effects of the FADAMA III Development Project on livestock farmers' productivity and food security in Abuja. It employs both cross-sectional and longitudinal data, comparing FADAMA III project's participants with non-participants. Data collection includes surveys and structured interviews for primary data, and project reports for secondary data.

Sample Size and Sampling Techniques

In the Abuja region of Nigeria, six zones have an equal probability of selection. However, for the sake of this research, five zones were chosen purposively to ensure a thorough representation of the area which are Bwari, Gwagwalada, Kuje, Kwali, and the Abuja Municipal Area Council (AMAC). This approach allows for the focus on regions where the project's impact is most likely to be observed. Criteria for selecting these areas include the extent of FADAMA III project's activities, the variety of farming practices, and the demographic features of farming communities.

After identifying the target areas, random sampling is employed to select individual livestock farmers within these regions. This involves creating a list of all livestock farmers in the selected areas and randomly choosing 250 participants. Random sampling

helps eliminate selection bias and ensures that each farmer in the identified areas has an equal chance of being included in the study. This sample size is large enough to capture the diversity of experiences and outcomes among farmers while remaining manageable for data collection and analysis.

Data Collection

The primary technique for gathering data for this study was a structured questionnaire. Each survey session lasted approximately 1 hour and 9 minutes. The questionnaire focused on gathering data connected to the socio-economic traits of both participants and non-participants in the FADAMA III Development Project. Key themes cover household size, gender, farming experience, marital status, age, educational attainment, farm size, membership in organizations, and access to inputs such as fertilizers, seeds, and contact with extension services. Production information such as output of livestock (such as number of animals produced per year) and inputs (e.g., veterinary care, feed and labour), and yield (Kg/animal) of livestock. To ensure the validity and dependability of the questionnaire, it underwent a pre-test during a pilot study. This preliminary assessment involved 40 livestock farmers selected from Abaji Zone, which was not part of the main study sample. Through this pilot study, any ambiguities or concerns with the questionnaire were identified, allowing for adjustments to better its effectiveness and clarity.

Data Analysis

The gathered information was examined using descriptive statistics, which included percentages, frequency counts, and means displayed in tables. Additionally, inferential techniques, such as the logit regression model, were employed. Objectives (i), (ii), and (v) were addressed through descriptive statistics, while objective (iii) was tackled using the logit regression model. Objective (iv) was addressed through the Z-test and Food Security Line. A statistical analysis was carried by utilizing the Statistical Package for the Social Sciences (IBM SPSS) version 27.

Model specification

Logit Regression Model

A logistic regression model was employed to ascertain the factors influencing farmers participation in the FADAMA III Development Project in the study area. The regression equation is represented as:

$$Y = f(X_1, X_2, X_3, X_4, X_6, X_7, X_8, X_9)$$

The Logit model in its explicit form is expressed as:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + e$$

Where;

Y = Farmer Participating in the FADAMA III Development Project

e = Regression constant

β = Coefficients for the respective variables

X1 = Marital status
 X2 = Age
 X3 = Gender
 X4 = Farming experience
 X5 = Household size
 X6 = Farm size
 X7 = Educational attainment
 X8 = Membership of Cooperative
 X9 = Level of awareness
 X10 = Access to input
 X11 = Extension contacts
 Z – statistic

The Z-test was employed to fulfil a portion of the goal (iv), focusing on evaluating the effect of the FADAMA III Development Project on livestock farmers' livelihoods, particularly regarding productivity. This statistical method was applied to a sample size exceeding thirty (30). Within the research, the Z-test compared the productivity differences between FADAMA III project's participants and non-participants in the region. The Z-statistic is represented as follows:

$$Z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

Z = The computed Z score

\bar{X}_1 = Average productivity and mean calorie consumption of participants

\bar{X}_2 = Average productivity and mean calorie consumption of non-participant

n_1 = Number of participants in the sample

n_2 = Number of non-participants in the sample

S_1 = Standard deviation for participant

S_2 = Standard deviation for non-participant

Food Security Line

The Food Security Line was utilized to fulfil component of the objective (iv) in the study, helping to categorize farmers as either a stable or unstable food supply based on their status relative to this line. This line corresponds to the suggested daily intake of calories per person of 2,260 kilocalories (Babatunde, 2007). The research utilized a one-month (30 days) recall method. To calculate the per capita calorie intake for households, the estimated total calorie intake was divided by the household size, adjusted for adult equivalence based on age-sex consumption factors.

To find the daily per capita calorie intake, the monthly total was divided by 30. Households with a daily per capita intake of 2,260 kcal or more were categorised as having access to food, but those with lower intakes were deemed food insecure.

The food insecurity line is given as:

$$Z = Y_i / R$$

Where:

Z = food security status of *ith* livestock farmers

Y_i = Per capita daily calorie intake of the *ith* livestock farmer

R = Suggested daily per capita calorie intake (2260 kilocalories)

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Respondents

Table 1 shows that a significant percentage (74.2% for participants and 79.2% for non-participants) of the study's respondents is in the bracket age range of 34-53 years. The mean ages for participants and non-participants were 40 and 41 years, respectively. It indicates that majority of respondents were in a productive and economically active age group, capable of generating income from both agricultural and non-agricultural sources. This outcome is consistent with earlier studies findings by Adebayo and Ayinde (2021) and Alabi (2022), which suggest that individuals in productive age brackets are more likely to take part in community development activities and agricultural, such as cooperative societies.

The data in Table 1 shows that a significant majority (89.2% and 90.8%) of participants and non-participants were male, with approximately 10.8% and 9.2% being female. Yusuf and Adamu (2023) assert that a person's gender does not hinder active involvement in livestock production activities. However, they observed a common perception that men are often more energetic and readily available for physically demanding jobs such as farming. The lower participation of females in the FADAMA III Development Project could be attributed to their involvement in various other activities outside farming, such as food vending, hairdressing, tailoring, and petty trading, which are prevalent among the female participants in the research.

As stated by the findings in Table 1, approximately 83.3% of participants and about 85.4% of non-participants were married, while roughly 16.7% and 14.6% were single. Married individuals often benefit from having spouses and children who can provide affordable labour, potentially leading to expanded farm sizes, greater adoption of innovations, and increased overall farm productivity.

The findings from Table 1 shows that a lot of participants (98.3%) and approximately 89.2% of non-participants featured households with sizes varying from 1 to 14 members. The mean household sizes for participants and non-participants were 8 and 9 members, respectively. This suggests that the relatively large household sizes likely contribute to increased family labour available for farming activities, thereby supporting the productive capacities of farmers, which are already enhanced by their age. This result is in line with research by Okon and Bassey (2022), which suggests that bigger sizes in household are associated

with greater sustainable labour efficiency on farms, due to consistent labour availability.

Looking at of educational attainment among the sampled respondents in the study area, it was noted that a majority (75.8% of participants and 66.2% of non-participants) were educated. This indicates that the respondents were mainly People who exhibit elevated levels of education., and the farmers can be considered literate, given that only a small proportion (about 22% of participants and 34% of non-participants) had no formal education. This finding aligns with the observations of Adeyemi and Lawal (2020), who observed that the level of education achieved by farmers significantly influences their approach to interacting with extension officers.

According to the findings in Table 1, approximately 45.8% of participants and about 52.3% of non-participants had between 10-17 years spent in agriculture. The mean farming experience for participants and non-participants was 14 and 15 years, respectively. Farming experience serves as a measure of managerial ability, with more experienced farmers

typically making better farm decisions. This finding suggests that the majority of respondents had considerable years of farming experience, suggesting their capability to make decisions that enhance output and income. This finding aligns with the work of Kareem and Adebisi (2021), who found an average of 21 years of experience among rice farmers in Abuja and Niger States, Nigeria.

Additionally, the results Table 1 demonstrates that approximately 69.1% of participants and about 77.7% of non-participants farmed on 7.0-9.9 hectares, while about 28.3% of participants and about 20.7% of non-participants farmed on 5.0-6.9 hectares. The mean farm sizes for participants and non-participants were 7 hectares and 8 hectares, respectively. This suggests that the majority of respondents were medium to large-scale farmers, and based on Ojuekaiye and Olaoye (2022), classification of farm sizes where 0.1 hectare to 5.9 hectares are considered small farms. This scale of farming allows for significant investments and potential returns that can contribute to food security and increased productivity.

Table 1: Socioeconomic Characteristics of Respondents (n =250)

Characteristics	Participants (n=120)		Non-Participants (n= 130)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Age				
24-33	28	23.3	20	15.4
34-43	53	44.2	70	53.8
44-53	36	30.0	33	25.4
54-63	2	1.7	6	4.6
64-73	1	0.8	1	0.8
Mean		40		41
Sex				
Male	107	89.2	118	90.8
Female	13	10.8	12	9.2
Marital Status				
Married	100	83.3	111	85.4
Single	20	16.7	19	14.6
Household Size				
1-7	52	43.3	52	40.0
8-14	66	55.0	64	49.2
15-21	1	0.8	11	8.5
22-28	1	0.8	1	0.8
29-35	0	0.0	2	1.5
Mean		8		9
Educational Level	No			
Formal	29	24.2	44	33.8
Primary	7	5.8	10	7.7
Secondary	30	25.0	38	29.2
Tertiary	53	44.2	37	28.5
Others	1	0.8	1	0.8
Farming Experience				
2-9	28	23.3	22	16.9
10-17	55	45.8	68	52.3
18-25	30	25.0	30	23.1
26-33	6	5.0	7	5.4
34-41	1	0.8	2	1.5

42-49	0	0.0	1	0.8
Mean		14		15
Farm Size				
5.0-5.9	12	10.0	5	3.8
6.0-6.9	22	18.3	22	16.9
7.0-7.9	24	20.0	33	25.4
8.0-8.9	34	28.3	42	32.3
9.0-9.9	25	20.8	26	20.0
10.0 And Above	3	2.5	2	1.5
Mean		7		8

Source: Field study, 2024

Participants’ Sources of Information on FADAMA III Development Project

Table 2 indicates that 72 participants ranked extension agents as their primary source of information on the FADAMA III Development Project, followed by radio with 55 participants. Only a small number, 11 participants, sourced information from friends and relatives. This implies that extension services in Abuja

effectively reached a majority of participants to fulfil their information needs regarding the FADAMA III project, likely influenced by government efforts to promote agricultural enterprises. This finding aligns with the results of Kareem and Adebisi (2021); Sennuga *et al.* (2024b) who noted that a majority of fish farmers were aware of and accessed information through extension agents.

Table 2: Distribution of Participant According to Sources of Information on FADAMA III Development Project

Sources of information	Frequency	Ranking
Friends and relations	11	8 th
Extension agents	72	1 st
Television	40	5 th
Newspaper	12	7 th
Radio	55	2 nd
Mobile phone	20	6 th
Ministry of Agriculture	51	3 rd
Fliers	43	4 th

Multiple Response Allowed*

Source: Field study, 2024

Factors Influencing Farmers’ Participation in FADAMA III Development Project

The analysis considered farmers’ socioeconomic and institutional factors such as membership in associations, household size, marital status, educational level, gender, farming experience, age, farm size, level of awareness, extension contact, and access to inputs.

The findings from Table 3 demonstrates that the Chi-square value for the regression is 38.69, that is important statistically at the 1% threshold. The model has a high negative Log likelihood of -188.360, which displays a good fit. This suggests that the explanatory variables in the calculated logit model effectively account for the probability of a respondent's participation in the FADAMA III Development Project. The results further demonstrate that the R-squared (R²) value is 0.6475, which is also significant at the 1% level. Among the eleven factors tested, six factors had coefficients that were statistically meaningful: gender, farm size, marital status, membership in associations, access to inputs, and level of awareness. These factors are identified as

important predictors influencing participation in the FADAMA III Development Project.

The coefficient for gender (9.12) was determined to be at least 1% statistically significant and had a positive impact on the willingness to take part in the FADAMA III Development Project. This implies that the gender of respondents significantly affected their participation in the FADAMA III project, with male farmers having a higher probability of participating compared to female farmers. These outcomes are not the same as those of Adeyemi and Lawal (2020), who noted that females are primarily involved in urban agriculture activities.

Similarly, the coefficient for farm size (4.56) was statistically significant at the 5% level and positively influenced the willingness to take part in the FADAMA III Development Project. This suggests that bigger farm sizes enhance the likelihood of participation in the project. These results contrast with those of Ojuekaiye and Olaoye (2022), Dahunsi *et al.* (2023) who discovered that the majority of urban farmers in Nigeria operate on a small scale. Additionally, the coefficient for marital

status (2.65) was also statistically significant at the 5% level, showing a better response on the willingness to participate in the FADAMA III Development Project. This suggests that married individuals are more inclined to participate in the project. This finding may lead to increased labor availability on farms, given that many agricultural activities require significant labor (Adedoyin, 2021). Therefore, women and children can serve as a cost-effective labour source, potentially leading to increased farm size, adoption of innovations, and overall farm productivity. This, in turn, can result in higher incomes for farmers and improved capacity to repay loans.

The coefficient for membership in associations (14.53) was found to be statistically significant at the 5% level of probability, indicating a positive influence on participation in the FADAMA III Development Project. This implies that those who responded were members of associations were more likely to take part in the FADAMA III Development Project, compared to people who were blind to the benefits of belonging to cooperatives. Being a member of an association increased the likelihood of taking part in the FADAMA

III Development Project. This finding aligns with Alabi (2022), who observed that increased participation in social organizations leads to greater interaction between farmers and earlier adoption of innovations.

The coefficient for access to inputs (11.39) was shown to be statistically significant 5% level, indicating a positive impact on the willingness to participate in the FADAMA III Development Project. This suggests that those who responded had better access to inputs were more motivated to participate in the FADAMA III Development Project.

Similarly, the coefficient for level of awareness (5.57) demonstrated statistical significance at the 5% level and had a favorable impact on the willingness to participate in the FADAMA III Development Project. This suggests that respondents' awareness positively affected their participation in the project, increasing the probability. This finding underscores the importance of awareness campaigns and information dissemination in promoting participation in agricultural development projects.

Table 3: Factors Influencing Livestock Farmers' Participation in FADAMA III Development Project

Variable	Coefficient	Standard error	Marginal effect	T-value
Constant	-23.24	4.25	0.63	-6.57
Age	5.36	6.26	0.82	1.20
Sex	9.12***	1.21	0.78	7.64
Marital Status	2.65**	1.04	0.10	2.22
Household Size	1.34	9.66	0.6	0.19
Educational Level	1.78	3.23	0.06	0.65
Farming Experience	7.34	5.65	0.88	1.21
Farm Size	4.56**	2.34	0.07	1.34
Membership of Association	14.53**	8.88	0.25	1.76
Level of Awareness	5.57***	1.86	0.49	3.03
Access to Inputs	11.18**	5.56	0.88	2.29
Extension Contact	2.20	2.77	0.32	0.78
Number of Observation	250.00			
LR Chi ² (11)	38.69			
Pseudo R ²	0.64750			
P-Value	0.0000			
Log likelihood	-188.360			

Note: ***, **, * and ^{NS} indicate significance at 1%, 5% and 10% probability level respectively

Source: Field Study, 2024

Effects of FADAMA III Development Project on Productivity of Livestock farmers

Table 4 displays the results regarding the effects of the FADAMA III Development Project on the productivity of participants and non-participants, using yield (kg/animal) as a proxy for productivity. The productivity values of both groups were subjected to a Z-test. The analysis reveals that the productivity of participants is significantly different from that of non-participants which is 1% level of probability (two-tailed). The calculated Z-value of 6.47 exceeds the tabulated Z-value of 1.88, indicating a significant difference in

productivity between the two groups. Furthermore, the mean difference in productivity values between participants and non-participants is positive (881.846 - 646.875 = 234.971). This positive mean difference seeks to find the FADAMA III Development Project had a beneficial influence on output of participants. A positive mean difference in productivity is indicative of a positive project impact on beneficiaries' productivity, as noted by Abubakar (2021). These results are consistent with previous studies. by Ogundele (2023) and Bello (2022), which reported that beneficiaries of agricultural projects,

such as the FADAMA project, experienced better income and productivity compared to non-beneficiaries.

Table 4: Impact of FADAMA III Development Project on productivity of livestock farmers

	Participants	Non-participants
Mean	881.846	646.875
Variance	204420.2	89734.20
Observations	120	130
Hypothesized Mean Difference	0	
Z-Computed	6.478923***	
P(Z<=Z) One-Tail	1.63E-14	
Z Critical One-Tail	1.784846	
P(Z<=Z) Two-Tail	2.72E-14	
Z Critical Two-Tail	1.857865	

Note: ***indicate significance at 1% probability level respectively

Source: Field Study, 2024

Impact of FADAMA III Development Project on Food Security Status of Livestock Farmers

Table 5 outlines the impact of the FADAMA III Development Project on the food security status of both participants and non-participants. Using the amount of calories that are advised to be consumed daily of 2,260 kcal as a benchmark, the headcount ratio reveals that 59% of participants, who had an average daily per capita household calorie consumption of 3,901.60 kcal, were food secure. In contrast, 38% of participants, averaging 1,744.53 kcal daily per capita, were deemed food insecure. For non-participants, the headcount ratio indicates that 31% were food secure, with an average daily per capita calorie consumption of 3,097.62 kcal, while 62% were food insecure, consuming an average of 1,494.72 kcal daily per capita. This finding aligns with Salisu (2021), who also utilized the 2,260-kcal benchmark to assess food security. The findings indicate that the individuals were significantly more food secure ($P < 0.10$) than non-participants, underscoring a positive

influence of the FADAMA III Development Project on food security for beneficiaries.

Considering the food security profiles of the FADAMA III project’s participants and non-participants, it may be concluded that participants faced lower levels of food insecurity. This indicates that involvement in the FADAMA III Development Project has indeed enhanced food security among livestock farming households taking part in the project. Promoting participation in FADAMA III Development Project agricultural initiatives could therefore be a viable strategy for alleviating food insecurity in rural households engaged in livestock farming. These findings are consistent with other research exploring the result of agricultural technologies on food security, including studies by Bello and Ajayi (2023), Alabi (2022), and Adedoyin (2021), which also highlight the beneficial effects of agricultural interventions on food security in rural communities.

Table 5: Distribution of the livestock farmers by their food security status

STATISTICS	PARTICIPANTS		NON-PARTICIPANTS	
	Food secure	Food insecure	Food secure	Food insecure
Frequency	79	41	50	80
Average daily calorie intake (kcal)	3901.60	1744.53	3097.62	1494.72
Maximum daily calorie intake (kcal)	19487.70	2156.45	8321.70	2148.22
Minimum daily calorie intake (kcal)	2458.51	856.22	2174.43	721.67
Head count ratio (H)	0.59	0.38	0.31	0.62
Standard deviation	1501.29	385.03	1422.15	358.62

Source: Field Study, 2024

Constraints to Livestock Farmers’ Participation in the FADAMA III Development Project

Table 6 presents the constraints to farmers' participation in the FADAMA III Development Project. The findings indicate that 130 respondents ranked lack of starting capital as the primary constraint. This was followed by 121 respondents identifying lack of land for

grazing as the second constraint. Additionally, approximately 109 respondents cited the high cost of inputs such as veterinary services, feeds, and medication as the third constraint. Other constraints mentioned include low pricing, lack of proper awareness, high management intensity, and rules and regulations, which were ranked by 49, 30, 8, and 6 respondents respectively.

These findings are in agreement with studies by Umar and Ibrahim (2023) and Adedoyin (2021), which highlight inadequate capital, high costs of farm inputs,

and poor access to loans among the challenges faced by members of cooperative societies.

Table 6: Constraints to livestock farmers' participation in the FADAMA III Development Project

Constraints	Frequency	Ranking
Lack of land for grazing	121	2 nd
Lack of Capital	130	1 st
High Cost of Inputs	109	3 rd
High Intensive Management	8	6 th
No Proper Awareness	30	5 th
Low Pricing	49	4 th
Rules and Regulation	6	7 th

Multiple Response Allowed*

Source: Field Study, 2024

CONCLUSION AND RECOMMENDATIONS

The respondents' socioeconomic characteristics demonstrated that the mean ages of participants and non-participants in the FADAMA III Development Project were 40 and 41 years, respectively. Most of the both participants and non-participants (89.2% and 90.8%, respectively) were male. Additionally, about 83% of participants and 85% of non-participants were married. In terms of education, a majority of participants (75.8%) and non-participants (66.2%) had formal education. Furthermore, a significant portion of both groups (69.1% of participants and 77.7% of non-participants) were medium to large-scale livestock farmers. These findings provide a snapshot of the socio-economic characteristics of participants and non-participants in the FADAMA III Development Project, highlighting demographic and educational backgrounds additionally farming scale.

In Abuja, extension agents were recognized as the most efficient information source for participants seeking information on the FADAMA III Development Project. Approximately 72% of the participants relied on extension agents for information in the study area.

The study identified gender, marital status, membership of association, farm size, level of awareness, and access to inputs as significant factors influencing livestock farmers' participation in the FADAMA III Development Project. These factors were determined to be significant at both the 1% and 5% levels of significance.

The Z-test analysis showed a notable difference in productivity (yield) between participants and non-participants in the FADAMA III Development Project. The difference in productivity was calculated at 234.971 kg/ha, with a calculated Z-value of 6.47 exceeding the tabulated Z-value of 1.88 at the 1% significance level. Therefore, the study rejects the null hypothesis, which posited no notable difference in productivity between participants and non-participants in the FADAMA III Development Project.

Based on the food security profiles of participants and non-participants in the FADAMA III Development Project, It might be inferred that participants experienced lower levels of insufficient food compared to non-participants, with statistical significance at ($P < 0.10$). The primary constraint faced by participants of the FADAMA III Development Project was identified as lack of capital. Other significant constraints included lack of land for grazing, low pricing, high costs of inputs, intensive management requirements, lack of proper awareness, and regulatory constraints.

Participation in the FADAMA III Development Project has had a positive and significant impact on the productivity and food security status of livestock farming households in the research field. Participants in the FADAMA III Development Project demonstrated lower levels of food insecurity compared to non-participants, likely due to their involvement in the project. These findings indicate that participating in FADAMA III Development Project contributes significantly to improving both productivity and food security among livestock farming households within the research area., the following recommendations are made:

- i. In light of the results of the Z-test analysis, the FADAMA III Development Project has positively impacted the livelihoods (productivity and food security status) of the participants. It is recommended that farmers explore commercial agriculture and seek loans to continue benefiting from the project's advantages.
- ii. Lack of starting capital was cited as the primary constraint by most respondents in participating in the FADAMA III Development Project. Since cooperative societies and banks may not fully provide the needed funds, farmers should diversify their livelihood activities by engaging in non-farming activities to supplement family income and increase productivity.
- iii. High costs of farm inputs such as veterinary services, feeds, and medication were major constraints mentioned by respondents in

participating in the FADAMA III Development Project. Cooperative societies could establish links with input suppliers to enable group purchases at factory costs, thereby reducing production expenses.

- iv. Lack of land for grazing was identified as a significant constraint in participating in the FADAMA III Development Project. To address land fragmentation issues, the government could acquire large tracts of land and lease them to livestock farmers at subsidized rates. This approach would improve land access and lower rental costs. Additionally, reviewing the Land Use Act of 1990 in Nigeria could facilitate access to land for landless farmers who contribute significantly to livestock production.

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