



## IMPACT OF ANCHOR- BORROWERS' PROGRAMME (ABP) ON RICE FARMING IN FEDERAL CAPITAL TERRITORY, ABUJA NIGERIA

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### ABSTRACT

The study investigates the impact of Anchor Borrowers' Programme on rice farming in the Federal Capital Territory Abuja, Nigeria. Multi-stage sampling technique was used to randomly select 357 respondents (162 beneficiaries and 195 non-beneficiaries). Data were collected using questionnaire. The data were analysed using descriptive statistics, Logistic regression model, Propensity Score Matching (PSM) and Gross Margin Analysis. The mean age of beneficiaries and non-beneficiaries were 37 and 49 years, respectively; 72.2% and 76.1% were male; 82.1% and 75% were married, respectively. Beneficiaries and non-beneficiaries on the average had farm size of 2 hectares approximately. The result of the logistic regression on determinant of participation in the ABP reveals that the model is statistically significant with pseudo-R-square of (0.563) indicating that about 56.3% of the variation in participation in the ABP explained by the socioeconomics characteristics considered in the model which are annual income with a coefficient of (4.198 at  $P < 0.01$ ), membership of association with a coefficient of (4.309 at  $P < 0.01$ ) and, farming experience with a coefficient of (0.247 at  $P < 0.01$ ), marital status with a coefficient of (0.803 at  $P < 0.10$ ), Age with coefficient of (-0.133 at  $P < 0.01$ ), Household size with a coefficient of (-0.244 at  $P < 0.05$ ), Farm size with a coefficient of (-0.313 at  $P < 0.10$ ), Access to extension has a coefficient of (-1.084 at  $P < 0.10$ ). PSM result on output reveals ATE of 18.1 bags significant ( $t=5.60$ ,  $P < 0.01$ ). The study concludes that ABP impacted positively on rice yield of beneficiaries in the Federal Capital Territory Abuja, Nigeria. The study recommends that, anchor borrowers programme should remove/cut down bureaucratic bottleneck that discourage intending farmers from participating in the programme; more female farmers should also be enrolled by ABP to bridge the gap between male farmers who benefited from the programme and farm inputs and credit facilities must be provided to farmers in a timely manner to ensure prompt preparation for farming activities.

**Keywords:** Anchor-borrower, Rice, Farming, Participation, Beneficiary, Non-beneficiary.

### INTRODUCTION

The agriculture sector has been the mainstay of the Nigerian economy since independence and despite several bottlenecks, it remains a resilient sustainer of the populace. Agriculture accounts for 24.64% of the Gross Domestic Product (GDP) (NBS, 2024) and provides employment for approximately 75% of the labour force in Nigeria (CIA, 2022). Furthermore, it stands as the predominant economic endeavor in rural regions, where nearly half of the populace resides. The agriculture sector has several untapped potentials for growth and development with the availability of land, water, labour and its large internal markets. Approximately 84 million hectares of Nigeria's land mass are believed to hold agricultural potential, yet merely 41% of this expanse is currently utilized for cultivation, as reported by FMAFS in 2023. Productivity in the cultivated lands is also low due to small farm holdings and underdeveloped farming methods. Nigeria has therefore become heavily dependent on food imports. Nigeria possesses considerable potential for irrigation, boasting surface water resources amounting to approximately 267.7 billion cubic meters and underground water resources totaling around 57.9 billion cubic meters (Chauvin *et al.*, 2012; Lipton, 2012; Salisu *et al.*, 2022). The country's sizable and expanding population offers promising prospects for a dynamic domestic market conducive to enhancing agricultural productivity.

Successive governments in Nigeria have prioritized the provision of institutional credit to smallholder farmers as a key policy objective. The initial endeavor to infuse financial resources into the agricultural sector occurred during the 1962 to 1968 Development Plan, spearheaded by the Federal



Government. This initiative allocated six million naira (₦6m) towards the development of the agricultural subsector of the economy (FMEP, 2021). Following this, bank credits to the agricultural sector in nominal terms over the years increased from ₦ 230 million in 1978 to over ₦342 billion in 2022 (CBN, 2023). Recognizing the necessity for enhancing food production and embracing modern agricultural advancements, it is understood that farmers must seek financial assistance from lending institutions (Obasi *et al.*, 2015). Moved by the desire to reduce import dependency, as well as by the need to relieve dependence on the oil sector for economic growth, Federal and State governments stepped up efforts to promote agricultural development through the establishment of a number of agricultural credit schemes. These schemes include the Agricultural Credit Guarantee Scheme Fund (ACGSF) established in 1978, the Supervised Agricultural Credit Scheme (SACS) established in 1979, the Special Emergency Agricultural Loans Scheme (SEALS) established in 1984, the Agricultural Credit Support Scheme (ACSS) established in 2006. During the era of Sanusi Lamido Sanusi as Governor of the Central Bank of Nigeria, various schemes were also established, such as the Commercial Agricultural Credit Scheme (CACCS) established in 2009, the Small and Medium Scale Enterprise Credit Guarantee Scheme (SMECGS) established in 2010, and the establishment of the Nigerian Incentive based Risk Sharing system for Agricultural Lending (NIRSAL) in 2010; though not a scheme as such, but it encourages farmers to insure their farms against natural disaster, and to borrow from commercial banks guaranteeing the interest paid by the farmer up to 60%.

The Federal Government of Nigeria, in collaboration with the Central Bank of Nigeria, launched the Anchor Borrowers' Programme (ABP) to address these challenges comprehensively. Implemented in selected states, the program aimed at establishing an ecosystem connecting smallholder farmers with local processors, enhance bank financing in the agricultural sector, boost capacity utilization among agricultural anchor companies, and elevate the productivity and incomes of farmers. Additionally, it seeks to enhance the capacities of banks, farmers, and agricultural entrepreneurs while curbing commodity imports and preserving external reserves. By mitigating poverty among smallholder farmers, creating employment opportunities, and facilitating the transition from subsistence to commercial farming, the ABP fosters the emergence of a new generation of farmers and entrepreneurs. This initiative is specifically tailored to reduce the operational costs of farming, increase rice production, and uplift the living standards of farmers (FMAFS, 2023). The inability of rice farmers to access credit, modern farm inputs and other machineries at affordable prices makes them to be perpetually poor as farm size and yield remain stagnated. Rice production in Nigeria slowed to 5.23 million metric tonnes in 2024, down from 5.61 million metric tonnes in 2023 and 5.41 million metric tonnes in 2022 (USDA, 2024). Consumption of rice in Nigeria has surpassed seven million metric tonnes annually over the past five years. In 2024 alone, rice consumption reached approximately 7.6 million metric tonnes, an increase from 7.55 million metric tonnes in 2023 and 7.5 million in 2022 (USDA, 2024). This shortfall between local production and demand has led to increased imports. In 2024, importation surged to 2.4 million metric tonnes from 1.89 million in 2023 at the expense of paucity national reserve. In response to these challenges posed by high cost of farm inputs among rice farmers in Nigeria, successive governments have adopted different policies such as tariff protection, subsidy, and credit support for rice production which have all functioned to stimulate small holders rice production. One of such credit support schemes is the Anchor Borrowers' Programme (ABP) (USAID, 2008).

Several empirical studies have been carried out to appraise the CBN programmes and schemes in agricultural development in Nigeria. For instance, Okeke *et al.* (2019) assessed the impact of ABP among rice farmers in Benue state.; Omoregie *et al.* (2018) investigated the impact of credit supply on rice output (RO) in Nigeria within the periods 1981-2016.; Ayinde *et al.* (2018) assessed anchor borrowers' programme central bank of Nigeria's intervention on rice production in Kwara state.; Olarenwaju (2019) assessed the awareness and adoption of Anchor Borrowers' Programme among rice farmers in Kaduna state.; Umeh & Adejo (2019) investigated the effects of Central Bank of Nigeria's Anchor Borrowers' Programme on rice farmers in Kebbi State Nigeria. However, no empirical data on the impact of the Anchor Borrowers' Programme on smallholders Rice farmers in the Federal Capital



Territory (FCT) Abuja. Thus, this study is aimed at bridging this knowledge gaps by providing answers to the following research questions;

- What are the socio-economic characteristics of beneficiaries and non-beneficiaries of Anchor Borrowers Programme?
- What are the determinants of participation in the Anchor Borrowers Programme?
- What is the impact of the programme participation on rice yield among rice farmers?

## METHODOLOGY

### The Study Area

The study was conducted in the Federal Capital Territory, Abuja. The federal capital territory is located in the geographical centre of Nigeria, with a land area of 8, 000 square kilometres and lies between latitude 9° 10' north of the equator and longitude 7° 11' East. It is bounded in the North by Kaduna state, in the West by Niger state, in the East by Nasarawa state and in the South by Kogi state; and it is made up of six area councils namely Gwagwalada, Kuje, Kwali, Bwari and Abuja Municipal. The major communities with high intensity of farming activities are Nyanya, Karu, Gwagwalada, Kuje, Abaji, Karshi, Bwari, Kwali and Garki. The study area experiences a tropical wet and dry climate (Koppen. Aw) characterized by high temperatures year-round, with distinct rainy (April-October) and dry (October-April) seasons. Daily temperatures range from 60<sup>0</sup>F to 93<sup>0</sup>F (15<sup>0</sup>C-34<sup>0</sup>C), often exceeding 30<sup>0</sup>C, with March being the hottest month and December the coolest. The Federal Capital Territory, Abuja is one of the fastest growing cities in Africa with a 2022 estimate of 3.06 million and with about 5% annual growth rate, the 2025 estimate of the population was put at 4.21 million and the 2026 estimate at 4.39 million. Farming is the major occupation of the people in the area and the crops grown are tomatoes, cowpea, soybean, maize, rice, yam and livestock reared include poultry, goats, sheep and cattle (FCT, 2007)

### Sampling Techniques and sample size

Multistage sampling procedure was used to select two categories of respondents (beneficiaries and non-beneficiaries of ABP). The Federal Capital Territory, Abuja is divided into six area councils (Kwali, Abaji, Gwagwalada, Kuje, Bwari and AMAC), which also served as the agricultural zones. The first stage, involved purposive selection of four LGAs based on their high concentration of Anchor Borrowers Programme registered rice farmers. Therefore, Kwali, Gwagwalada, Abaji and Kuje were purposively chosen in accordance with the concentration of ABP beneficiaries Rice farmers. The second stage, used a stratified sampling technique to randomly select 162 beneficiaries and 195 non-beneficiaries of anchor-borrowers programme. The sample frame of beneficiaries and non-beneficiaries of the Anchor Borrowers Programme in the FCT was obtained from the FCT Agricultural Development Programme headquartered in Gwagwalada Area Council. This can be seen in Table 1.

**Table 1:** Sample Size Selection Plan

Zone	Number of beneficiaries ABP	of Sample of size	Number of non-beneficiaries of ABP	of Sample size	Total Sample size
Kwali	2700	54	3263	65	119
Abaji	2500	50	2888	58	108
Gwagwalada	1700	34	2135	43	77
Kuje	1200	24	1452	29	53
<b>Total</b>	<b>8100</b>	<b>162</b>	<b>9738</b>	<b>195</b>	<b>357</b>

Source: FCT ADP, 2023

### Method of Data Collection

Data for this study were collected using a well-structured questionnaire. The questionnaire was divided into ABP beneficiary and ABP non-beneficiary component. Each questionnaire consisted of 3 sections; A, B and C. Section A dealt with the socio-economic characteristics of the respondents.



Section B centred on the determinants of participation of rice farmer in the programme which is objective 2. Section C focused on the impact of anchor borrowers' programme on rice yield among beneficiaries and non-beneficiaries which is objective 3.

**Method of Data Analysis**

Data for this study were analysed using both descriptive and inferential statistics. The socio-economic characteristics of beneficiaries and non-beneficiaries was analysed using descriptive statistics such as frequency and percentages. Logit regression analysis was used to assess determinants of participation in the anchor borrowers' programme. Propensity Score Matching (PSM) was used to determine the impact of anchor borrowers' programme.

The logistic model was used to estimate the determinant of participation on the ABP by the respondents. The model is expressed as follows:

$$Y_i = \ln \left( \frac{pi}{1-pi} \right) = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + e \dots (1)$$

$$= \ln(p/1-p) = B_0 + B_1 X_1 + B_2 X_2 + \dots + B_n X_n + e \dots (2)$$

Where

P = is the probability of the outcome

Y<sub>i</sub> = 1 if success i.e. respondent participated in ABP

Y<sub>i</sub> = 0 if failure i.e. if respondent did not participate in ABP

β<sub>0</sub> = Constant term/ the intercept

β<sub>1</sub>, ...β<sub>n</sub> = Logistic regression coefficients for predictor variables

X<sub>1</sub>, X<sub>2</sub>, .....X<sub>n</sub> (predictor variables): the independent variables used to predict the outcome

μ = error term

The independent variables specified as determinants of participation in ABP are

X<sub>1</sub> = Sex (1 = Male, 0 otherwise)

X<sub>2</sub> = Age (years)

X<sub>3</sub> = Household size (in number)

X<sub>4</sub> = Membership of farmers- based association (1= yes, otherwise = 0.)

X<sub>5</sub> = Years of experience in Rice farming (years)

X<sub>6</sub> = Educational level (years of schooling)

X<sub>7</sub> = Annual income (naira)

X<sub>8</sub> = Farm size (in hectares)

X<sub>9</sub> = Access to extension workers (if yes = 1, 0 = no)

This study focused on estimating the average effect of treatment on the treated (ATT). This estimated the average impact among ABP beneficiaries and if applied to non-beneficiaries, D=0. This is defined as:

$$\Delta^{ATT} = E [Y^1 | D = 1] - E [Y^0 | D = 1] \dots (3)$$

Where;

Δ<sup>ATT</sup>: Estimated Average Treatment-on effect on the Treated,

Y<sup>1</sup>: Programme participation

Y<sup>0</sup>: Programme non-participation

D=1: ABP beneficiaries

D=0: Nonbeneficiaries

E [Y<sup>1</sup> | D = 1]: Expected outcome after benefiting from ABP

E [Y<sup>0</sup> | D = 1]: Hypothetical outcome without benefiting from ABP for those who participated in ABP.

**RESULTS AND DISCUSSION**

**Socio-economics Characteristics of Beneficiary and Non-beneficiary of Respondents**

Table 2, shows that beneficiaries and non-beneficiaries had mean age of approximately 37 years and 49 years respectively. This suggest that rice farmers in the study area are predominantly in their active age; still having the vigour and vitality to actively engage in farming and readily adopt new ideas such as the one introduced by ABP. This finding is consistent with the findings of Olarenwaju (2019), Ayuba *et al.* (2020), Balogun *et al.* (2021) and Ugbor *et al.* (2022) which stated that rice farming is now dominated by young people with some level of education.



Table 2 indicates that 72.2% of beneficiaries and 76.1% of non-beneficiaries were male. This shows high level of male dominance in rice farming and may be attributed to the labour-intensive nature of rice farming. These findings are consistent with those of Olutumise *et al.* (2019).; Abdulmumin (2021) who reported that agricultural activities are predominantly undertaken by male farmers in North Central Nigeria. The male dominance in this sector may be attributed to the physically demanding nature of rice farming as well as traditional gender roles that tend to favour men in accessing key production resources such as land, credit facilities, extension services, and modern farming technologies.

The result also reveals that most (82.1% beneficiaries, 75% non-beneficiaries) of the respondents were married. These reflects the commonality of married individuals engaging in farming activities to provide for their household needs. This result aligns with the findings of Balogun *et al.*, 2021; Yakubu *et al.* 2021) who reported that agricultural activities were majorly involved by married people. The predominance of married individuals among rice producers may also have a significant influence on the level of technical efficiency observed because, married farmers are generally more experienced and may have access to a wider network of social capital, including access to credit, extension services, and cooperative societies. Additionally, having a spouse involved in farming operations or home management may allow the farmer to concentrate more on production activities, further contributing to improved efficiency and profitability (Adeoti & Oladele, 2017).

The result from Table 2 shows that majority (87% beneficiaries and 63% non-beneficiaries) of the respondents had at least a primary education which could significantly facilitate their ability to understand and implement new programs introduced by the ABP. This aligns with the finding by (Abdu-Raheem *et al.* 2023). Formal education provides farmers with essential cognitive skills such as reading, writing, and numeracy, which are crucial for interpreting agricultural information, following instructions on input use, and keeping records of farming activities. With these skills, farmers are better positioned to learn about modern agronomic practices such as timely planting, pest and disease management, proper fertilizer application, and crop rotation (Adebayo & Ogunleye, 2019). Ultimately, better technical efficiency translates into increased profitability by reducing production costs, minimizing wastage, and improving yield quality and quantity (Ibrahim & Bello, 2020).

Table 2 reveals that about (47.5%) of the beneficiaries have household size of 0-5 and (45.2%) of non-beneficiaries have household size of between 6-10 persons per household. The mean household size was 6 persons approximately for beneficiaries and 8 persons for non-beneficiaries. This finding is consistent with Lawal and Fakayode (2021) which highlighted the positive impact of family labour on production efficiency. This suggests that the majority of rice farming households in the study area are relatively large. A household size of this magnitude typically provides a readily available labour force for various farming activities such as land preparation, planting, weeding, and harvesting, which are essential for timely operations in rice production. According to Adeoti and Oladele (2013), larger household sizes may positively influence technical efficiency among smallholder farmers as the availability of family labour reduces the need for hired labour and ensures timely execution of farm activities. In their study on rural farm households in Nigeria, Adeoti and Oladele (2013) observed that family labour availability is critical in labour-intensive cropping systems where mechanization is limited. Similarly, Obisesan *et al.* (2010) noted that timely completion of farming operations, made possible by larger working households, improves productivity and farm management practices, which are key determinants of technical efficiency. Additionally, reliance on family labor helps reduce production costs and enhances scheduling flexibility, which can improve profitability (Obisesan *et al.*, 2010).

Table 2 shows that the farmers had considerable farming experience with mean years of farming experience being (9 years) for both beneficiaries and non-beneficiaries. This suggests a reasonable level of expertise in rice farming (Onoja *et al.*, 2020). Experienced farmers develop skills in pest and disease management, resource allocation, and risk coping strategies that enhance productivity and sustainability. Furthermore, the accumulated knowledge from repeated farming cycles increases their ability to adopt new technologies and select appropriate crop varieties, thus minimizing waste and maximizing yield (Onyeneke *et al.*, 2017).



Table 2 also shows that 43.8% of ABP beneficiaries and 59.6% of non-beneficiaries obtained their land for rice farming through inheritance, this implies that agricultural practice in Nigeria is highly influenced by land tenure system thereby preventing willing farmers from practicing agriculture due to unavailability of land. This also implies that land tenure in the study area is predominantly traditional, with most rice farmers relying on inherited family land for production. However, inherited lands are often fragmented and may not always be optimally located or sufficiently large to support economies of scale, which could limit technical efficiency (Oluwatayo & Oladele, 2018).

Table 2 shows that the majority (52.5% for beneficiaries and 60.6% for non-beneficiaries of ABP ) had a farm size range of (0.1-1.9ha) with a mean farm size for both beneficiaries and non-beneficiaries being approximately 2 hectare which suggest rice farming activities that is predominantly small-scale operations aligning with the findings of other studies (Balogun *et al.*, 2021; Olanrewaju,2019) which discovered that rice farming in Nigeria is mostly on subsistence basis. The relatively small average farm size may also suggest that rice farming is practiced alongside other livelihood activities, making it part of a diversified household income strategy rather than large-scale commercial agriculture. According to Adewuyi *et al.* (2016), limited farm size constrains the capacity of smallholder farmers to adopt capital-intensive or scale-dependent technologies, which negatively affects efficiency and productivity.

Also, 95.7% of the beneficiaries of the programme were members of cooperative while 29 % of non-beneficiary belonged to cooperative society. The 95.7% membership of beneficiary in cooperative indicate active engagement among beneficiaries potentially facilitating knowledge sharing and innovation diffusion resulting in their participation in ABP. The low membership of non-beneficiaries in cooperative could be responsible to their non-awareness and non-participation in the programme. This aligns with the work of Balogun *et al.* (2021) who assessed the performance of Anchor Borrowers Programme (ABP) beneficiary and non-beneficiary rice farmers in Badagry LGA, Lagos State, Nigeria which shows that the major constraint of the farmers' participation in the ABP programme was non-membership of cooperatives

**Table 2:** Distribution of Respondents' Socio-economics Characteristics

Variables	Beneficiaries			Non-Beneficiaries		
	Freq.	%	Mean	Freq.	%	Mean
<b>Age (years)</b>						
20-29	49	30.2		23	12.2	
30-39	55	34.0		32	17.0	
40-49	34	21.0	37	35	18.6	47
50-59	13	8.0		44	23.4	
60 Above	11	6.8		54	28.7	
<b>Gender</b>						
Male	117	72.2		143	76.1	
Female	45	27.8		45	23.9	
<b>Marital status</b>						
Single	21	12		28	14.9	
Married	133	82.1		141	75.0	
Divorced	8	4.9		19	10.1	
<b>Educational level</b>						
No formal edu.	21	13.0		69	36.7	
Primary	43	26.5		59	31.4	
Secondary	55	34.0		39	20.7	
Tertiary	43	26.5		21	11.2	
<b>Household size</b>						
0-5	77	47.5		52	27.7	
6-10	67	41.4	6	85	45.2	8
11-15	15	9.3		42	22.3	
16-20	3	1.8		9	4.8	
<b>Years of experience</b>						
0-6	50	30.8		37	19.7	
7-12	63	39.0	9	100	53.2	9
13 Above	49	30.2		51	27.1	
<b>Farm size</b>						
0.1-1.9	85	52.5		114	60.6	
2.0-3.9	67	41.4	2	58	30.9	2
4 Above	10	6.1		16	8.5	
<b>Membership of coop.</b>						
Yes	155	95.7		56	29.8	
No	7	4.3		132	70.2	
<b>Source of land</b>						
Inherited	71	43.8		112	59.6	
Leased	16	9.9		11	5.9	
Rented	22	13.6		18	9.6	
Purchased	40	24.7		24	12.8	
Borrowed	13	8.0		23	12.2	

**Source:** Field Survey 2023

### Determinants of Participation in Anchor Borrowers' Programmes

The result of the logistic regression presented in Table 3 reveals Chi-square statistic (225.141) and its probability (0.000). This indicates that the model is statistically significant, suggesting that the socioeconomic characteristics considered are important factors influencing participation in the program. The pseudo-R-square (0.563) indicates that about 56.3% of the variation in participation in the Anchor Borrowers Programme is explained by the socioeconomic characteristics included in the model

#### Age

The coefficient of age is (-0.133) and significant at  $p \leq 0.01$ , indicating that older respondents are less likely to participate in the programme. This could be because younger farmers may be more aware of new programmes and more willing to take on new ideas and ventures and perhaps take risk.



This result contradicts the findings of Epundu (2019) who reported a positive relationship between the age of farmers and access to government interventions especially credit.

#### **Marital Status**

The coefficient of marital status is (0.803) and significant at  $p \leq 0.10$ . This suggests that married respondents are more likely to participate in the programme. This might be because married individuals have more family responsibilities and may be more interested in programmes that can help increase income. This Finding is consistent with the work and finding of Olanrewaju *et al.* (2020) who examined the determinants of participation in Anchor Borrowers Programme (ABP) by youth rice farmers' and productivity (yield/ha) in Kaduna state, Nigeria. the study indicated that marital status was positive and significant determinants of participation in the ABP amongst the youth rice farmers.

#### **Farming Experience**

The coefficient of years of farming experience is (0.247) and significant at  $p \leq 0.01$ . This result is an indication that more experienced farmers have greater tendency to participate in the programme. This could be because experienced farmers have a better understanding of the benefits of new programs and are more likely to take advantage of them. This finding contradicts the work and findings of Olanrewaju (2019) who assessed the determinants of participation in Anchor Borrowers Programme (ABP) among rice farmers and gave a negative and significant relationship between farming experience and participation in the Anchor Borrowers programme.

#### **Household Size**

The coefficient of household size is (-0.244) and significant at  $p \leq 0.05$ . This result suggests that respondents with larger household sizes have less probability to participate in the Anchor Borrowers' Programme. This might be because larger households may have more mouths to feed and may be more focused on immediate needs rather than long-term benefits. The negative coefficient of (0.244) also means that a unit increase in the number of persons in a household significantly leads to a decrease in the likelihood of having access to an ABP loan. This result contradicts the findings of Ezedinma (2020) who reported no significant effect of household size on participation in government interventions like ABP.

#### **Farm Size**

The coefficient of farm size is (-0.313) and significant at  $p \leq 0.10$ . This indicates that respondents with larger farm sizes have less likelihood to participate in the programme. This might be because farmers who have larger farms may already have access to resources and may not see the need for the programme. This result is in contrast with the work and finding by Salisu *et al.* (2022) who analyzed the determinants of participation in the Anchor Borrowers Programme by rice farmers in Kebbi State, Nigeria using multiple regression model and reported a positive relationship between farm size and farm productivity and participation in the ABP.

#### **Membership of Association**

The coefficient of membership of association is (4.309) and significant at  $p \leq 0.01$ . This means that respondents who are members of associations are more likely to participate in the programme. This might be because membership of associations can provide access to information, resources and networks that can help member farmers benefit from the programme. This finding is consistent with the works of Olanrewaju (2019) which assessed the determinants of participation in Anchor Borrowers Programme (ABP) among rice farmers and revealed that membership of association was positive and a critical determinant of participation in the ABP

#### **Access to Extension Services**

The coefficient of access to extension services is (-1.084) and significant at  $p \leq 0.01$ . This indicates that respondents with access to extension services are less likely to participate in the programme. This could be because farmers who already have access to extension services may not see the need for the programme. This finding contradicts the findings of Ibrahim *et al.* (2022) in Kano state Nigeria which showed a positive and significant relationship between access to extension services and participation in the Anchor Borrowers' Programme.

### Annual Income

The coefficient of annual income is (4.198) and significant at  $p \leq 0.01$ . This result suggests that respondents with higher annual incomes have greater likelihood of participating in the programme. This might be because higher-income farmers may have more resources to invest in the farms and may be more interested in programmes that can help increase income. This result correlates with the work and finding of Ibrahim *et al.* (2022) who assessed the determinants and impact of Anchor Borrowers Programme (ABP) on rice production in Kano state which showed positive relationship between the annual income of farmers and participation in the Anchor Borrowers' Programme.

**Table 3:** Determinants of Anchor Borrower Program Participation

Independent variable	Coefficient	Std. error	T-values	P-values
Constant	-3.033	1.783	-1.70*	0.089
Sex	-0.597	0.537	-1.11	0.266
Age	-0.133	0.028	-4.82***	0.000
Marital status	0.803	0.478	1.68*	0.093
Level of education	0.055	0.041	1.33	0.183
Farming experience	0.247	0.064	3.89***	0.000
Household size	-0.244	0.106	-2.30**	0.022
Farm size	-0.313	0.188	-1.66*	0.096
Member of association	4.309	0.607	7.10***	0.000
Access to extension	-1.084	0.627	-1.73*	0.084
Access to credit	0.324	0.264	1.34	0.181
Annual income	4.198	1.387	3.03***	0.002
<b>Diagnostic Parameters</b>				
Chi-squared	225.141			
Prob > Chi-squared	0.000			
Pseudo R-squared	0.563			

Source: Field survey, 2023

\*\*\*, \*\* and \* respectively represent  $p < 0.01$ ,  $p < 0.05$  and  $p < 0.1$ .

### Impact of ABP on Yield Using PSM

The impact of participation in the ABP is presented in Tables 4, Table 5 and Table 6. The Average Treatment Effect on the Treated (ATT) of 18.86 bags implies that farmers who participated in the Anchor Borrowers Programme harvested, on average, 18.9 bags more than they would have without the programme, after controlling for selection bias through matching. The result is statistically significant at the 1% level ( $t = 5.60$ ). The positive ATT shows that ABP had a substantial positive impact on yield, suggesting access to improved inputs, credit, or extension services increased productivity. The ATE (18.13) reinforces that the overall expected gain from participation is large and positive. The ATU (16.58) indicates that even non-participants would have gained similarly if they had been included. This implies the programme could potentially benefit a wider pool of farmers. These findings are consistent with previous impact studies of ABP and related agricultural credit programmes in Nigeria. Nwosu *et al.*, (2021); Aliyu & Ibrahim, (2022), who found that access to subsidized inputs and finance under ABP significantly increased crop yields. The results also reflect the importance of credit-access programmes in addressing production constraints such as inadequate inputs, low adoption of improved seeds, and weak extension linkages. In the FCT context, where land access and extension services are relatively better than in some rural states, these gains suggest that ABP effectively enhanced resource productivity and improved technical efficiency among participants. These results further support previous studies by Ayuba *et al.* (2020), Ewuzie & Okwu (2020), Aboje & Akintoye (2021), Akpan & Edet (2021), Soom *et al.* (2023), and Akinbile *et al.* (2023), which observed increased in rice yield among ABP beneficiaries over non-beneficiaries

Since both ATT and ATE values are positive for yield and statistically significant at 1% with coefficients ( $t=5.60$ ) therefore the null hypothesis 2, which stated that there was no significant difference between the yield of beneficiaries of ABP and non-beneficiaries in the study area was rejected for the



alternative hypothesis  $H_a^2$  which is there is significant relationship between the yield of ABP beneficiaries and non-beneficiaries of ABP in the FCT Abuja.

**Table 2:** ATT Results Summary for Various Matching Algorithms (Yields)

Outcome	Matching Method	ATT	Std. Error	T-Stat	Significance	Interpretation
<b>Yield (bags)</b>	Nearest Neighbor	18.86	3.37	5.60	***	Participants produced ~19 more bags on average
	Radius Matching	18.44	2.19	8.41	***	Confirmed strong positive yield gain
	Kernel Matching	19.46	3.43	5.67	***	Robust across methods

**Source:** Field Survey 2023

\*\*\* indicates significance at 1% level. Pseudo  $R_2 = 0.4721$  LR  $\chi^2 = 228.16$

**Table 5:** Unmatched, ATU and ATE Statistics of Participation in ABP Yield Results

Statistic	Treated (Participants)	(Non-participants)	Difference	S.E.	T-stat
<b>Unmatched</b>	35.83	15.84	19.99	2.12	9.41
<b>ATU</b>	18.01	34.59	16.58	—	—
<b>ATE</b>	—	—	18.13	—	—

**Source:** Field Survey 2023

ATU = Average Treatment Effect on the Untreated; ATT = Average Treatment Effect on the Treated and ATE = Average Treatment Effect.

**Table 6:** Impact of ABP on Yield, Results of ATT, ATE and ATU from PSM in Bags

Variable	Sample	Treated	Controls	Difference	S.E.	T-stat
<b>Yield in bags</b>	Unmatched	911219.126	399577.128	511642.008	53814.1444	9.51
	<b>ATT</b>	36.4545455	17.5935065	18.861039	3.36550144	5.60
	<b>ATU</b>	18.0136986	34.5945205	16.5808219	.	.
	<b>ATE</b>	.	.	18.1277533	.	.

**Source:** Field Survey 2023

**Note:** S.E. does not take into account that the propensity score is estimated

## CONCLUSION AND RECOMMENDATION

The study concludes that the Anchor Borrowers' Programme (ABP) positively impacted on rice yield and income of participants in the Federal Capital Territory (FCT) Abuja, Nigeria. The beneficiaries had significantly higher yield than non-beneficiaries using. The determinants of the programme participation were annual income, membership of association, farming experience, marital status, age, household size, farm size, access to extension.

Based on my results and findings, the following recommendations and suggestions were put forward:

1. Anchor Borrowers Programme should remove/cut down bureaucratic bottleneck that discourage intending farmers from participating in the programme
2. More female farmers should also be enrolled by ABP to bridge the gap between male farmers who benefited from the programme;
3. Farm inputs and credit facilities must be provided to farmers in a timely manner to ensure prompt preparation for farming activities.

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