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

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ABSTRACT

The study assessed the impact of the Anchor Borrowers' Programme on rice farming in the Federal Capital Territory, Abuja, Nigeria. A multi-stage sampling technique was used to randomly select 357 respondents (162 beneficiaries and 195 non-beneficiaries). Data were collected using a questionnaire. The data were analysed using descriptive statistics, Logistic regression, Propensity Score Matching (PSM), and Gross Margin Analysis. The mean age of beneficiaries and non-beneficiaries was 37 and 56 years, respectively; 72.2% and 76.1% were male; 82.1% and 75% were married, respectively. Beneficiaries and non-beneficiaries on average had a farm size of 2 hectares approximately. The Gross margin result revealed Gross margin/ha of ₦304,414 for beneficiaries and ₦62,255.32 for non-beneficiaries of ABP respectively in the Study Area The result of the logistic regression on determinant of participation in the ABP revealed 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 P<0.01) and, farming experience with a coefficient of (0.247, P<0.01), marital status with a coefficient of (0.803, P<0.10), Age with coefficient of (-0.133, P<0.01), Household size with a coefficient of (-0.244, P<0.05), Farm size with a coefficient of (-0.313, P<0.10), Access to extension had a coefficient of (-1.084, P<0.10). PSM result on income reveals Average Treatment Effect (ATE) of ₦467,802/ha, significant at (t=5.60, P<0.01). It was concluded that ABP had a positive impact on beneficiaries' incomes in the Federal Capital Territory, Abuja, Nigeria. It was recommended that the anchor borrowers programme should remove/cut down the bureaucratic bottleneck that discourages intending farmers from participating in the programme; more female farmers should also be enrolled in the programme to narrow the gap between male beneficiaries and female beneficiaries

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

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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 employs approximately 75% of the labour force in Nigeria (CIA, 2022). Furthermore, it stands as the predominant economic endeavour in rural regions, where nearly half of the population resides. The agriculture sector has several untapped potential for growth and development, given 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, with surface water resources of approximately 267.7 billion cubic meters and groundwater resources of 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 endeavour 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 dependence and 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, and 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 (CACS) 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 to establish an ecosystem connecting smallholder farmers with local processors, enhance bank financing in the agricultural sector, boost capacity utilisation among agricultural anchor companies, and elevate farmers' productivity and incomes. 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 farming operational costs, increase rice production, and improve farmers' living standards (FMAFS, 2023).
The inability of rice farmers to access credit, modern farm inputs, and other machinery at affordable prices leaves them perpetually poor, as farm size and yield remain stagnant. 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 a paucity of national reserves. In response to these challenges posed by the 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 conducted to assess the CBN programmes and schemes for 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 over the period 1981-2016. Ayinde *et al.* (2018) assessed the Central Bank of Nigeria's anchor borrowers' programme for 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 the Central Bank of Nigeria's Anchor Borrowers' Programme on rice farmers in Kebbi State, Nigeria. However, there is limited 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 these knowledge gaps by providing answers to the following research questions;

i. What are the socio-economic characteristics of beneficiaries and non-beneficiaries of Anchor Borrowers Programme?
ii. What is the cost and returns associated with rice farming in the study area?
iii. What are the determinants of participation in the Anchor Borrowers Programme?
iv. What is the impact of the programme participation on income 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 levels of farming activity are Nyanya, Karu, Gwagwalada, Kuje, Abaji, Karshi, Bwari, Kwali, and Garki. The study area experiences a tropical wet and dry climate (Koppen, Aw) characterised by high temperatures year-round, with distinct rainy (April-October) and dry (October-April) seasons. Daily temperatures range from 60^0F to 93^0F (15^0C-34^0C), often exceeding 30^0C, 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 an annual growth rate of about 5%. The 2025 population estimate was 4.21 million, and the 2026 estimate was 4.39 million. Farming is the major occupation of the people in the area, and the crops grown are tomatoes, cowpea, soybean, maize, rice, yams, and livestock reared include poultry, goats, sheep and cattle (FCT, 2007)

Sampling Techniques and Sample Size

A multistage sampling procedure was used to select two respondent categories (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 serve as the agricultural zones. The first stage involved purposive selection of four LGAs with a 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 the 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 is shown in Table 1.

Table 1: Sample Size Selection Plan

Zone	Numberof beneficiaries of ABP	Sample size	Number of non-beneficiaries of ABP	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
Total	**8100**	**162**	**9738**	**195**	**357**

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 components. Each questionnaire consisted of 4 sections: A, B, C, and D. Section A dealt with the respondents' socio-economic characteristics. Section B centred on the determinants of rice farmers' participation in the programme, which is objective 2. Section C focused on Costs and returns associated with Rice farming, and Section D dealt with the impact of the anchor borrowers' programme on the income of ABP Rice beneficiaries and non-beneficiaries, which is objective 4.

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 were analysed using descriptive statistics, including frequencies and percentages. Logit regression analysis was used to assess determinants of participation in the anchor borrowers' programme. Gross Margin Analysis was used to estimate cost and return in rice production. Propensity Score Matching (PSM) was used to determine the impact of the anchor borrowers' programme on the income of rice farmers

The Gross Margin Analysis was used to analyse costs and returns in rice production. The model is represented as follows;

GM = TR – TVC

Where:

GM= Gross margin/ha

TR = Total revenue/ha

TVC = Total variable cost/ha

$TVC = P_1X_1+P_2X_2 +P_3X_3+ \ldots\ldots\ldots PnXn$

Where $P_1\ldots\ldots Pn$ = unit price of inputs and

$X_1\ldots\ldots Xn$ = quantity of inputs such as seeds, fertilizers, labour etc

TR = Price(P) selling price per units sold X Quantity sold (Q)

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

$Yi=ln\ (pi/1-pi) = \beta 0 + \beta_1 X_1 + \ldots\ldots\ldots + BnXn + e$ …(1)

$=ln(p/1-p) = B0+B1X1+B2X2+\ldots\ldots\ldots BnXn+ e$ …(2)

Where

P = is the probability of the outcome

Yi= 1 if success i.e. respondent participated in ABP

Yi = 0 if failure i.e. if respondent did not participate in ABP

β_0 = Constant term/ the intercept

$\beta_1, \ldots \beta_n$ = Logistic regression coefficients for predictor variables

$X_1, X_2, \ldots\ldots Xn$ (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_1= Sex (1 = Male, 0 otherwise)

X_2 = Age (years)

X_3= Household size (in number)

X_4 = Membership of farmers- based association (1= yes, otherwise = 0.)

X_5 = Years of experience in Rice farming (years)

X_6 = Educational level (years of schooling)

X_7 = Annual income (naira)

X_8 = Farm size (in hectares)

X_9 = Access to extension workers (if yes = 1, 0 = no)

The Propensity Score Matching (PSM) was used to determine the causal effect of ABP on income of Beneficiaries. This focused on estimating the average treatment effect on the treated (ATT). After the propensity scores have been estimated, the causal effect of Anchor Borrowers on rice income was calculated using the average treatment effect on the Treated (ATT). The average treatment effect is defined as the mean difference between the treatment group matched with the control group who are balanced on the propensity scores and fall within the regions of common support. In this research, our concentration was on estimating the average effect of treatment on the treated (ATT). Using the propensity score, a researcher can match participants from the treatment group with participants from the control group, so that the treatment and control group can be balanced. This approach can significantly reduce bias in observational study (Rosenbaum, 1987, 2004; Rosenbaum and Rubin, 1985; Rubin and Thomas, 1992).

Ideally, the households representing one matched pair are identical to each other except for their participation in the Anchor Borrowers Programme. As a consequence, this approach isolates the impact idiosyncratic factors have on outcome variables by reducing observed heterogeneity between ABP participants and non- participants.

This estimated the average impact among ABP beneficiaries and if applied to non-beneficiaries, D=0. This is defined as:

$\Delta\hat{}^{ATT} = E\ [Y^1 \rceil D = 1] - E\ [Y^0 \lceil D = 1]$ …(3)

Where;
$\Delta^{\wedge}{}^{ATT}$: Estimated Average Treatment-on effect on the Treated,
Y^1: Programme participation
Y^0: Programme non-participation
D=1: ABP beneficiaries
D=0: Nonbeneficiaries
E [Y^1 ⎪D =1]: Expected outcome after benefiting from ABP
E [Y^0⎪D =1]: Hypothetical outcome without benefiting from ABP for those who participated in ABP.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Beneficiaries and Non-beneficiaries

Table 2 shows that beneficiaries and non-beneficiaries had mean ages of approximately 37 and 56 years, respectively. This suggests that rice farmers in the study area are predominantly in their active years, still having the vigour and vitality to engage in farming and readily adopt new ideas, such as the one introduced by ABP. This finding is consistent with those of Olarenwaju (2019), Ayuba *et al*. (2020), Balogun *et al*. (2021), and Ugbor *et al.* (2022), who stated that rice farming is now dominated by young people with some education. Table 2 indicates that 72.2% of beneficiaries and 76.1% of non-beneficiaries were male. This shows a high level of male dominance in rice farming, which may be attributed to the labour-intensive nature of the crop. These findings are consistent with those of Olutumise *et al.* (2019*) and* 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 respondents (82.1% beneficiaries, 75% non-beneficiaries) were married. These reflect 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) and Yakubu *et al.* 2021), who reported that agricultural activities were mainly carried out 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 results from Table 2 show that the majority (87% beneficiaries and 63% non-beneficiaries) of 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 findings 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 input-use instructions, 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: Distribution of Respondents' Socio-economics Characteristics

Variables	Beneficiaries			Non-Beneficiaries		
	Freq.	%	Mean	Freq.	%	Mean
Age (years)						
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	56
50-59	13	8.0		44	23.4	
60 Above	11	6.8		54	28.7	
Gender						
Male	117	72.2		143	76.1	
Female	45	27.8		45	23.9	
Marital status						
Single	21	12		28	14.9	
Married	133	82.1		141	75.0	
Divorced	8	4.9		19	10.1	
Educational level						
No formal educ.	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	
Household size						
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	
Years of experience						
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	
Farm size						
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	
Membership of coop.						
Yes	155	95.7		56	29.8	
No	7	4.3		132	70.2	
Source of land						
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

Costs and Return in Rice Production of Respondents in the Study Area

Table 3a presents information on the costs and returns associated with rice farming among ABP beneficiary rice farmers and non-beneficiaries in the study area. The Table gives a Gross margin/ha of ₦304,414/ha for beneficiaries and ₦62,255.32/ha for non-beneficiaries of ABP, respectively. This result signifies that rice farming among beneficiaries and non-beneficiaries of ABP was both profitable in the study area, the beneficiary realised more profit per hectare than the non-beneficiary. This suggests that ABP enhances the income/profit of beneficiary rice farmers. This outcome aligns with previous studies by Balogun *et al.* (2021), Okoroh *et al.* (2021), Emeh & Ani (2021), Akinbile *et al.* (2023), and Baraya *et al.* (2023), who found significant differences in yields/income between ABP beneficiaries and non-beneficiaries, with beneficiaries consistently outperforming non-beneficiaries. This finding is also consistent with Okeke *et al*. (2019) who examined the impact of Anchor Borrowers' programme (ABP) on the income of rice farmers in Benue State, Nigeria which showed that the income and farm output of beneficiaries of Anchor Borrowers' Programme were significantly higher compared to the non-beneficiaries and Balogun *et al*. (2021) that assessed the performance of Anchor Borrowers Programme (ABP) beneficiary and non-beneficiary rice farmers in Badagry LGA, Lagos State, Nigeria which gave the mean income of the ABP beneficiary and non-beneficiary rice farmers to be N631, 177.99 and N447, 092.20 respectively. This result reveals that ABP beneficiary rice farmers had a higher income than non-beneficiaries

Table 3: Costs and Return in Rice Production of Respondents

	ABP Beneficiaries				Non-Beneficiaries			
Variables	Avr Qty	Avr Unit Price	Cost/Rev/ha	% of TVC	Avr Qty	Avr unit Price	Cost/Rev/ha	% of TVC
Labour (man day)	34.9	2,035	71,022	35.36	39.2	1,443.47	56,584	38.25
Fertilizer	2.96	25,114	74,337	37.01	1.96	24798	48,604	32.85
Seeds (bags)	0.79	36,407	28,762	14.32	0.86	30354	26,104	17.65
Herbicides (litres)	4.22	2,780	11,732	5.84	3.34	2802	9,358.68	6.33
Transport (naira)			15,007	7.47			7,285	4.92
TVC (naira)			200,860	100			147,935.68	100
Revenue Yield (bags)	19.87	25429	505,274		8.33	25,233	210,191	
Gross Margin= (GR-TVC)			304,414				62,255.32	

Table 3b: T-test of Income of beneficiaries of ABP and Income of non-beneficiaries

Variables	obs	Mean1	St Err	t-value	p-value
Beneficiairies	162	911219.14	50783.672	8.652	0.000
Non-Beneficiaries	188	418601.85	27438.146		

Source: Field Survey 2023

The result of the paired t-test comparing the income of beneficiaries of the Anchor borrowers' programme and non-beneficiaries of the programme is presented in Table 3b. The table shows a mean income of ₦911219.14 for beneficiaries of the Anchor borrowers' programme and ₦418601.85 for non-beneficiaries of the scheme, and a t-value of 8.652, which is significant at P<0.01. Hence, the null hypothesis, which stated that there is no significant difference in the income of beneficiaries of the Anchor borrowers' programme and that of non-beneficiaries of the scheme in the study area, is rejected in favour of the alternative hypothesis.

Determinants of Participation in Anchor Borrowers' Programmes

The result of the logistic regression presented in Table 4 reveals a 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

Table 4: Determinants of Anchor Borrower Programme 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
Diagnostic Parameters				
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.

Age

The coefficient of age is (-0.133) and significant at $p < 0.01$, 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 risks. This result contradicts the findings of Epundu (2019), who reported a positive relationship between farmers' age 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 findings of Olanrewaju *et al*. (2020), who examined the determinants of participation in the Anchor Borrowers Programme (APB) by youth rice farmers and productivity (yield/ha) in Kaduna state, Nigeria. The study indicated that marital status was a positive and significant determinant 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 indicates that more experienced farmers are more likely 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 of Olanrewaju (2019), who assessed the determinants of participation in the Anchor Borrowers Programme (ABP) among rice farmers and found a negative and significant relationship between farming experience and participation.

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 are less likely to participate in the Anchor Borrowers' Programme. This might be because larger households have more mouths to feed and may be more focused on immediate needs than on 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 are less likely 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 findings by Salisu *et al*. (2022), who analysed the determinants of participation in the Anchor Borrowers Programme by rice farmers in Kebbi State, Nigeria, using a multiple regression model and reported a positive relationship between farm size and farm productivity and participation in the ABP.

Membership of an Association

The coefficient of membership of the association is (4.309) and is significant at p≤ < 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 the Anchor Borrowers Programme (ABP) among rice farmers and revealed that membership of an 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≤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≤ < 0.01. This result suggests that respondents with higher annual incomes are more likely to participate 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.

Impact of ABP on Income Using PSM

The impact of participation in the ABP on income is presented in Tables 5, 6 and 7. The ATT of ₦484,849 indicated that, on average, farmers who participated in the ABP earned nearly ₦485,000 more than similar non-participants after matching. The effect is statistically significant (t = 5.65), confirming that participation in the programme significantly increased farmers' income. The ATE (₦467,802) shows that even at the population level, the average expected income gain from participation remains strongly positive. The ATU (₦431,840) also indicates that non-participants would likely have gained comparable benefits had they been included, highlighting the programme's potential scalability. The significant positive income impact suggests that income is translated into improved household welfare. Increased access to affordable credit and farm inputs, coupled with better marketing arrangements through the ABP, likely enhanced profitability. These findings align with results reported by CBN (2022) and Adamu & Bello (2023), who found that ABP participation significantly raised farm income and improved livelihood outcomes across multiple states.

The results for the FCT suggest that the programme was successful in reducing financial constraints and stabilizing farmers' earnings through improved productivity and market linkages. The ABP significantly improved income with consistent ATT values across all matching algorithms. This robustness strengthens the credibility of the programme's impact. The positive ATU values suggest that non-participants could also benefit if included in the programme, implying potential for expansion. The Policy Implications are that we need to strengthen ABP outreach and training to sustain these gains, ensure equitable inclusion of smaller or marginalised farmers who were less likely to be selected and enhance monitoring to ensure credit is utilised for productive purposes. The matching diagnostics confirm that the propensity Score Matching model successfully balanced covariates and the resulting ATT are reliable, hence participation in the Anchor Borrowers Programme had a strong, statistically significant, and positive impact on both farm yield and income among farmers in FCT Abuja. This underscores the programmes' effectiveness as an agricultural finance intervention that enhances rural livelihoods and contributes to food security.

Table 3: ATT Results Summary for various matching Algorithms

Outcome	**Matching Method**	**ATT**	**Std. Error**	**T-Stat**	**Interpretation**
Income (₦)	Nearest Neighbor	₦484,849	₦85,757	5.65***	Significant positive impact on income
	Radius Matching	₦472,179	₦55,514	8.51***	Robust and consistent
	Kernel Matching	₦497,789	₦87,022	5.72***	Further confirms Robustness

Source: Field Survey, 2023

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

Table6: Unmatched, ATU and ATE statistics of participation in ABP Income Results

Statistic	Participants	Non-participants	Difference	S.E.	T-stat
Unmatched	₦911,219	₦399,577	₦511,642	₦53,814	9.51
ATU	₦454,500	₦886,340	₦431,840	—	—
ATE	—	—	₦467,802	—	—

ATU-Average Treatment Effect on the Untreated
ATT- Average Treatment Effect on the Treated
ATE= Average Treatment Effect

Source: Field Survey 2023

Table 7: Impact of ABP on Income: Results of ATT, ATE and ATU from PSM

Variable	Sample	Treated	Control	Difference	S.E.	T-stat
Income	Unmatched	911219.126	399577.128	511642.008	53814.1444	9.51
	ATT	926678.571	441829.221	484,849.351	85756.8695	5.65
	ATU	454500	886329.726	431,829.726		
	ATE			467,802.203		

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 participants' incomes in the Federal Capital Territory (FCT), Abuja, Nigeria. The beneficiaries had significantly higher income than non-beneficiaries of the programme. The determinants of the programme participation were annual income, membership of an association, farming experience, marital status, age, household size, farm size, and access to extension.

Based on the findings, the following recommendations are put forward:

a. The Anchor Borrowers Programme should remove/cut down the bureaucratic bottleneck that discourages intending farmers from participating in the programme

b. More female farmers should also be enrolled in the programme to narrow the gap between male and female beneficiaries.

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