ASSESSMENT OF THE CENTRAL BANK OF NIGERIA ANCHOR BORROWERS’ PROGRAMME ON RICE PRODUCTION IN KEBBI STATE, NIGERIA

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ABSTRACT

Objective: This study aims to assess the Central Bank of Nigeria anchor borrowers’ programme on rice production in Kebbi State, Nigeria. Specifically, the study aims to determine the impact of ABP on the beneficiaries in the study area. One important question addressed in this study is, how ABP impacts beneficiaries' income.

Methods: The study used a well-structured questionnaire and obtained data from 320 rice farmers (160 each of those who benefit and those who benefit not from the fund). Additionally, data were analysed using binary logistic regression models, average treatment effect, and descriptive statistics.

Results: The empirical strategy, indicated that membership in cooperatives increases the chances of rice farmers' access to ABP’s funds. Findings further reveal that the income of the beneficiaries has been positively impacted by ABP funds with explanatory variables like farm size, experience, age, extension visit and adequate input correlated positively with ABP intervention.

Conclusion: The study concludes that ABP is a success, even though there is a need for sustainability of the programme as well as proper monitoring and evaluation to maintain and improve on the gains recorded so far.

Keywords: anchor borrowers' programme, rice production, Kebbi State, Nigeria.

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AVALIAÇÃO DO PROGRAMA DO BANCO CENTRAL DA NIGÉRIA PARA A PRODUÇÃO DE ARROZ NO ESTADO DE KEBBI, NIGÉRIA

RESUMO

Objetivo: Este estudo visa avaliar o programa do Banco Central da Nigéria para a produção de arroz no estado de Kebbi, Nigéria. Especificamente, o estudo visa determinar o impacto do ABP nos beneficiários na área de estudo. Uma questão importante abordada neste estudo é como a ABP impacta a renda dos beneficiários.

Métodos: O estudo utilizou um questionário bem estruturado e obteve dados de 320 rizicultores (160 cada um dos que se beneficiam e os que não se beneficiam do fundo). Além disso, os dados foram analisados utilizando modelos de regressão logística binária, efeito médio do tratamento e estatística descritiva.

Resultados: A estratégia empírica indicou que a adesão a cooperativas aumenta as chances de acesso dos produtores de arroz aos fundos da ABP. As constatações revelam ainda que os rendimentos dos beneficiários foram afetados positivamente pelos fundos dos GPA, com variáveis explicativas como a dimensão da exploração, a experiência, a idade, a visita de extensão e os fatores de produção adequados, correlacionados positivamente com a intervenção dos GPA.

Conclusão: O estudo conclui que a ABP é um sucesso, embora haja necessidade de sustentabilidade do programa, bem como de monitoramento e avaliação adequados para manter e melhorar os ganhos registrados até agora.

Keywords: programa âncora de mutuários, produção de arroz, Estado de Kebbi, Nigéria.

1 INTRODUCTION

Before oil discovery in commercial quantity in late 1950, agriculture was the bastion of the Nigerian economy. Agricultural produce was the dominant exportable commodity and a major foreign exchange earnings source before independence in 1960. Subsequently, Nigeria abandoned agriculture as a result of the oil discovery in commercial quantity. Although, laudable programmes were made to uphold the role of agriculture by successive governments, what was lacking is the political will to make such programmes see the light of the day. The reason is that little or no effort was made toward addressing issues of high interest rates on farm loans, tariffs for agricultural input, the collateral requirements among others. As such a large portion of farmers still practice at the subsistence level thereby producing only to meet the household's needs with little or no left over for market (Badejo & Adekeye, 2018).

Importation of rice Gulf Nigerian government over 356 billion Naira annually, subsequently, almost 1 billion Naira is used daily (Emefiele, 2016). Nigeria is recognized as a net importer of rice which negatively affects production locally just as cabal involvement in the import (Akinwumi, 2016). Nigeria is running a lavish consumption...
model thereby spending billions of Naira daily on the importation of rice from Asia and other parts of the world when we can grow it locally. Production of rice in Nigeria is bedevilled with numerous Challenges which include; the high cost of inputs, and policy instability resulting in poor decision-making and planning which makes investors lose confidence in the system. Others are low technology base (mechanization), infrastructural deficit, high interest rates, poorly-funded research institutes, lack of extension workers, lack of improved seeds, corruption in the public sale and distribution of fertilizer, and poor investments in agriculture from budgetary allocation among others. Insufficiency and the unbearable cost of inputs have discouraged a lot of rice farmers. This has led to farmers quitting the venture or using sub-optimal proportions of the inputs leading to poor yields.

The Rice Farmers Association of Nigeria (RIFAN), aims at supporting its members in production, marketing, processing, and input supply at an affordable price. But this aim has not seen the light of day as poor technical know-how in processing, infrastructural deficit, market access, and inadequate and inefficient farm inputs have remained a grave dilemma in turning around rice production. Consequently, there is little or no value addition to the rice which makes local rice production uncompetitive in the country. As such commercialization of rice production become almost impossible with attaining consequences among which are the poor financial status of farmers because inputs are costly and unavailable, small farm size, and sub-optimal input usage which results in low yields, high interest rate and collateral requirement which reduces tendencies of rice farmers having access to agricultural loans. These and other on-the-farm challenges created a huge gap between rice production and consumption (Ayinde et al., 2018).

It is against this backdrop that long before now different stakeholders call for economic diversification from oil to non-oil sectors with a special emphasis on agriculture. Given Nigeria’s abundant agricultural resources, it is obvious that the sector would positively turn around the economy within the shortest period if the economy is diversified. It is also pertinent to note that the agricultural sector alone employs over 70% of the population, thus making it the largest employer of labour and an important sector in poverty alleviation and wealth generation. However, the rate at which the sector develops over the years has failed to be in tandem with the fast-growing population thereby widening the country's importation bills on food and industrial inputs. For
instance, between 1981 and 2011 live animals and food importation has seen an increase from 14.1 per cent to 20.2 per cent of total importation (CBN, 2015). Likewise, between 1981 and 2015 Nigeria recorded a tremendous expenditure of N0.1 billion to N144.7 billion within the period. The potential of the agricultural sector as the foremost foreign exchange source and highest labour employer has also been diluted. As such, poverty remained among a large number of the populace, most of them are rural dwellers; while Nigeria's quest to achieve food security remained a mirage. This can be traced to many on and out-of-the-farm constraints among them are the smaller farm size, low level of technology and inadequate input use, infrastructural deficit, pests, and diseases leading to poor harvest and inadequate storage services (Ojo & Evbuomwan, 1997; Evbuomwan, 2016).

Consequently, the importation of agricultural products has remained a serious challenge for Nigeria over the years. These products include but are not limited to; wheat, paddy and parboiled rice, sugar cane, whole milk powder and fish products. Various financing programmes have been rolled out aimed at improving the productivity of peasant farmers as well as the total transformation of the agricultural sector (Evbuomwan, 2004). Nevertheless, those objectives have not seen the light of the day due to some of the peculiarities of the smallholder farmers which include, poor financial access and profitable markets, which has left most of them poor (Evbuomwan, 2016). To a proper lasting solution to the problems that bedevilled Nigerian farmers, especially smallholders, the federal government through its Central Bank launched the ABP in November 2015. The ABP model was found to be effective in other developing countries like India where it is often called the 'contract farmer model' (Bommanahalli & Rangappa, 2016).

Given the foregoing, the Nigeria Agricultural Cooperative Bank later the Nigerian Agricultural Cooperative and Rural Development Bank was established with the mandate of ensuring available agricultural credits to farmers at lower interest rates. nevertheless, farmers are yet to fully access services rendered by the bank as a result of high-level corruption in the system through the presence of third parties who are out to make a profit at the expense of the real farmers. To address the problem, ABP was initiated and implemented. The programme aimed at creating a link between smallholder farmers, local processors, and financial institutions through increased financing to the agricultural sector, input suppliers and other stakeholders in the agricultural value chain. In addition, the programme aims at building the capacity of banks, farmers, and agricultural
entrepreneurs to help reduce rice import, preserve external reserves, and poverty reduction among smallholder farmers, job creation, and assist in commercial rice production (Badejo & Adekeye, 2018). ABP is designed to provide farm inputs both in cash and in kind, boost production, stabilize the supply of inputs to processors, and address Nigeria’s negative balance of payments on food. While smallholder farmers supply their products to the agro-processor (anchor) at harvest, who then pays into the farmer’s account the cash equivalent (CBN, 2015).

In light of this, many studies investigated the impact of ABP on rice production. However, findings from most of these studies revealed that the programme recorded significant success. Notably, some of these studies are Umeh & Adejo (2019), Ayinde et al. (2018), Grace & Lawrence (2017), Badejo & Adekeye (2018), and Saheed et al. (2018) among others. What seems to be insufficient in the literature is evidence that most studies conducted in Kebbi State capture only a particular local government and are more interested in the impact of the programme on rice output and beneficiaries' income with little or no concern on how to capitalize on the successes recorded by the programme so far. Equally, most studies were conducted during the pilot year of the programme i.e., 2015/2016 planting while the programme is still ongoing. It is worthy of empirical investigation to determine whether earlier findings still hold and determine the pattern of these variables for effective agricultural/development. Therefore, the study aims to fill this gap by modelling the impact of ABP on rice production as well as the income of beneficiaries in Kebbi State covering 2019/2020 planting using four logistic regression models with the aid of primary data sourced from 320 respondents.

The main objective of the study is to assess the impact of the Central Bank of Nigeria (CBN) anchor borrowers’ programme on rice production in Kebbi State, Nigeria. Specifically, the study aims to determine the impact of ABP on the beneficiaries in the study area. One important question is how ABP impacts beneficiaries' income. Studies on the impact of ABP on rice production and beneficiaries' income in Kebbi State produce mixed results and concentrate mostly on an increase in rice output. Secondly, most literature concentrates on the pilot year of 2015/2016, and thus, the empirical reviews with special attention on 2019/2020 are few. Thirdly, those studies were not necessarily conducted in Kebbi State. This study explores among others that, the intended objectives of the programme of getting access to finance for the rice farmers and in turn increasing
the income of the beneficiaries as well as general improvement of their standard of living have been achieved.

2 LITERATURE REVIEW

This section reviewed concepts that relate to this study contextually, theories that establish relationships between the variables under study and an empirical evaluation of recent and related literature.

2.1 THEORETICAL FRAMEWORK

Development financing literature provides some theoretical justification for the connection between access to finance and development as well as economic growth. For instance, a Cobb-Douglas production function described a linear homogeneous function with an elasticity of substitution of degree one between factors. The production function assumed a constant return to scale. This function is used as the guiding theory in this study. Consequently, the key to this study, are studies by Osaretin et al. (2018) and Ayinde et al. (2018) as their models were amplified to suit its objective. The aspect of the theory that was significant to the study was the thought that output depends on the amount of labour and capital employed with a given technical progress. Following these explanations, the study modelled the impact of ABP on beneficiaries' income. Similarly, the variables of interest in the study were rice production as outputs, labour as smallholder farmers (SHF), and capital as the credit facilities issued to farmers by the CBN through the ABP. The Cobb-Douglas work on production function inspired a large number of researchers in many ways. Recently researchers have developed a keen interest in studying the relationship between production as output, capital as finance or credit facilities as the case may be and labour as farmers. Prominent among them is the work of Osaretin et al. (2018) and Ayinde et al. (2018). Also investigating the effect of finance on output are studies by Anthony (2010), Adetiloye (2012), Rahman et al. (2014), Ammani (2012), Chisasa (2014), Osa-Afiana & Kelikume (2015).

2.2 SOME CONCEPTS

2.2.1 anchor borrower’s programme (ABP)

In alignment with its developmental role, the Central Bank of Nigeria (CBN) established the Anchor Borrowers’ Programme (ABP). Which was officially launched on
November 17, 2015, in Kebbi State, Nigeria by President Muhammadu Buhari (GCFR). The main objective of the ABP is to make an economic linkage between smallholder farmers and reputable large-scale processors to increase agricultural output and improve the capacity utilization of processors (CBN, 2016). The anchor borrowers’ programme (ABP) was conceptualised to complement the growth enhancement support (GES) scheme, which was implemented under the agricultural transformation agenda (ATA) and improve the status of many peasant rural and small-holder farmers to commercial purposes or large farm growers with improvement in agricultural productivity and income earning (Emefiele, 2016).

2.2.2 Rice production

Rice is one of the most important grain crops in the globe, it has a significant contribution to meeting the food needs across the globe. Rice is grown in many parts of the world from Asia to the Americas, Europe and Africa following different production patterns (Mahajan et al., 2017). Rice in Nigeria is produced both during the dry and rainy seasons following different stages from site clearing, nursery, plantation, continuous watering, application of fertilizer, harvest and many other processes before it is served on the table. Rice is an ever more vital crop in Nigeria because it is relatively easy to produce and is grown for both commercial and non-commercial purposes.

2.2.3 Rice production trend in Kebbi state

Currently, the Kebbi State Government’s key focus is on rice crop production to meet the ever-increasing demand in the country. This has become an essential sequel to the Federal Government’s re-introduction of the rice importation ban through land borders in 2016. Kebbi experienced tremendous improvement in rice production from 2005 to 2016. Production of rice has increased by over 100% from between 751,000 metric tons (MT) to 1,805,000 MT between 2015 and 2016. This sharp rise in production (faster than the rise in land area) could be associated with several governments and donor programs in the state. They include the Kebbi agricultural transformation and self-help initiative (KATASHI) others include; NATASHI, GES, Fadama II & III programs supported by the World Bank and the current Anchor Borrower’s Programme (Bello & Abubakar, 2017).
2.3 EMPIRICAL REVIEW

Researchers overtime have carried out many studies and assessed the influence of financial intervention by the central bank and other financial institutions on rice production, agricultural output, employment and overall GDP in Nigeria and beyond. Depending on the methodology used these studies have observed positive, negative and mixed findings. For instance, a study by Umeh & Adejo (2019) assessed the effects of ABP on rice farmers in Kebbi State, Nigeria. Their findings indicate that ABP beneficiaries were 17% more efficient with 0.98 average technical efficiencies in comparison to non-beneficiaries with 0.81 technical efficiencies. This efficiency translates to a higher average output of (5504.4kg/ha) for beneficiaries and 3267.7kg/ha for non-beneficiaries. Badejo & Adekeye (2018) and Abu & Rohana (2016) examine the impact of ABP and agricultural credit on poverty alleviation in the Kebbi and Niger States of Nigeria. Their findings reveal that ABP and agricultural credit have a positive significant impact on poverty alleviation. A similar result has been observed by Ayinde et al. (2018) whose findings indicate that ABP has a positive effect on the income of beneficiaries in Kwara State, Nigeria. Saheed et al. (2018) investigated the impact of ABP on agricultural commodity prices and employment generation in Kebbi State, Nigeria. Findings revealed that the ABP assert a significant and positive impact on agricultural commodity prices and employment generation.

In another study, Olanrewaju et al. (2021), examine the impact of youth participation in ABP on rice productivity in northern Nigeria. Their finding indicates that youth participation increases yield by about 42.46% and this underscores the efficiency of ABP. Grace & Lawrence (2017) report that because of the ABP for small-scale rice farmers in Kebbi State, Nigeria a yield of as high as 7.5 to 8.0 tons per hectare was recorded by farmers as against less than 2.0 tons per hectare before the introduction of the programme. Umar et al. (2019) observed that under ABP, year of schooling, farming experience, access to credit, farm machinery ownership, the complexity of the technology and contact with extension agents had a significant positive influence on the adoption of improved rice production technology and variety, while age had a significant negative effect in Kebbi State, Nigeria.

Osaretin et al. (2018) investigated the effect of credit supply on rice output in Nigeria for the periods 1981–2016. Study findings revealed that a rise in credit supply is closely associated with increased rice output. In the case of Bangladesh Muhammad et al.
Assessment of the Central Bank of Nigeria Anchor Borrowers’ Programme on Rice Production in Kebbi State, Nigeria (2014) revealed that agricultural credit has a positive and significant effect on rice production, input demand, and food security. Based on multi-stakeholder platforms (MSPs) Flippi et al. (2019) have in the case of Benin revealed that MSPs are efficient in increasing access to formal credit and that membership of MSPs increases the likelihood of rice producers and processors’ access to credit. Other key factors that are significant in explaining rice farmers’ access to formal credit include; demographic features, soft guarantees usage for securing a loan and frequency of participation in the MSPs. In the Mekong River Delta (MRD), Vietnam, Hon & Ninh (2019) show that the degree of credit rationing facing rice farmers is affected by land value, income, education, gender and distance to the nearest credit institution. The finding further indicates that the amount of capital allocated to inputs increases with a decrease in credit rationing while there is no significant link between credit rationing and capital allocated to seed and pesticides.

Emenuga (2019) observed that in Nigeria, there is evidence of a long-run nexus between bank credit and agricultural development. While banks’ credit is positively related to agricultural development, it is found to be negatively related to interest rates. In a study by Friday et al. (2016), the agricultural credit guarantee scheme fund (AGSF) has been found to assert no significant effect on agricultural productivity while credit facilities by commercial banks significantly affect productivity in Nigeria. Bodiseowei & Tombofa (2016) report that agricultural credit affects agricultural productivity and GDP in Nigeria positively. In the case of Ghanaian youth farmers, Twumasi et al. (2020) observed that rural youth farmers are constrained by credit facilities. Additionally, youth farmers’ education level, age, savings, and parents’ occupation reduced the probability of credit constraint while unwieldy loan application processes and time loan take before disbursement increases credit constraint.

Other studies by Adetiloye (2012), Ammani (2012), Chisasa (2014), Rahman et al. (2014), and Osa-Afiana & Kelikume (2015) showed that agricultural credit has impacted positively on the agricultural sector and output in Nigeria, Pakistan and South Africa. In another study, Haryanto et al. (2023) report that access to credit in the agricultural sector increases farm productivity, performance, and technical efficiency. Over the period 1981-2013, Kiragu (2015) reported a significant causal link between agricultural financing and the productivity of dairy farms in Central Kenya. While examining the effect of CBN’s credit scheme on the Nigerian economy Dori (2016) has found a positive effect of the scheme on agricultural output, employment generation, rural
development, exports and foreign exchange earnings. A study by Anthony (2010) showed that agricultural credit has significantly influenced exports in Nigeria. Saad et al. (2014) report a positive and significant effect of loan facilities on farmers’ socio-economic life in Pakistan.

3 DATA AND METHODOLOGY

This study aimed to assess the Central Bank of Nigeria ABP on rice production in Kebbi State, Nigeria. Specifically, the beneficiaries' income. The study focused on eight local government areas (LGAs) of the Kebbi States which are; Augie, Argungu, Bagudo, Birnin-Kebbi, Jega, Suru, Wara, and Yauri. These LGAs were chosen purposively because the areas account for over 90 per cent of rice output in Kebbi State. The target populations are the beneficiaries and non-beneficiaries of the ABP in eight LGAs in the year 2019/2020 planting period. The list of beneficiaries has been collected from the CBN and project management team. Multi-stage sampling technique was deployed for the study. The study used primary data, obtained from rice farmers using a well-structured questionnaire. Moreover, the study randomly selects two villages from each of the beneficiary LGAs. Twenty (20) ABP participants and non-participants were selected from each of the chosen villages making a total of three hundred and twenty (320) respondents for the study, even though three hundred and thirteen (313) respondents are considered useful.

3.1 ESTIMATION TECHNIQUE

Following the work of Ayinde et al. (2018), Umeh & Adejo (2019), and Rahman et al. (2014) the study adopted binary logistic regression to determine whether the ABP fund has increased beneficiaries' income in the study area. A Logistic regression model otherwise known as the logit model uses a dummy dependent variable (1 or 0) while the independent variables are both discrete and continuous. The model is expressed by Gujarati (2004) as;

\[
P = E(Y = \frac{1}{X_i}) = \frac{1}{1+e^{-(\beta_1 + \beta_2 X_i)}}
\]  

(1)

For ease of expression if \( z = \beta_1 + \beta_2 X_i \)
\[ P = \frac{1}{1+e^{-zi}} = \frac{e^z}{1+e^z} \]  

(2)

If \( P \) stands for the probability of occurrence (say, access to ABP fund), the probability of \( =-\) otherwise can be expressed as:

\[ 1 - P = \frac{1}{1+e^{-zi}} \]  

(3)

Thus, the odds ratio between the two can be expressed as:

\[ \frac{P}{1-P} = \frac{1+1+e^{-zi}}{1+e^{-zi}} = e^{zi} \]  

(4)

Where:

\( P_i/(1 - P_i) \) stands for the odds ratio of the reason behind access to ABP funds. That is the ratio of the probability that a farmer access anchor borrowers’ programme fund to the probability of otherwise. Taking the natural log of Equation (4) we get;

\[ L_i = \ln \left( \frac{P_i}{1-P_i} \right) = Z = \beta_1 + \beta_2 X_i \]  

(5)

Where:

\( L \) means the log of odd ratio, Equation (5) represents what is known as the logistic model which is used when the dependent variable takes a binary value of 0 or 1. Drawing from these the model our empirical model is expressed as;

\[ Y = \log \left[ \frac{P}{1-P} \right] = \log Z = \beta_0 + \beta_1 Age + \beta_2 MSta + \beta_3 Edu + \beta_4 Income + \beta_5 HSize + \beta_6 Mship + \beta_7 EVisit + \beta_8 FSize + \beta_9 FExp + \beta_{10} AdInp + \mu \]  

(6)

Where:

\( Y \) is the probability of improvement in income as a result of access to ABP fund with a dummy variable of 1 if a farmer is a beneficiary or has access to ABP fund and 0 otherwise. \( \beta_s \) are the parameters to be estimated that explained changes in \( Y \) resulting from changes in the explanatory variables. \( Age \) is the age of the beneficiary and non-beneficiary, \( MSta \) is the marital status of the farmers, \( Edu \) is the level of education, \( Income \) is the income from paddy rice (measure in Naira amount), \( HSize \) is the size of the household, \( Mship \) is a dummy for membership of the cooperative with 1 being a member and 0 otherwise, \( EVisit \) is the number of extension visits, \( FSize \) is the farm size (measure in hectares), \( FExp \) is the farming
experience and managerial skills (measure as the number of years), $AdInp$ is the adequate input received dummy with 1 adequately received and 0 otherwise, $\mu$ is the error term. Also, the model will be reestimated by measuring the income of the beneficiaries by five, six and seven variables respectively. Hence the following multivariate models will be estimated.

$$Y = \beta_0 + \beta_1 Age + \beta_2 AdInp + \beta_3 Edu + \beta_4 Fsize + \beta_5 FExp + \varepsilon$$  \hspace{1cm} (7)

$$Y = \beta_0 + \beta_1 Age + \beta_2 FSize + \beta_3 FExp + \beta_4 HSize + \beta_5 EVisit + \beta_6 Edu + \varepsilon$$  \hspace{1cm} (8)

$$Y = \beta_0 + \beta_1 Mship + \beta_2 MSta + \beta_3 AdInp + \beta_4 Edu + \beta_5 FSize + \beta_6 income + \beta_7 EVisit + \varepsilon$$ \hspace{1cm} (9)

Where:

$Y$ in Equations (7) – (9) is the probability of access to ABP fund with a dummy variable of 1 if a farmer is a beneficiary or has access to ABP fund and 0 otherwise. The explanatory variables in Equations (7) – (9) are as defined in Equation (6), while $\beta_0$ is the intercept or constant term, $\beta_1$ …… $\beta_7$ are the parameters to be estimated while $\varepsilon$ is the error term.

The study also employed average treatment effect (ATE) to assess the effect of ABP on beneficiaries' income. It’s a statistical tool that is used to estimate the effect of a treatment, policy, or other intervention like ABP by accounting for the covariates (Pearl, 2009). Assuming we have background variables $T$, outcome $Y$ and binary treatment $Z$. Hence, ATE is defined as the conditional difference of treatment given the background variables expressed as;

$$p(x) = \text{Pr}(Z = 1|T = t)$$ \hspace{1cm} (1)

4 RESULTS AND DISCUSSION

In this part of the analysis, we examine the extent to which ABP impacted the income of the beneficiaries. Logistic regression results, the result of the average treatment effect as well and descriptive statistics of the responses between beneficiaries and non-beneficiaries are also presented in this section.
Marginal effects after binary logistic regression results are presented in Table 1. In column 1 we present the result of the baseline model as depicted in Equation 6. The result opined that age, membership of cooperatives, extension worker visits, farm size, farming experience, and adequate input supply are all positive and statistically significant. This suggests that for any unit increase in any of the aforementioned explanatory variables, there is an expected probability of an increase in the income of the beneficiaries by 0.145, 0.087, 0.279 and 0.093, 0.025, and 0.037 respectively. The level of significance of these variables appeared at less than 1 per cent except for farming experience and adequate input supply which appeared at less than 5 per cent level. However, household size though significant but negative. Implying that a unit increase in the size of the household leads to the probability of a 0.082 decrease in the income of the beneficiaries holding all other variables constant. On a different twist, marital status, education and income are all positively insignificant in the study.

Columns 2–4 of Table 1 depict the results of the estimated logistic model as specified in Equations (7)–(9). In this estimate, we further attempt to assess whether the income of the beneficiaries is affected by the included variables while excluding other variables from the baseline model. From the result, the age coefficient is significant at
less than 1 per cent in all the estimates. This finding suggests that youths who fall between the ages of 18 to 40 constitute a larger workforce at the farm and their productivity translates to an increase in the income of the beneficiaries as evident in not only Models 2 and 3 but in the whole estimates. Similarly, farm size correlates positively with improvement in beneficiaries' income as presented in all estimates. With a unit increase in farm size, we expect a probable increase in beneficiaries' income by 0.093, 0.082, 0.094, and 0.088 respectively. Adequate input is also found to be positive and significant at less than a 5 per cent level in both Models 1, 2, and 4 models. In the same vein, the result shows that beneficiaries’ income responds positively and significantly to the number of extension visits. Membership of cooperatives in Model 4 is equally positive and significant with a probable projection of a 0.126 increase in beneficiaries' income as a result of membership. This conforms with our prior expectations as one of the conditions of ABP funds access is membership in a farmers' cooperative. However, education even though positive but insignificant in all the estimated models, as, well as farming experience and income in Models 2, 3, and 4 respectively. On the contrary, marital status is not only mixed but insignificant in all the estimates.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Control Treated ATE Standard-Error Z-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income</td>
<td>160 160 6.318** 3.682 1.72</td>
</tr>
</tbody>
</table>

Source: Authors’ computation using STATA 15
Note: Standard errors in parentheses, and also ** p < 0.05

With the aid of endogenous treatment-effects estimation Table 2 presents the result of the average treatment effect in the linear outcome model and probit treatment model which indicate that ABP had a positive effect on beneficiaries' income as it’s significantly positive at 5 per cent. Findings opined that the effect parameter brought about a 6.318 per cent increase in beneficiaries' income because they partake in the programme.

4.1 DESCRIPTIVE STATISTICS

<table>
<thead>
<tr>
<th>Questions/Responses</th>
<th>Beneficiaries</th>
<th>Non-Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you received money from the programme?</td>
<td>Frequency (n = 160) Percentage</td>
<td>Frequency (n = 160) Percentage</td>
</tr>
<tr>
<td>Yes</td>
<td>96 60.0</td>
<td>0 0</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>65.0</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Have you been visited by the extension worker?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>104</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Unspecified</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Have you been supplied with improved rice seed?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>106</td>
<td>66.3</td>
</tr>
<tr>
<td>No</td>
<td>53</td>
<td>33.1</td>
</tr>
<tr>
<td>Unspecified</td>
<td>1</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Have you been supplied with Fertilizer by the programme?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>116</td>
<td>72.5</td>
</tr>
<tr>
<td>No</td>
<td>44</td>
<td>27.5</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Has the programme increased your yield per hectare?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>105</td>
<td>65.6</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>25.6</td>
</tr>
<tr>
<td>Unspecified</td>
<td>14</td>
<td>8.8</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>At harvest did you encounter difficulty taking your product to the market or looking for a buyer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>45</td>
<td>28.1</td>
</tr>
<tr>
<td>No</td>
<td>115</td>
<td>71.9</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Is the current market price of rice (paddy) profitable for rice farmers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>109</td>
<td>68.1</td>
</tr>
<tr>
<td>No</td>
<td>41</td>
<td>25.6</td>
</tr>
<tr>
<td>Unspecified</td>
<td>10</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Has the collaboration between rice farmers, marketers and processors increased farmers’ income?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>120</td>
<td>75.0</td>
</tr>
<tr>
<td>No</td>
<td>36</td>
<td>22.5</td>
</tr>
<tr>
<td>Unspecified</td>
<td>4</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Have you been empowered with the necessary techniques that resulted in a reduction in cost and increased output?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>117</td>
<td>73.1</td>
</tr>
<tr>
<td>No</td>
<td>23</td>
<td>14.4</td>
</tr>
<tr>
<td>Unspecified</td>
<td>20</td>
<td>12.5</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
<tr>
<td>Does household size affect the income of rice farmers?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>91</td>
<td>56.9</td>
</tr>
<tr>
<td>No</td>
<td>69</td>
<td>43.1</td>
</tr>
<tr>
<td>Total</td>
<td>160</td>
<td>100%</td>
</tr>
</tbody>
</table>

Source: Authors’ computation using Stata15
Table 3 shows that over 60 per cent of the beneficiaries received funds from the programme unlike the non-beneficiaries who none received from the ABP and also another 5.6 per cent did not explicitly state their response. Similarly, the responses were also in conflict on the issue of fertilizer supplied and improved seed distributed by the programme as beneficiaries attest to the receipt of commodities, unlike the non-beneficiaries. However, both beneficiaries and non-beneficiaries are in agreement that at harvest they did not encounter challenges taking their products to the market or looking for a buyer. This is evident as 71.9 per cent of the beneficiaries and 78.7 per cent of non-beneficiaries responded that they did not face challenges disposing of their commodities. In a similar vein, they both responded positively with regard to whether the current market price of paddy rice is profitable for rice farming where over 68 per cent and 63 per cent of beneficiaries and non-beneficiaries respectively responded positively. In addition, 56.9 per cent of the beneficiaries agreed that household size affects the income of the farmer as against 51.9 per cent of the non-beneficiaries. Also, 73.1 per cent, as well as 70.6 per cent, are believed to have received empowerment that increases their yield and saves costs at the farm.

5 CONCLUSION AND RECOMMENDATIONS

This study assessed the CBN intervention programme on rice production in Kebbi State, Nigeria. Specifically, the study evaluated its impact on beneficiaries’ income in the study area. The study analysed primary data obtained through the use of a well-structured questionnaire. Also, four binary logistic regression models, average treatment effect, and descriptive statistics were used in the analysis. Findings from the study’s estimated model have proven that farm size, farming experience, extension visit, membership of cooperative and adequacy of farm input are critical variables and their positive increase translates to the probability of an increase in beneficiaries' income in the study.

Generally, findings from the results reveal that the ABP is a success, even though there is a need for sustainability of the programme as well as proper monitoring and evaluation to maintain and improve on the gains recorded so far. Hence, the study offers the following policy recommendations given the empirical findings:

i. There is a need to further reduce the interest rates and also the creation of an interest-free window, this will go a long way in encouraging more farmers to
key into the programme. By extension, access to low-cost loans will mean expansion in production, more income and poverty alleviation.

ii. Training and re-training of farmers, exposing them to more than farming techniques as well as capacity building and farm management training by learned extension workers. Enlightenment and sensitization campaigns on the benefits of the programme should be widened into the local communities as a lot of farmers in the rural areas are unaware or have a wrong understanding of the programme. To support the effort of extension workers which is inadequate, the government may employ the services of skilled commercial extension workers.

iii. Government should regularly check with keen interest sharp practices in the programme especially politicians and middlemen who divert resources meant for the farmers to their personal use.

iv. Government should ensure a regular and adequate supply of inputs like fertilizer, improved seeds, and pesticides among others not only for rice production but for the entire sector. This will guarantee improved output as the current average yield is considered low and requires continuous interventions.

v. Awareness of programme implementation guidelines and review of stakeholder roles needs to be sustained. Comprehensive monitoring and evaluation will check excesses by all stakeholders, especially defaulters, especially on timely repayment of all credit facilities by the beneficiaries, this will guarantee the sustainability of the programme.
REFERENCES


