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The Impact of the Anchor Borrowers' Programme on the Livelihoods of Smallholder Farmers in Southeast, Nigeria

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Attamah, Clement Okechukwu
Corresponding author
Department of Agricultural Extension, University of Nigeria, Nsukka, Enugu, Nigeria.
Email: clement.attamah@unn.edu.ng
Phone no: +234 703 539 7081
https://orcid.org/0000-0002-1343-7987

Von Abubakari, Fatimah
Department of Agricultural Economics and Extension, University of Cape Coast, Ghana.
Email: fatimah.von@ucc.edu.gh
Phone no: +233 241 242 112
https://orcid.org/0000-0001-5485-4085

Bosompem, Martin
Department of Agricultural Economics and Extension, University of Cape Coast, Ghana
Email: mbosompem@ucc.edu.gh
Phone no: +233 208 070 013
https://orcid.org/0000-0001-6633-2399

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Abstract
The study assessed the impact of the Anchor Borrowers' Programme (ABP) on the livelihoods of smallholder farmers in Southeast, Nigeria. Quantitative data were explored using a cross-sectional survey hinged on the difference-in-difference, a retrospective causal-comparative impact evaluation design. All ABP beneficiaries and non-beneficiary smallholder farmers constituted the population for the study. A multi-stage sampling procedure was employed to select a representative sample size of 381 for the beneficiaries and 384 for the non-beneficiaries. Data were collected using a structured interview schedule. The collected data were analysed using mean, standard deviation, t-test and DiD estimator. The findings show that the ABP intervention did not significantly (β = 78,874; t = 0.02) impact the livelihood assets of smallholder farmers on the whole, though it had an impact on some human (level of education: DiD=0.04) and financial assets (level of access to credit: DiD=0.01). The Project Management Team should critically review the programme's design and implementation to ensure it better addresses the factors that influence livelihood assets.

Introduction

Agricultural development is a cornerstone of national progress, driving economic transformation and poverty reduction (Liang, 2024). In Nigeria, with a youth unemployment rate of 42.5%, the sector holds immense potential to engage this demographic, provided there is a robust policy framework and political will (National Bureau of Statistics, 2022; Owan et al., 2024).

Despite its potential, Nigeria's agricultural sector faces significant challenges. Smallholder farmers (SHFs), who contribute over 90% of the nation's agricultural output, grapple with limited access to capital, markets, inputs, extension services, and modern technology (Chiaka et al., 2022; FAO, 2022). To address these issues, the Nigerian government introduced various agricultural intervention programmes, such as the Rural Finance Institution Building Programme (RUFIN), Agriculture Promotion Policy (APP), and the Anchor Borrowers' Programme (ABP) (FAO, 2022; RUFIN, 2011).

The ABP, as one of the interventions, was launched in 2015 by the Central Bank of Nigeria (CBN). It is a $2.2 billion initiative designed to address the challenges faced by SHFs (CBN, 2016; Azeez, 2023). The programme provided loans and inputs to farmers organized into groups of 5 - 20 members, linking them with agro-processors to ensure market access. Key commodities targeted include rice, maize, cassava, cotton, and livestock (CBN, 2016). The ABP aimed to boost production, stabilize input supply, and reduce Nigeria's food import bill, thereby enhancing food security and aligning with the Sustainable Development Goals (SDGs) (CBN, 2016).

Drawing from the theory of change and sustainable livelihood framework, programme impact refers to the measurable change attributable to an intervention (Truong et al., 2021; Glewwe & Todd, 2022). Evaluating the ABP's impact on these assets is essential to inform policy and improve programme effectiveness. Notwithstanding its potential, the ABP's impact remains understudied, particularly in Southeast Nigeria. Existing studies have focused on Northern and Western Nigeria, and specific commodities like rice, often relying on self-assessment reports or desk reviews that may introduce bias (Olanrewaju et al., 2021; Akinbile et al., 2023; Okoroh et al., 2021; CBN, 2017). This study addresses these gaps by employing the difference-in-difference methodology to isolate the ABP's impact on SHFs' livelihoods.

The study assessed the impact of the ABP on the livelihood assets of smallholder farmers in Southeast Nigeria. Specifically, it answered the following questions: What changes in the human capital are attributable to ABP? To what extent do beneficiaries differ from the non-beneficiaries in their physical assets? What impact does ABP have on the natural and financial capital of the beneficiaries? And what differences in the social capital are attributable to the intervention?

Methodology

The research was carried out in Southeast, Nigeria. It is located between latitudes 04°17′ and 07°06′ North and longitudes 05°23′ and 09°28′ East. All ABP beneficiaries and non-beneficiary smallholder farmers (farm size less than two hectares) in Southeast, Nigeria constituted the population for the study. Using the Krejcie and Morgan Table for sample size estimation at a 95% confidence level, a population of 50,000 beneficiaries (Ofulue et al., 2021; Chima et al., 2024) required a representative sample size of 381, while a non-beneficiary population of 2,060,941 (National Bureau

of Statistics, 2010) required 384. A multi-stage sampling approach, incorporating simple random and proportionate sampling techniques, was used to select the sample. In the first stage, three states were randomly chosen from the five in the region. In the second stage, based on the beneficiaries' list, Anambra had 759 beneficiaries, Ebonyi had 347, and Enugu had 4,268. Proportionately, 54 beneficiaries were interviewed in Anambra, 25 in Ebonyi, and 302 in Enugu, resulting in a total of 381 respondents. For the non-beneficiaries, smallholder farmers with comparable characteristics to the beneficiaries were proportionately selected from the same three states. From Anambra, which had 447,454 smallholder farmers, 134 were interviewed; from Ebonyi, with 384,855 farmers, 116 were interviewed; and from Enugu, with 443,973 farmers, 134 were interviewed. The snowball sampling method was employed to identify these respondents. Data were collected using a validated structured interview schedule for the two categories of respondents. The impact of the programme on the beneficiaries' livelihood assets covered questions on human capital (education, health, skills etc.), social capital (membership of associations, mentorship etc.), natural capital (land, forest etc), physical capital (house, livestock, crops, vehicle, equipment, furniture, etc.) financial capital (savings, cash, access to financial services, income, credit, insurance, etc.) for both beneficiaries and non-beneficiaries at two points measured on interval and ratio scales. Ethical clearance was obtained from the University of Cape Coast Institutional Review Board. The collected data were analysed using mean, standard deviation, independent t-test, paired sample t-test, standardized mean difference, and DiD estimator.

Difference-in-Differences model specification

Simply put:

DiD = [ABPB(After) – ABPB(before)] – [NABPB(after) – NABPB(before)]

The regression model of a DiD estimator can be specified as:

$Yit=\beta0+\beta1Groupi+\beta2Timet+\beta3(Groupi\times Timet)+\epsilon it$

Where; ABPB: Anchor Borrowers' Programme Beneficiary

NABPB: Non-Anchor Borrowers' Programme Beneficiary

Yit: Outcome variable for individual 'i' at time 't'

β0: Intercept

Groupi: Dummy variable indicating whether individual i belongs to the ABPB (1) or NABPB (0)

Timet: Dummy variable indicating the post-treatment period(after) (1) or pre-treatment period(before) (0)

Groupi×Timet:Interaction term capturing the DiD estimate of the treatment effect (β3)

ϵit: Error term

β1: Group effect: Captures the baseline differences between the treatment and control groups before the intervention.

β2: Time effect: Accounts for temporal changes affecting all groups equally.

β3: Interaction term: Represents the DiD estimator, isolating the effect of the intervention by accounting for differences between groups over time.

Matching test

The results of the matching analysis indicate a high level of balance between the ABP beneficiaries and non-beneficiaries across measured covariates, as evidenced by the calculated Standardized Mean Differences in Table 1. SMD values are commonly used to assess balance in matching. They ensure that the parallel trend assumption

is fulfilled, a precondition for DiD; with a threshold of less than 0.10 considered indicative of adequate balance (Zhang et al., 2019; Wei et al., 2020).

Table 1: Standardized mean differences for matching

Variable	Mean difference	Standard error (SE)	Pooled variance (S_P^2)	Pooled standard deviation (Sp)	SMD
Age	0.57	0.74	105.96	10.29	0.06
Level of education	-0.09	0.07	0.96	0.98	-0.09
Sex	0.05	0.04	0.25	0.50	0.09

Source: Authors' field data (2024)

The Table reveals that the SMD for age is 0.06, which is well below the threshold of 0.10, suggesting that the ABP beneficiaries and non-beneficiaries have very similar distributions of age. The pooled variance (S_P^2) is 105.96, reflecting a moderate level of variability in this variable, and the pooled standard deviation (Sp) is 10.29. The SMD for the level of education is −0.09, which is very close to the threshold but still indicates a good balance. The pooled variance is 0.96, and the pooled standard deviation is 0.98. The SMD for sex is 0.09, which, while slightly higher than other variables, remains below the 0.10 threshold. The pooled variance is 0.25, and the pooled standard deviation is 0.50, indicating minimal variation. The consistently low SMD values across variables confirm that balance was achieved, a critical prerequisite for estimating causal treatment effects using DiD model. The balanced covariates suggest that confounding has been minimized, enhancing the validity of treatment effect estimates. Well-balanced covariates contribute to reducing bias, making the results more comparable to those of randomized controlled trials (RCTs).

Results and Discussion

Impact of ABP on the Livelihood Assets of Smallholder Farmers

The impact of ABP was estimated on the livelihood assets of the smallholder farmers, capturing the five livelihood assets.

Impact of ABP on the human capital of smallholder farmers

Table 2 provides a comparative analysis of human capital attributes between smallholder farmers who benefitted from ABP and the non-beneficiaries. Using a DiD approach, the table evaluates paired mean differences for both groups and provides DiD to assess the programme's overall impact.

Item-wise, ABP beneficiaries show a statistically significant increase in education level (t = 3.38*), with a mean difference of 0.08 and a standard deviation of 0.36. Non-beneficiaries exhibit a smaller increase (t = 1.83), resulting in a DiD of 0.04. This suggests modest gains in education levels attributable to the programme. Both groups showed significant improvements in access to health, with ABP beneficiaries (t = 3.89*) and non-beneficiaries (t = 4.95*) demonstrating mean differences of 0.09 and 0.12, respectively. The DiD (−0.03) suggests that health access improvements were relatively consistent but slightly better for non-beneficiaries. ABP beneficiaries experienced significant improvement (t = 3.77*) in market access, with a mean

difference of 0.10, whereas non-beneficiaries saw a smaller, non-significant change (t = 1.38). The DiD of 0.04 indicates that market access gains were largely programme-driven. This shows that the market component of the ABP programme is efficient. Significant increases in skill levels were observed for both groups, but ABP beneficiaries (t = 4.62*) experienced smaller improvements (MD **=** 0.11) compared to non-beneficiaries (MD **=** 0.32, t = 6.20*).

Table 2: Impact of ABP on the human capital of smallholder farmers

Human capitals	**Paired differences**						**DiD**
	ABP beneficiaries			**Non-Beneficiaries**			
	Mean diff. (MD)	**Std. dev.**	**t-value**	**Mean diff. (MD)**	**Std. dev.**	**t-value**	
Level of education	0.08	0.36	3.38*	0.04	0.34	1.83	0.04
Access to health facilities	0.09	0.38	3.89*	0.12	0.37	4.95*	-0.03
Access to market	0.10	0.44	3.77*	0.06	0.67	1.38	0.04
Level of skill	0.11	0.37	4.62*	0.32	0.83	6.20*	-0.21
Number of skilled labourers	-0.91	3.27	-3.59*	0.24	1.93	1.90	-1.15
Number of unskilled labourers	2.73	7.56	5.66*	0.80	2.38	5.31*	1.93
Number of extension visits	0.03	0.79	0.40	0.05	1.51	0.45	-0.02
Access to extension	0.17	0.58	4.36*	0.22	0.69	4.73*	-0.05
Household size	0.10	0.96	1.54	0.10	0.93	1.65	0.00
Number of wives	0.02	0.14	1.74	0.01	0.16	0.45	0.01

DiD = Difference in Difference; MD = Mean Difference; p≤0.05
Source: Authors' field data (2024)

Significant improvements were also observed for both groups on extension access, though non-beneficiaries (MD **=** 0.22, t = 4.73*) had more; ABP beneficiaries (MD **=** 0.17, t = 4.36*). Access to extension could be boosted by adopting the template used in *Fadama* III additional financing (Badiru, 2024). Conversely, the number of skilled labourers declined significantly for ABP beneficiaries (t = −3.59*), with a mean difference of −0.91, while non-beneficiaries saw a slight, non-significant increase (t = 1.90). The decline in the demand for skilled labourers could be tied to the positive impact of the training component of ABP on the farmers. On unskilled labourers, ABP beneficiaries (t = 5.66*) and non-beneficiaries (t = 5.31*) both reported increases, though more on the ABP beneficiaries (DiD = 1.93). This suggests that ABP farmers sought more hands in handling the less technical aspects of their farm operations. Hence, the programme created employment opportunities. Improvements were observed for both beneficiaries (t = 4.36*) and non-beneficiaries (t = 4.73*). However, the DiD (−0.05) implies a slightly greater gain for non-beneficiaries. Neither household size (t = 1.54) nor number of wives (t = 1.74) showed statistically significant changes among ABP beneficiaries. The DiD were 0.00 and 0.01, respectively, indicating negligible effects in these areas.

In general, the findings highlight varying impacts of the ABP on human capital. Beneficiaries achieved notable gains in market access and education level but lagged in areas like access to health and extension compared to non-beneficiaries. These mixed outcomes suggest programme implementation challenges, such as unequal resource allocation or a focus on short-term outcomes. On another hand, the

significant decline in the number of skilled labourers among beneficiaries (t = −3.59*) warrants further investigation, as resource limitation could limit engagement (Kambali & Panakaje, 2022). Also, a study by Attamah and Chah (2024) suggests that programmes like ABP may inadvertently favour immediate production outcomes (unskilled labour) at the expense of longer-term capacity building. Effective programmes, as noted by Fatch et al. (2021), should prioritize both skill enhancement and labour diversification. Moreover, the programme's limited impact on household size and number of wives reflects its narrow focus on economic aspects of human capital, potentially neglecting broader socio-demographic factors that influence household welfare (Fatch et al., 2021).

Impact of ABP on the natural capital of smallholder farmers

Data in Table 3 reveal the natural capital of smallholder farmers participating in ABP compared to non-beneficiaries. Using paired mean differences and DiD, the table shows key indicators such as land ownership, livestock, access to natural resources, and renewable energy sources. In the size of total land owned, the ABP beneficiaries saw a slight increase (MD = 0.21, t = 1.76), while non-beneficiaries experienced a negligible change (MD = −0.01, t = −0.18). The DiD (0.22) suggests a marginal programme-driven improvement, although the effects are statistically insignificant. Non-beneficiaries experienced a statistically significant increase in the size of agricultural land owned (MD = 0.06, t= 3.05*), compared to beneficiaries who showed a smaller and insignificant increase (MD = 0.03, t = 1.71). The negative DiD (−0.03) indicates beneficiaries lagged behind non-beneficiaries in acquiring or expanding agricultural land. Both groups exhibited increases in the size of cultivated land, with ABP beneficiaries (MD = 0.10, t = 4.47*) performing slightly better than non-beneficiaries (MD = 0.10, t = 1.27). The DiD (0.00) indicates the programme had no additional impact beyond general trends. A closer look at the standard deviations for the two groups across the land ownership items, reveals that the recorded differences are not normally distributed. This implies that the changes could be personal efforts of a very small fraction of the population and not that of the programme. On the number of crops cultivated, ABP beneficiaries experienced a significant decline (MD = −0.12, t = −2.01*), whereas non-beneficiaries showed an increase (MD = 0.08, t = 1.96). The DiD (−0.20) suggests a negative programme effect on crop diversification, potentially reflecting reduced diversification incentives. This could be linked to the programme design where farmers are expected to choose a particular commodity of interest.

On livestock such as poultry, goats, sheep, and pigs, the beneficiaries recorded significant increases in goat ownership (MD = 0.38, t = 3.19*) but not in other livestock categories. Non-beneficiaries exhibited significant increases across multiple categories, including goats (MD = 2.90, t = -2.97*), sheep (MD = 2.60, t = 2.08*), and pigs (MD = 3.17, t=3.27*). The negative DiD for all categories (e.g., −2.52 for goats) suggests ABP beneficiaries did not capitalize on livestock opportunities as effectively as non-beneficiaries. This shows that ABP activities in southeast Nigeria were crop-centric.

Access to natural resources such as land, forest, renewable energy and water. The non-beneficiaries reported a significant increase in access to agricultural land (MD = 0.27, t = 5.47*), whereas beneficiaries showed negligible improvements (MD = 0.01, t = 0.34).

Table 3: Impact of ABP on the natural capital of smallholder farmers

Natural capitals	Paired differences						DiD
	ABP beneficiaries			Non-Beneficiaries			
	Mean diff. (MD)	Std. dev.	t-value	Mean diff. (MD)	Std. dev.	t-value	
Size of total land owned (ha)	0.21	1.85	1.76	-0.01	0.48	-0.18	0.22
Size of agricultural land owned (ha)	0.03	0.26	1.71	0.06	0.34	3.05*	-0.03
Size of cultivated land (ha)	0.10	0.36	4.47*	0.10	1.30	1.27	0.00
Number of cultivated crops	-0.12	0.92	-2.01*	0.08	0.70	1.96	-0.20
Number of poultry owned	8.58	75.07	1.33	10.07	93.35	1.53	-1.49
Number of goats owned	0.38	1.40	3.19*	2.90	13.52	2.97*	-2.52
Number of sheep owned	0.02	0.53	0.33	2.60	16.90	2.08*	-2.58
Number of pigs owned	0.18	2.11	0.96	3.17	13.27	3.27*	-2.99
Access to agricultural land	0.01	0.56	0.34	0.27	0.80	5.47*	-0.26
Access to forest and woodland	0.05	0.38	2.01*	0.19	0.72	4.26*	-0.14
Access to renewable energy sources (solar, wind, hydro etc)	0.02	0.48	0.79	0.23	0.84	4.50*	-0.21
Sources of drinking water	0.08	0.47	2.54*	0.19	0.86	3.51*	-0.11
Access to natural water supply (rivers, streams, groundwater etc.)	0.02	0.26	1.21	0.24	0.68	5.66*	-0.22

DiD = Difference in Difference; MD = Mean Difference; p≤0.05
Source: Authors' field data (2024)

The DiD (−0.26) reflects an insufficient programme impact on land accessibility. Both groups showed significant gains, with beneficiaries (MD = 0.05, t = 2.01*) lagging behind non-beneficiaries (MD = 0.19, t=4.26*) in access to forests and woodland. The DiD (−0.14) highlights limited programme contributions to forest and woodland access. Beneficiaries demonstrated insignificant changes (MD = 0.02, t = 0.79), whereas non-beneficiaries experienced substantial improvements (MD = 0.23, t = 4.50*) in access to renewable energy sources. The DiD (−0.21) suggests the programme did not adequately promote renewable energy use among its participants. Beneficiaries reported significant improvements in sources of drinking water (MD = 0.08, t = 2.54*), though non-beneficiaries (MD = 0.19, t = 3.51*) outperformed them. The DiD (−0.11) indicates that non-beneficiaries had better access improvements. The beneficiaries showed insignificant changes in access to natural water supplies (MD = 0.02, t = 1.21), while non-beneficiaries exhibited significant gains (MD = 0.24, t = 5.66*). The DiD (−0.22) reflects insufficient programme emphasis on improving natural water access.

The results reveal that ABP beneficiaries experienced only marginal or insignificant improvements in most natural capital indicators compared to non-beneficiaries. Notably, beneficiaries showed statistically significant gains in cultivated land size and goat ownership but lagged in key areas like agricultural land access, crop diversification, and renewable energy utilization. The limited impact may stem from inadequate targeting or implementation gaps. According to Rakotonarivo et al. (2023), programmes focused on natural capital must address structural barriers, such as land

tenure insecurity and resource access inequalities. Furthermore, programmes often prioritize productivity over-diversification, leading to reduced resilience among smallholder farmers (Nepali et al., 2024).

Impact of ABP on the social capital of smallholder farmers

Table 4 compares the social capital of smallholder farmers in ABP and that of the non-beneficiaries. Key social capital indicators include participation in associations, levels of trust, mentorship, and the ability to contribute to social and familial responsibilities. The table captures importantly, the paired mean differences for each group and DiD, which reflect programme-driven impact.

Both ABP beneficiaries (MD = 0.10, t = 3.59*) and non-beneficiaries (MD = 0.17, t = 4.78*) experienced significant increases in association memberships. The DiD (−0.07) suggests that the programme did not provide additional benefits in fostering association memberships beyond general trends. ABP beneficiaries showed a modest improvement in the level of participation in community groups (MD = 0.04, t = 1.87), whereas non-beneficiaries experienced a greater and significant increase (MD = 0.24, t = 5.17*). The DiD (−0.20) highlights that beneficiaries did not gain as much from community involvement as non-beneficiaries despite group formation being a basis for participation in ABP. This may not be unconnected with the fact that people are more attached to associations or groups that are organic to their personality and interest than associations they are coerced or forced into by economic inducement (Reynolds, 2019).

Table 4: Impact of ABP on the social capital of smallholder farmers

Social capitals	Paired differences						DiD
	ABP beneficiaries			Non-Beneficiaries			
	Mean diff. (MD)	Std. dev.	t-value	Mean diff. (MD)	Std. dev.	t-value	
The number of associations belonged	0.10	0.41	3.59*	0.17	0.58	4.78*	-0.07
Level of support from family and friends	-0.01	0.38	-0.33	0.25	0.76	5.25*	-0.26
Level of participation in community groups or associations	0.04	0.37	1.87	0.24	0.74	5.17*	-0.20
Level of connection or network for business opportunity or employment	0.10	0.43	3.66*	0.19	0.68	4.63*	-0.09
Level of trust and cooperation within the community	0.07	0.41	2.62*	0.25	0.78	5.25*	-0.18
Degree of mentorship and guidance from experienced individuals	-0.34	1.09	-4.97*	0.02	1.10	0.34	-0.36
Level of contribution to social events (such as burial, naming, housewarming, birthdays, coronation, etc.)	0.00	0.47	0.00	0.12	0.67	2.86*	-0.12
Ability to pay children's or wards' school fees	0.10	0.56	2.65*	0.08	0.64	1.94	0.02

DiD = Difference in Difference; MD = Mean Difference; p≤0.05
Source: Authors' field data (2024)

In the level of connection or network for business opportunity or employment, the beneficiaries demonstrated significant gains (MD = 0.10, t = 3.66*), though non-

beneficiaries showed a slightly higher improvement (MD = 0.19, t = 4.63*). The DiD (−0.09) implies limited additional benefits for beneficiaries in building business networks. Both groups showed significant gains, with beneficiaries (MD = 0.07, t = 2.62*) lagging behind non-beneficiaries (MD = 0.25, t = 5.25*) in the level of trust and cooperation within the community. The DiD (−0.18) indicates that the programme's contribution to trust-building was relatively weak. This may be associated with poor government image in Nigeria, where people tend to slowly accept the government's action and their agents (Aleyomi, 2020). ABP beneficiaries recorded a decline in the level of support from family and friends (MD = −0.01, t = −0.33), while non-beneficiaries experienced significant improvements (MD = 0.25, t = 5.25*). The DiD (−0.26) suggests that the programme did not foster strong informal support systems. This could be tied to the popular perception that anyone or body connected to the government by any means is rich and well-to-do (Salawu., 2023). Beneficiaries experienced a significant decline in the level of mentorship and guidance received from experienced individuals (MD = −0.34, t = −4.97*), while non-beneficiaries showed no significant change (MD = 0.02, t = 0.34). The DiD (−0.36) indicates a programme-related negative effect, suggesting that mentorship opportunities were either neglected or maybe on the account of programme's promises that were not implemented. ABP beneficiaries showed no change in their level of contribution to social events or gatherings (MD = 0.00, t = 0.00), whereas non-beneficiaries reported significant increases (MD = 0.12, t = 2.86*). The DiD (−0.12) indicates that beneficiaries did not engage more actively in social events may be due to weak financial strength and the burden of loan repayment. Both groups showed improvements in their ability to pay children's or wards' school fees, with beneficiaries (MD = 0.10, t = 2.65*) slightly outperforming non-beneficiaries (MD = 0.08, t = 1.94). The DiD (0.02) indicates a small but positive programme effect.

Generally, the results indicate mixed outcomes for ABP beneficiaries in social capital development compared to non-beneficiaries. While beneficiaries experienced modest gains in areas such as business networks, trust, and school fee payments, they lagged in key domains like mentorship, community participation, and informal support systems. The decline in mentorship and lack of significant improvements in informal support and participation suggest implementation gaps in the programme's design. Social capital development requires intentional efforts to build networks and trust within communities (Miszczak, 2022). Programmes like the ABP may inadvertently focus on financial or physical capital, neglecting relational and social aspects that underpin community resilience (Jilani et al., 2024). Summarily, while the ABP has made incremental progress in some social capital indicators, its overall impact remains limited compared to non-beneficiaries outcomes. Future iterations of the programme should adopt a more holistic approach, integrating social capital development as a core objective alongside economic and physical capital improvements. This shift would ensure a more equitable and sustainable impact on smallholder farmers' livelihoods.

Impact of ABP on the financial capital of smallholder farmers

Table 5 explores differences in financial capital between smallholder farmers who benefitted from the ABP and non-beneficiaries. Financial capital indicators include income, savings, access to financial services, credit, and insurance. The analysis utilizes paired mean differences for each group and DiD, which estimate the programme's impact.

ABP beneficiaries experienced a modest but non-significant increase in their total annual income from the sale of farm produce (MD = 2.92×10^4, t = 1.30), while non-beneficiaries saw a significant rise (MD = 1.02×10^5, t = 3.80*). The DiD (-7.27×10^4) indicates that beneficiaries did not outperform their counterparts in improving farm income, despite the programme's objective to enhance agricultural productivity. Beneficiaries saw a small and insignificant increase in the total annual income from trade (MD = 2.25×10^5, t = 1.82), while non-beneficiaries reported a decline (MD = -3.03×10^6, t = −0.98). The DiD (3.26×10^6) highlights a potential programme-related effect on trade income for beneficiaries. The effect on trade could be due to programme fund reassignment by some farmers. This aligns with Burke et al. (2019) who reported a case of intervention fund diversion to an unrelated business in Mozambique.

Table 5: Impact of ABP on the financial capital of smallholder farmers

Financial capitals	Paired differences						DiD
	ABP beneficiaries			Non-Beneficiaries			
	Mean diff. (MD)	Std. dev.	t-value	Mean diff. (MD)	Std. dev.	t-value	
Total annual income from the sale of farm produce (naira)	$2.92x10^4$	$3.46x10^5$	1.30	$1.02x10^5$	$4.07x10^5$	3.80*	$-7.3x10^4$
Total annual income from trade (naira)	$2.25x10^5$	$1.43x10^6$	1.82	$-3.03x10^6$	$4.32x10^7$	-0.98	$3.26x10^6$
Level of availability or possession of savings or cash reserves	0.05	0.52	1.57	0.26	0.72	5.89*	-0.21
Level of access to credit or loans	0.27	0.59	7.17*	0.26	0.76	5.43*	0.01
Level of access to financial services (such as banks, microfinance)	0.25	0.59	6.74*	0.24	0.73	5.35*	0.01
Level of access to insurance coverage	0.03	0.35	1.46	0.26	0.85	5.04*	-0.23
Remittances to children	0.004	0.48	0.13	0.21	0.85	3.90*	-0.21

DiD = difference in difference; MD = Mean Difference; p≤0.05
Source: Authors' field data (2024)

On the level of savings or cash reserves, ABP beneficiaries (MD = 0.05, t = 1.57) showed limited improvements, while non-beneficiaries experienced significant growth (MD = 0.26, t = 5.89*). The DiD (−0.21) suggests that the programme did not significantly improve beneficiaries' capacity to accumulate savings. Beneficiaries reported significant improvements in the level of access to credit or loans (MD = 0.27, t = 7.17*), comparable to non-beneficiaries (MD = 0.26, t = 5.43*). The DiD (0.01) indicates similar benefits for both groups, suggesting broader financial system reforms or external factors influencing access to credit. ABP beneficiaries (MD = 0.25, t = 6.74*) and non-beneficiaries (MD = 0.24, t = 5.35*) both recorded significant increases in the level of access to financial services. The DiD (0.01) highlights that access improvements were not specific to ABP participation.

On the level of access to insurance schemes, ABP beneficiaries experienced a small and insignificant increase (MD = 0.03, t = 1.46), whereas non-beneficiaries recorded significant growth (MD = 0.26, t = 5.04*). The DiD (−0.23) suggests that ABP did not enhance access to insurance as captured in the programme design. Beneficiaries showed negligible changes in remittances to children (MD = 0.004, t = 0.13), while non-beneficiaries reported significant improvements (MD = 0.21, t = 3.90*). The DiD (−0.21) reflects limited programme impact on remittance behaviour. This could be tied to the apprehension associated with loans, where recipients are frugal with money until full repayment is accomplished (Hartantri et al., 2024).

Holistically, the findings suggest mixed outcomes for ABP in improving financial capital. While beneficiaries achieved notable gains in access to credit and financial services, their performance in other areas, particularly income and savings, fell short of expectations. Non-beneficiaries generally outperformed beneficiaries, raising questions about the programme's additionality. The limited gains in farm income among beneficiaries may reflect inefficiencies in the programme's implementation, such as delays in fund disbursement or inadequate support for value chain development. Research highlights that agricultural programmes need to focus on both production and market access to achieve sustainable income growth (Abdullah et al., 2024). Beneficiaries' modest savings growth, points to challenges in translating programme benefits into financial stability. Savings accumulation often depends on access to stable income and financial literacy (Bhutta et al., 2023). Future ABP interventions should integrate savings promotion strategies, such as mobile banking and group savings schemes. The negligible improvements in insurance access suggest a missed opportunity to address farmers' vulnerability to shocks. Insurance schemes tailored to smallholder farmers, such as index-based weather insurance, have proven effective in enhancing resilience (Yu & Aleksandrova, 2021). In a wider context, the mixed outcomes align with global evidence on agricultural financing programmes, which often face challenges in achieving financial sustainability for beneficiaries (Onyiriuba et al., 2020). Programmes like ABP must strike a balance between short-term credit provision and long-term capacity building to foster self-reliance.

Impact of ABP on the physical capital of smallholder farmers

Data in Table 6 shows the differences in physical capital assets between ABP beneficiaries and non-beneficiaries. Physical capital includes ownership of productive assets, household items, and access to agricultural services. The table captures the paired mean differences for each group and the DiD.

Beneficiaries showed a small, non-significant increase in house ownership (MD = 0.03, t = 1.91), with non-beneficiaries reporting negligible growth (MD = 0.01, t = 0.63). The DiD (0.02) indicates a limited impact on housing from ABP participation. Motorcycle ownership improved marginally for beneficiaries (MD = 0.09, t = 1.83) and significantly for non-beneficiaries (MD = 0.04, t = 3.23*), resulting in a small DiD (0.05). Car ownership declined slightly among beneficiaries (MD = −0.04, t = −0.71) but increased slightly for non-beneficiaries (MD = 0.03, t = 1.74), with a DiD of −0.07. Significant increases in knapsack sprayer ownership were observed among beneficiaries (MD = 0.25, t = 7.83*) and to a lesser extent among non-beneficiaries (MD = 0.06, t = 1.40), leading to a DiD value of 0.19. Access to agrochemicals improved significantly for both groups, with slightly better gains for non-beneficiaries

(DiD = −0.05). Beneficiaries reported significant increases in mobile phone (MD = 0.05, t = 2.75*), refrigerator (MD = 0.06, t = 2.60*), and ceiling fan ownership (MD = 0.06, t = 2.32). Non-beneficiaries achieved higher gains in these assets, as reflected by DiD (−0.06, −0.02, and −0.09, respectively).

Table 6: Impact of ABP on the physical capital of smallholder farmers

Physical capitals	Paired differences						DiD
	ABP beneficiaries			Non-Beneficiaries			
	Mean diff. (MD)	Std. dev.	t-value	Mean diff. (MD)	Std. dev.	t-value	
Number of personal houses owned	0.03	0.21	1.91	0.01	0.33	0.63	0.02
Number of motorcycles owned	0.09	0.71	1.83	0.04	0.21	3.23*	0.05
Number of cars owned	-0.04	0.66	-0.71	0.03	0.23	1.74	-0.07
Number of wheelbarrows owned	0.17	0.43	6.26*	0.05	0.47	1.52	0.12
Number of knapsack sprayers owned	0.25	0.50	7.83*	0.06	0.66	1.40	0.19
Number of cooking stoves owned	-0.01	0.29	-0.26	0.04	0.73	0.76	-0.05
Number of phones owned	0.05	0.30	2.75*	0.11	0.39	4.37*	-0.06
Number of radio sets owned	0.00	0.27	0.00	0.01	0.41	0.32	-0.01
Number of refrigerators owned	0.06	0.33	2.60*	0.08	0.46	2.58*	-0.02
Number of generators owned	0.02	0.31	0.73	-0.02	0.44	-0.60	0.04
Number of rooms occupied	0.02	0.22	1.51	0.16	0.70	3.33*	-0.14
Number of furnished beds owned	0.24	2.88	1.14	0.12	0.67	2.73*	0.12
Number of ceiling fans owned	0.06	0.35	2.32	0.15	0.58	3.74*	-0.09
Number of wall clocks owned	-0.08	0.80	-1.30	0.01	0.42	0.16	-0.09
Number of water wells owned	0.00	0.22	0.00	0.02	0.26	0.83	-0.02
Number of furnished chairs owned	0.05	0.60	1.08	0.15	1.05	2.13*	-0.10
Number of televisions owned	0.01	0.24	0.58	0.01	0.36	0.35	0.00
Level of access to agrochemicals	0.21	0.67	4.76*	0.26	0.83	4.95*	-0.05
Level of access to tractor services	0.14	0.43	5.27*	0.18	0.84	3.45*	-0.04
Housing	0.02	0.25	1.29	0.07	0.32	3.34*	-0.05
Toilet facility	0.00	0.13	0.00	0.07	0.29	4.08*	-0.07

DiD = Difference in Difference; MD = Mean Difference; p≤0.05
Source: Authors' field data (2024)

Furnished chair ownership increased slightly among beneficiaries (MD = 0.05, t = 1.08) and more significantly for non-beneficiaries (MD = 0.15, t = 2.13*). Beds saw similar trends, with a DiD of 0.12. Changes in generator and television ownership were negligible for both groups, with DiD of 0.04 and 0.00, respectively. Access to tractor services improved significantly for beneficiaries (MD = 0.14, t = 5.27*) and non-beneficiaries (MD = 0.18, t = 3.45*). The DiD of −0.04 suggests the ABP had no distinct advantage over other mechanisms in improving access. Beneficiaries (MD = 0.02, t = 1.29) and non-beneficiaries (MD = 0.07, t = 3.34*) saw some gains in housing, with DiD favouring non-beneficiaries (−0.05). Improvements in toilet facilities were negligible for beneficiaries (MD = 0.00, t = 0.00), while non-beneficiaries reported significant progress (MD = 0.07, t = 4.08*).

The results reflect mixed outcomes for physical capital under the ABP. While some assets like knapsack sprayers and access to agricultural services showed notable improvements among beneficiaries, others such as income-generating assets (motorcycles, cars) and household goods saw limited or comparable gains with non-beneficiaries. Significant improvements in knapsack sprayers and agrochemical access for ABP beneficiaries align with programme objectives to enhance productivity through better input availability (CBN, 2016). A similar finding reported by Lameck et al. (2019) highlights the role of subsidized tools in boosting smallholder farmers' productivity. Gains in mobile phones and refrigerators suggest improved household welfare, albeit at a slower pace compared to non-beneficiaries. Access to communication tools like mobile phones is critical for market integration and financial inclusion, as emphasized by Bayar et al. (2021). Despite progress in tractor services and agrochemicals, the DiD suggest no unique advantage for ABP beneficiaries. Similar challenges were observed in rural mechanization programmes (Abirami et al., 2020), emphasizing the need for complementary infrastructure. The minimal gains in housing and sanitation facilities among beneficiaries highlight broader rural development challenges. Improved housing correlates with income growth, and limited progress underscores the need for more integrated development strategies.

This notwithstanding, ABP has made progress in improving selected aspects of physical capital, particularly agricultural tools and services. However, gaps in income-generating assets, household items, and basic amenities highlight the need for a more comprehensive approach to rural development and farmers' welfare.

Summative impact of ABP on the smallholder farmers' livelihood assets

Table 7 presents regression results estimating the total impact of ABP on the livelihood assets of smallholder farmers, using a DiD regression framework. The analysis was performed upon certifying the parallel trend assumption as detailed in Table 1. The output suggests a lack of statistically significant impact from the ABP, as evidenced by the non-significant DiD coefficients (β = 78874). This indicates no measurable treatment effect of ABP on the livelihood assets of smallholder farmers. Neither the "Group" nor the "Time" coefficients are statistically significant, suggesting that both ABP beneficiaries and non-beneficiaries experienced similar changes over time. The lack of statistical significance implies that either the intervention was ineffective or there are other underlying factors projecting the contrary. Earlier findings on the impact of ABP on human capital as captured in Table 2 showed marginal improvements in education and health-related aspects. The weak DiD coefficient aligns with this, as modest gains in human capital may not translate into large measurable impacts, especially if implementation challenges exist. The mixed outcomes in natural capital (Table 3), such as modest increases in land ownership but declines in crop diversity and livestock, suggest limited support for sustainable resource management. These inconsistencies could dilute any measurable impact of ABP, contributing to the non-significant result. Significant improvements were observed in community participation, trust, and networks in Table 4.

However, social capital gains might not immediately translate into measurable economic outcomes in the short term, which may explain the insignificant regression results. While access to credit and financial services improved (Table 5), inconsistencies in income growth suggest that these benefits were not uniformly effective (Singh et al., 2024). Limited economic returns might explain why the

regression failed to detect significant overall impacts. Gains in agricultural tools and basic household assets suggest positive but fragmented physical asset outcomes (Table 6). These small, incremental changes might not aggregate into significant overall improvements, especially if programme resources were unevenly distributed (Lu et al., 2020). Market volatility, climate shocks, or socio-political barriers could have offset programme benefits, rendering them statistically insignificant.

Table 7: Summative impact of ABP on the smallholder farmers' livelihood assets

	Estimate	Std. error	t-value	Pr(>|t|)
(Intercept)	4408965	1891036	2.33	0.02*
Group	-2964674	2714147	-1.09	0.28
Time	119064	2671814	0.05	0.96
DiD	78874	3836632	0.02	0.98

P≤0.05
Source: Authors' field data (2024)

The DiD estimate result differed from other impact reports on ABP (Akinbile et al., 2023; Olanrewaju et al., 2021, Onoja et al., 2024 & Okoroh et al., 2021). This could be associated with the methodology's strength in insolating and addressing confounding factors which other methods lack. Hence, the possibility of attributing an effect to an intervention that ordinarily did not make such a magnitude will always exist if potential confounders are not addressed.

The regression results, combined with earlier findings (Tables 2 to 6), suggest that ABP faced significant implementation challenges that limited its measurable impact (Menon, 2024). While gains in individual capital dimensions (e.g. human and financial) were observed, these did not aggregate into a significant overall effect. This highlights the need for more comprehensive, sustained, and well-targeted interventions to achieve meaningful and measurable outcomes.

Conclusion and Recommendation

The result reveals a mixed impact of ABP on smallholder farmers. While beneficiaries experienced notable improvements in areas like numbers of unskilled labour and income from trade, they lagged in critical aspects such as access to mentorship, insurance coverage, and livestock ownership. This suggests that while the intervention targeted specific outcomes effectively, additional support might be needed to address areas where beneficiaries underperformed compared to non-beneficiaries. On a general note, the ABP intervention did not meaningfully impact the livelihood assets of smallholder farmers. This highlights the need for a critical review of the programme's design and implementation by the Project Management Team to ensure it better addresses the factors that influence livelihood assets.

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