



EFFECT OF NIGERIA'S COMMUNITY ACTION FOR RESILIENCE AND ECONOMIC STIMULUS (NG-CARES) PROGRAMME ON MAIZE FARMERS INCOME IN JIGAWA AND KANO STATES, NIGERIA

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ABSTRACT

The study assessed the effect of NG-CARES programme on maize farmers' income in Kano and Jigawa States, Nigeria. A multi-stage sampling method was used to select 260 beneficiaries and 260 non-beneficiaries, making a total of 520 respondents from six Local Government Areas in the two states. Data were collected with the aid of well-structured questionnaire and analyzed using descriptive statistics and Propensity Score Matching (PSM). The findings revealed that the beneficiaries were mainly middle-aged farmers, with a mean age of 49.38 years. They had large households, with a mean of 13 people, and small farms, with a mean of 1.45 hectares. The programme has demonstrated significant effect on the income of its beneficiaries with an ATT of ₦151,720.93 and an ATU of ₦144,906.667 and an ATE of ₦148,546.584 which reflects what the non-beneficiaries would have earned had they benefitted from the programme. Which was statistically significant at ($p < 0.01$). The study concluded that the NG-CARES programme significantly improved the income of the maize farmers in the study area. The study recommends the need for sustaining the programme since it made such significant impact on the livelihood of its target beneficiaries.

Keywords: Impact, Income, NG-CARES, Average Treatment, ATE.

INTRODUCTION

Agriculture is a fundamental part of human civilization. Its significance is clear as it provides food for consumption, ensures food security, and meets the global food demand sustainably. It produces staple crops like rice, wheat, and maize, which are essential energy and nutrient sources for billions of people (FAO, 2017). Nigeria, an agricultural economy, depends heavily on this sector as a major contributor to its Gross Domestic Product (GDP) and employs about 70% of the workforce (World Bank, 2020). It also plays a crucial role in food security and rural livelihoods (National Bureau of Statistics, 2024). Maize is one of the most widely grown crops in Nigeria, serving as a staple food and providing income for millions of smallholder farmers (Igbalajobi et al., 2019). In 2024, maize production in Nigeria reached 11.22 million metric tons, marking a 3% increase over 2023 levels, despite a slight decline in cultivated area due to a shift toward rice production. The national average yield is low at 2.22 metric tons per hectare, substantially below the potential yield of 6 to 8 metric tons per hectare that can be achieved with good farming practices (International Food Policy Research Institute, 2025). However, Nigeria's agricultural sector faces myriad of challenges, including low productivity, climate change, limited access to modern farming technologies, and outbreaks of pandemics and natural disasters (Adejuwon, 2018).

Notable among one of the natural disasters that poses challenge to agricultural production is the COVID-19 pandemic which further worsened the existing vulnerabilities in Nigeria's agricultural systems. It disrupted supply chains, restricted farmers' access to inputs, and reduced market access for smallholder producers. In response to these issues, the Federal Government of Nigeria, supported by the World Bank, launched the Nigeria Community Action for Resilience and Economic Stimulus (NG-CARES) Programme in 2020. The program was created as an emergency response to reduce the socio-economic impacts of the pandemic on poor and vulnerable households, smallholder farmers, and micro and small enterprises across all 36 states and the Federal Capital Territory (World Bank, 2020). The



NG-CARES Programme represents a significant investment in social support and economic recovery, with initial financing from the World Bank of \$750 million and an additional \$500 million approved in 2025 for a second phase, bringing the total funding to \$1.25 billion (NG-CARES, 2025).

The programme operates on a Performance-for-Results (PforR) model, where states receive reimbursement after implementing verified activities. The first phase of NG-CARES impacted over 17 million Nigerians directly, helping communities build schools and health facilities, revitalize small businesses, and support smallholder farmers with agricultural inputs and services (World Bank, 2025). The program has since evolved into a responsive platform providing interventions across various sectors. It addresses not only COVID-19 impacts but also economic difficulties resulting from recent changes, including the removal of fuel subsidies and unification of foreign exchange rates (World Bank, 2025).

The NG-CARES Programme's intervention or deliverables in these states includes providing improved seeds, fertilizers, agrochemicals, and extension services to smallholder maize farmers. The goal is to boost productivity, increase incomes, and build resilience against economic shocks. However, while the programme has scaled considerably, questions about its effectiveness among specific beneficiary groups, especially maize farmers in Kano and Jigawa States, remain. Understanding the programme's impact on yield, income, and livelihoods is crucial for guiding policy decisions, improving implementation strategies, and ensuring lasting results. Despite significant investments in agricultural intervention programmes in Nigeria, smallholder farmers still face low productivity and limited income growth. The productivity gap in Nigerian maize production is considerable, with actual yields averaging 2.17 to 3.59 metric tons per hectare compared to potential yields of 6 to 8 metric tons per hectare under optimal conditions (International Food Policy Research Institute, 2025). This gap is due to multiple constraints, including low use of productivity-boosting inputs like inorganic fertilizer and improved seeds, limited access to mechanization services, poor extension support, and inadequate market infrastructure (International Food Policy Research Institute, 2025).

Such constraints may limit the programme's impact on beneficiaries' livelihoods through its indicators such as income. Without thorough evaluations that establish causal connections between programme participation and outcomes, policymakers will definitely lack essential insights to refine implementation strategies, allocate resources effectively, and ensure the programme achieves its maximum impact.

It is against this back drop that the study raises the following research objectives which are to:

- i. describe the socioeconomic characteristics of the beneficiaries of NG-CARES in the study area; and;
- ii. determine the effect of NG-CARES programme on the income of beneficiaries in the study area;

METHODOLOGY

Study Area

The study was conducted in Kano and Jigawa states which are located in the northwestern part of Nigeria. Kano and Jigawa states are located in between latitudes 10°32'16.17"N to 13°00'23.96"N and longitudes 07°040'12.60"E to 10°13'35.90"E It covers 43,569 km² (National Bureau of Statistics, 2017). They are among the major producers of cereal crops include maize sorghum and millet (Abubakar, 2024). They are representing 4.78% of Nigeria's total land area the estimated combined population of these states as of 2019 was 19,706,675 (National Bureau of Statistics, 2020), The soil is reddish brown or brown soils of the semi-arid and arid areas and are known as tropical ferruginous soils which are made up of about 85% sand with pH values that varied between 6.0-7.0 (Dogonyaro, Abaje and Bello (2022). The area is known for low annual rainfall with less than 1000 mm of rain with prolonged dry season of up to 9 months. The rainfall intensity is between the months of July and August with a minimum rainfall of 60mm and a maximum of 99mm. An annual variation in rainfall of between 15% and 20% Dogonyaro et al., (2022). The region is characterized by northern Guinea Savannah and Sudan Savannah with few trees. By implication, more arable crops are grown in the region, crops like maize, sorghum, millet, cowpea, wheat and vegetable crops. The major source of livelihood of the



inhabitants of the region is agriculture although with variations across the States. Off-farm activities include trading, tailoring, bricklaying and carpentry among others. Farming practices used in the States are shifting cultivation, mixed farming, mixed cropping and pastoralism. The major crops grown in the region are maize, millet, sorghum, cowpea and beans. The area is traversed by rivers and streams for instance, the Kano River (in Kano State) and the Hadejia and Jama'are rivers (in Jigawa State). This allows for the construction of many earth dams, which are being used for urban water supply irrigation agriculture and fishing. Hydrologically, the area falls within the Lake Chad basin and groundwater is the major source of water supply for the majority of the population. The area has a tropical continental (Aw) type of climate characterized by wet (June – September) and dry (October – May) seasons (Usman et al., 2023)

Kano and Jigawa States, located in Northwestern Nigeria, share a deep-rooted history as centers of the Hausa-Fulani civilization. Their religious and cultural landscapes are inextricably linked, characterized by a blend of Islamic tradition and ancient Sahelian customs.

Sampling Procedure and Sample Size

The study was carried out in two North Western states of Kano and Jigawa, and the population consists of identified beneficiaries of NG-CARES Programme in the states using the existing structures of Farmer community association (FCAs) and Farmer user groups (FUGs) a Multi-stage sampling technique was used to select the sample for the study which involves the following stages: Stage I: involves a purposive selection of two states out of the seven northwestern states (Kano and Jigawa States) base on the presence of the programme as well as the intensity of participation. Stage II: involves a purposive selection of three (3) LGAs from each state based on the high number of maize farmers promoted by the programme, Shanono, Kiru and Doguwa were purposively selected in Kano state while Auyo, in (Hadeja zone), Miga, in (Birnin kudu zone) and Ringim in (Ringim zone) were selected and the reason for the selection of the LGAs in these states was based on the maize farmers promoted by the NG-CARES programme in accordance to the FCA plan. Stage III: From a list of NG-CARES beneficiaries in each LGAs using existing structure a simple random sampling technique (balloting method) and proportionate sampling was used to draw the sample size of 260 beneficiaries from the sample frame of 731 in order to achieve greater precision 35.5% of the population were selected since the population is not too large as advanced by Leedy and Ormrod (2010) that a sample size of 30% is commonly employed in practical research when high precision is required, and the population is not too large. Stage IV: A same number of sample size from registered maize farmers who were non beneficiaries were randomly selected from each LGAs to serve as the control group.

Table 1: Sample Frame and Sample Size

States	LGAs	Sample Frame	Sample Size Beneficiaries	Non Beneficiaries
Kano	Kiru	80	28	28
	Shanono	80	28	28
	Doguwa	363	126	126
Jigawa	Miga	59	21	21
	Ringim	80	31	31
	Auyo	69	26	26
	Total	731	260	260
				520

Source: Field survey, 2025

Data Collection

Well-structured questionnaires were administered to the beneficiaries by well-trained Fadama extension staff in each of the selected local government areas of the states who served as enumerators and interviewers and interview schedules was also conducted in order to collect adequate data on the stated objectives which includes socioeconomic characteristics of the beneficiaries, inputs and services



received, perception and satisfaction on the inputs received as well as the effect of the programme on their livelihood and constraints encountered.

Secondary information from relevant NG-CARES offices and documents in the states were also consulted.

Analytical Techniques

Descriptive statistics such as means, frequency, percentages were used to achieve objectives (i) which is to describe the socioeconomic characteristics of the beneficiaries of NG-CARES and propensity score matching score (PSM) was used to achieve objective (ii) which is to determine the effect of the programme on the income of beneficiaries.

Propensity Score Matching (PSM)

Propensity score matching is a useful tool for evaluating the effectiveness of social programs." (Caliendo and Kopeinig, 2008).

The propensity score is a balancing score, which means that it can be used to balance the distribution of covariates between treatment and control groups." (Rosenbaum and Rubin, 1983) PSM use logistic regression or probit models to estimate the propensity score, which is the probability of being treated (i.e., participating in the NG-CARES program) given the covariates. Use matching algorithms (e.g., nearest neighbor, caliper matching) to match treatment and control groups based on their propensity scores.

PSM use the matched samples to estimate the treatment effect (i.e., the effect of the NG-CARES program on social protection outcomes) using difference-in-means or regression analysis then perform sensitivity analysis to assess the robustness of the results to different matching algorithms, caliper sizes, and propensity score models and finally Interpret the results in terms of the estimated treatment effect and its significance level. Rosenbaum and Rubin (1983).

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Beneficiaries and non-Beneficiaries of NG-CARES Intervention Programme

The result in Table 2 revealed that the mean age of beneficiaries and non-beneficiaries in Kano were 49.64 and 48.14 years respectively implying that the beneficiaries are older than non-beneficiaries. In Jigawa state, the average age was 49.84 and 44.81 years for beneficiaries and non-beneficiaries respectively with margin of 5 years which also implies that beneficiaries are older than non-beneficiaries. The mean age for the pooled was 49.70 years for the beneficiaries and 47.18 years for the non-beneficiaries with marginal difference. The average age of beneficiaries of NG-CARES Programme implies that they are still in active and productive age group of farming activities. This age profile is as reported by National Agricultural Performance Survey 2024, which reported that the mean age of Nigerian farmers are within 47 - 48 years and that this age distribution indicates that Nigerian farmers are within their economically active age group which is necessary for agricultural production activities and significantly influences their decision-making processes regarding the adoption of technologies and farm operations. In Kano state, (85.4%) of the beneficiaries of NG-CARES Programme were males and (93.5%) for non-beneficiaries indicating only 14.6% and 6.5% of female beneficiaries and non-beneficiaries in Kano State respectively indicating wide gender gap among the maize farmers in the state. while in Jigawa state, 85.3% and 98.7% of maize farmers for beneficiaries and non-beneficiaries were male respectively indicating also 14.7% and 1.3% females maize farmers for both beneficiaries and non-beneficiaries in the state. The Pooled data shows 85.4% and 95% males for beneficiaries and non-beneficiaries respectively were males. This indicates male dominate maize farming in the states which is common practice in the northern states as stressed by Sinyolo (2025) that to achieved gender balance women farmers and other groups such as youths programmes must adopt women-only farmer groups, female extension agents, and childcare support. The distribution of respondents based on their marital status as presented in table 3 below, shows that married individuals dominate both groups, in Kano state, 81% and 93.5% were married for beneficiaries and non-beneficiaries respectively while in Jigawa state, 89.3 and 93.3% were married for both beneficiaries and non-beneficiaries indicating married dominated groups for both states while the pooled data reveals that



83.5% of beneficiaries and 93.5% of non-beneficiaries being married in the pooled sample. Notably, divorced individuals constitute 3.8% of beneficiaries but are absent (0%) among non-beneficiaries, while widows represent 12.7% of beneficiaries compared to 6.5% of non-beneficiaries. Marital status significantly influences agricultural productivity and programme participation as advanced by Onya et al (2024) that marital stability enhances access to labour and decision-making in agricultural operations. The higher proportion of widows among beneficiaries suggests that the intervention may have successfully targeted vulnerable groups, which is crucial for pro-poor development. Oyotombe (2025). Table 2 further revealed that the average household size for beneficiaries and non-beneficiaries in Kano were about 13 and 15 persons respectively implying existence of margin in household size among the beneficiaries while in Jigawa average household size among beneficiaries and non-beneficiaries were 11.49 and 13.04 households size respectively also indicating higher household size among non-beneficiaries. The pooled mean of household size for beneficiaries and non-beneficiaries 12.67 and 13.15 indicated higher household size among non-beneficiaries. This implies that larger households increase labour availability and technical efficiency thereby increases farm production conversely, it can imply more mouth to feed which could be a driving force for the beneficiaries. However, the NG-CARES Programme pattern is as set by its goals that is supporting the vulnerable more so, Olanrewaju *et al.*, (2020) states that household size is an important key in rural development intervention which can affect intervention outcome Distribution based on farm size as presented below revealed that the mean farm size for beneficiaries and non-beneficiaries in Kano states were 1.45 and 1.51 hectares of land respectively indicating a slight margin among the beneficiaries and non-beneficiaries indicating slight increase among the non-beneficiaries while, in Jigawa state the mean farm size for beneficiaries and non-beneficiaries were 1.45 and 1.50 respectively indicating little margin for non-beneficiaries. The pooled data revealed that beneficiaries cultivated 1.45hectare of land while non-beneficiaries cultivated mean of 1.51 hectare of land. The fore-going implies that the non-beneficiaries have access and cultivated more farmland (1.51ha) than the beneficiaries who cultivated 1.45ha. The fact that the beneficiaries have smaller land size though very marginal could be the reason why they benefitted from the programme as the programme targets the most vulnerable. Table 2 also revealed that the beneficiaries and non-beneficiaries' mean farming experience in Kano state is 23.52 and 23.25 years of farming experience respectively. This indicates decades of accumulated experience in farming which also aligns with age distribution. In jigawa state, the mean farming experience is 22.73 and 22.73 years of farming experience for both beneficiaries and non-beneficiaries respectively showing a slight margin of experience among the two states. The pooled data revealed that beneficiaries had 23.30 years of farming experience while non-beneficiaries had a mean of 23.09 years of farming experience. The implication is that there is accumulation of vast experience in farming which enables them to acquire more knowledge of local agro-ecological conditions, risk management capabilities, and social network that facilitates information access. As reported by Ebenehi, (2023) farming experience can have both negative and positive effect and influence on programme participation, with more experience farmers can be cautious and unwilling to take risk but with little experience farmers might be eager and anxious to participate in an intervention that promise to improve their living standard.

Table 2: Socio-Economic Characteristics of Beneficiaries and Non-Beneficiaries of NG-CARES Intervention Programme in Kano and Jigawa States

	Kano		Jigawa		Pooled	
	B	N.B	B	N.B	B	N. B
Age						
20-30	0	2(1.1)	0	2(2.7)	0	4(1.5)
31-40	0	18(9.7)	0	25(33.3)	0	43(16.5)
41-50	136(73.5)	118(63.8)	54(72)	33(44)	190(73.1)	151(58.1)
51-60	44(23.8)	41(22.2)	19(25.3)	14(18.7)	63(24.2)	55(21.1)
61>	5(2.7)	6(3.2)	2(2.7)	1(1.3)	7(2.7)	7(6.7)
X	49.64	48.14	49.84	44.81	49.70	47.18
Sex						
Male	158(85.4)	173(93.5)	64(85.3)	74(98.7)	222(85.4)	247(95)
Female	27(14.6)	12(6.5)	11(14.7)	1(1.3)	38(14.6)	13(5)
X	1.15	1.06	1.15	1.01	1.15	1.05
Marital Status						
Single	0	0	0	0	0	0
Married	150(81.1)	173(93.5)	67(89.3)	70(93.3)	217(83.5)	243(93.5)
Divorced	10(5.4)	12(6.5)	8(10.7)	5(6.7)	10(3.8)	0
Widow	25(13.5)	0	0	0	33(12.7)	17(6.5)
Widower	0	0	0	0	0	0
X	2.24	2.06		2.07	2.20	2.07
HH Size						
1-8	65(35.1)	19(10.3)	6(8)	19(25.3)	71(27.3)	38(14.6)
9-16	80(43.2)	121(65.4)	40(53.3)	44(58.7)	120(46.2)	165(63.5)
17-23	34(18.4)	42(22.7)	23(30.7)	8(10.7)	57(21.9)	50(19.2)
24-31	6(3.2)	3(1.6)	6(8)	4(5.3)	12(4.6)	7(2.7)
32 >						
X	13.15	15.64	11.49	13.04	12.67	13.15
Farm size						
<1	6(3.2)	5(2.7)	2(2.7)	3(4)	8(3.1)	8(3.1)
1-<2	111(60)	106(57.3)	45(60)	39(52)	156(60)	145(55.8)
2-3	68(36.8)	74(40)	28(37.3)	33(44)	96(36.9)	107(41.2)
3>	0	0	0	0	0	0
X	1.45	1.51	1.45	1.50	1.45	1.51
Farming Experience						
1-9	0	0	0	0	0	0
10-18	45(24.3)	46(24.8)	21(28)	21(28)	66(25.4)	68(26.1)
19-27	99(53.5)	99(53.5)	39(52)	39(52)	138(53.1)	137(52.7)
28-36	21(11.3)	21(11.4)	8(10.7)	8(10.7)	29(11.1)	29(11.15)
37-45	20(10.8)	19(10.2)	7(9.3)	7(9.3)	27(10.3)	26(10)
46-54	0	0	0	0	0	0
55>	0	0	0	0	0	0
X	23.52	23.24	22.73	22.73	23.30	23.09
Total	185(100)	185(100)	75(100)	75(100)	260(100)	260(100)

Source: Field survey, 2025

KEY:

- B=Beneficiaries
- N.B=Non-Beneficiaries
- X=Mean

Effect of NG-CARES Intervention Programme on Respondents

The effect of NG-CARES Programme on the beneficiaries was assessed. However, before the assessment of the effect, a comparison of the socio-economic characteristics of both beneficiaries and non-beneficiaries was carried out and the socio-economic factors that influenced participation were established and the result presented accordingly on Table 7 and 8. The probability of participation in

NG-CARES programme was predicted by the propensity score and this was estimated from a logistic regression of NG-CARES participation status on the predictor variables as revealed by Table 5. The common support graph was drawn to test the balancing as well as the matching quality with the region of common support found to be between 0.02 – 0.999 these is the region were the overlap in the distribution of the propensity scores of both treated and untreated groups concentrated.

Common Support Region

The study imposes the common support condition in the estimation by matching in the region of common support. Based on this condition, the result in Figure 12 shows the Distribution of propensity scores for the treated (beneficiaries) and untreated (non-beneficiaries) group and the region of common support. The bottom half of the figure shows the propensity scores distribution for the untreated group, while the upper-half refers to the treated individuals. The densities of the scores are on the y axis. It is very clear, from the observation of this figure, that the common Support condition is satisfied as there is overlap in the distribution of the propensity scores of both the treated and the untreated groups

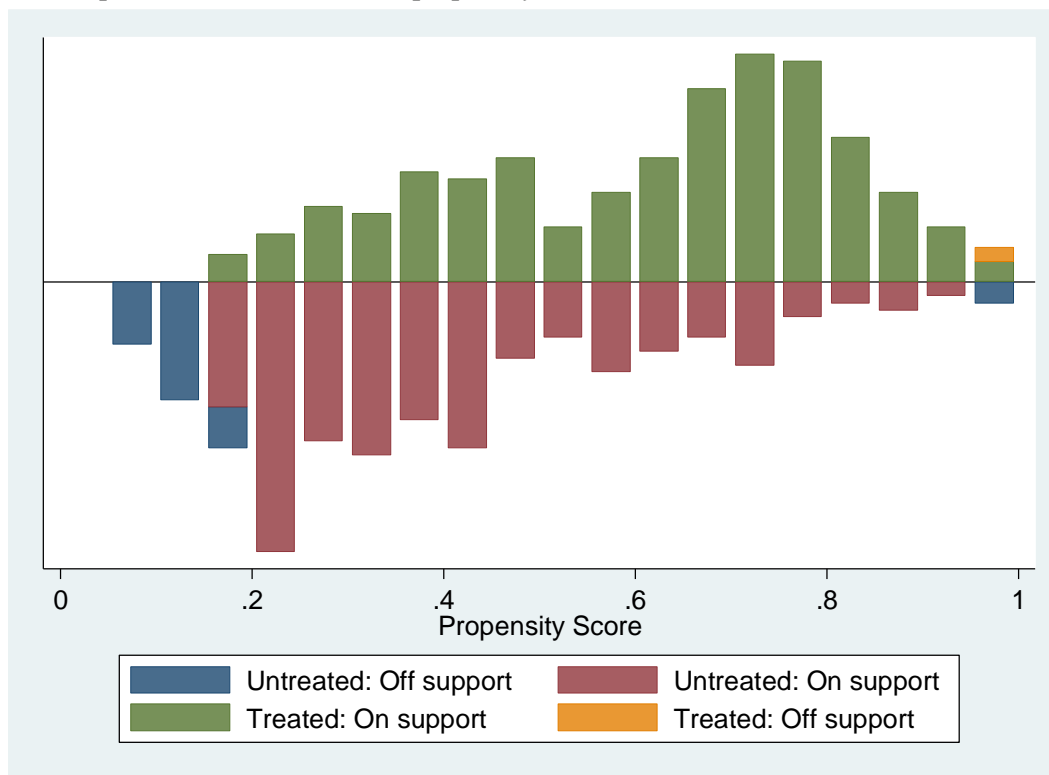


Figure 1: Common region graph

Effect of NG-CARES Programme on the Beneficiaries’ Income in the Study Area

Effect of NG-CARES Programme on the beneficiaries’ income is presented in the Table 2. The result revealed that NG-CARES Programme beneficiaries had a positive and significant effect on the maize farmers’ income in the study area with an average treatment effect on treated (ATT) of N151, 720.93 in term of income obtained from maize production per hectare by the farmers who benefited. Similarly, the result of the analysis revealed that the average treatment effect (ATE) ₦148,546.584 on the entire farmers’ population that is picking any farmer at random he or she will earn an income of about ₦148,546.584 per hectare. This implies that the participation in NG-CARES will result to increase in income. For the effect on untreated category, ATU value was ₦144, 906.667 implying that, categories of non-beneficiaries if assume they were treated there income would have also increased by ₦144, 906.667 per hectare. This is consistent with the findings of previous studies. Ebenehi (2024) who found a positive in the income of programme beneficiaries when compared with non-beneficiaries.



Table 2: Effect of NG-CARES Programme on the Income of Maize Farmer Beneficiaries

Outcome	Sample	Treated	Control	Difference	SE	t-test
Income	Unmatched	702553.846	556119.231	146942.308	7531.0446	19.38
	ATT	703290.698	551569.767	151720.93	13270.8716	11.43
	ATU	557346.667	702253.333	144906.667		
	ATE			148546.584		

Source: Field survey, 2025

CONCLUSION AND RECOMMENDATION

In conclusion, the NG-CARES programme has had significant effect on the income of the beneficiaries. The programme represents a viable model for emergency agricultural interventions, though refinements are needed to address implementation constraints and maximize long term impact. Based on the findings and conclusions of this study, the following recommendations are proposed for policy makers, programme implementers, and stakeholders:

The programme has demonstrated significant effect on the income of its beneficiaries as revealed by the result of the PSM of an ATT of ₦151,720.93 and an ATU of ₦144,906.667 and an ATE of ₦148,546.584 which represents what the non-beneficiaries would have gained in terms of income if they had benefitted from the NG-CARES programme.

The stake holders should consider providing additional finance in order to increase the number of beneficiaries as well as to facilitate and fund scaling up the programme.

The stakeholders should also consider assisting beneficiaries towards increasing their farmland as this can go a long way to increase productivity, income, livelihood as well as the sustainability of the programme.

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