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Impact of government agricultural empowerment scheme on expenditure and poverty of youth in Nigeria

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ABSTRACT

The establishment of various programs targeted at youths by the government is a way to improve decent work opportunities for them thereby reducing the incidence of unemployment and poverty. One of the programs structured to address unemployment and improve the welfare of youth in Nigeria is the agricultural youth empowerment scheme. However, the empirical evidence on the impact of participation in the program on the welfare of participants is limited. Hence, this study was designed to estimate the impact of the program on the welfare of youths in Southwestern Nigeria using the logit model and propensity score matching. A multistage sampling technique was used to randomly select 316 beneficiaries and 656 non-beneficiaries across 2 states (Oyo State and Lagos State). Findings from the analyses indicated that age, ethnicity, years of education, and being a member of a social group positively increased the probability of participation in the program. The impact of participation on the monthly per capita expenditure was estimated to increase by ₦6,946.47 for the beneficiaries and it reduced the poverty status by 46.8 percent. Therefore, participation in the scheme has a positive impact on the welfare of youth beneficiaries. It is recommended that the youth empowerment program should be replicated in other segments of the economy.

Keywords: programs, beneficiaries, youth empowerment, average treatment effect

INTRODUCTION

The operational definition of youth differs extensively from one country to the other. The United Nations (UN) describes youth as individuals within the age range of 15 and 24 years (Chhetri, 2023; ILO, 2017). In Uganda, the age of the youth ranges between 12 and 29 years, whereas in Nigeria, the age of youth falls between 18 and 35 years (ILO, 2021; Ubani et al., 2023). In the present world population, an estimated 1.2 billion people (16%) are between the ages of 15 and 24 years, which is an equivalent of 1 in every 6 individuals worldwide. Presently, developing countries have about 87% of this group of people as residents, particularly in Africa where 211 million people are in this age range. Over the next three decades, this population is projected to increase from 207 million in 2019 to 336 million by 2050. Sub-Saharan Africa is expected to have the largest increase of about 89% (Carvalho, 2020; UN, 2019).

In various places around the world, the level of joblessness among youths is increasing astronomically. The global employment trends for youths' report of 2022 suggests that the COVID-19 pandemic has aggravated the labor market challenges facing young people between 15 and 24 years, as they have experienced a very high percentage of job loss since 2020. The number of unemployed youth globally reached 75 million in 2021 against 67 million at the pre-pandemic level of 2019 (ILO, 2022). The majority of the unemployed youths are found in developing economies. In sub-Saharan Africa, youths accounted for 36.9% of the populace that are in good jobs and 59.5% of the aggregate unemployed. This is a huge increase compared to the 2005 average for the globe (43.7%); thus indicating a severe labor shortage in the region (IEG, 2013) with three out of the five youths (ILO, 2006). Young people's share of the working-age population has fallen to 24% and it will continue to decline (Fox & Gandhi, 2021). Recently, the unemployment rate in Nigeria rose to 33.3% of a population of over 200 million. The figure is more than the combined population of Cote D'Ivoire (26.38 million), Ghana (31.07 million), and Togo (8.279 million). Amidst this, the

The data for this study was collected as part of the fulfillment for the award of a PhD.

unemployment rate among youths rose to 42.5%, which was the highest compared to other age groups (NBS, 2021).

The high rate of youth unemployment is a major concern for development agents across the globe (FAO & ILO, 2012; UN, 2019); and has become a priority development issue for many countries including Nigeria (UNECA, 2012; Onwuka & Udeze, 2023). The cause for concern is the likely negative impact that youth unemployment could have on the economy in terms of performance and social stability (Onwuka & Udeze, 2023). For sustainable economic growth and social well-being, there is a need to involve and put the youth at the center of the various national program. Evidence has shown that Nations that devote resources in support of their young people receive the reward of the venture through greater development and social well-being for future generations (World Bank, 2010). The present situation where youth suffers a high job deficit and engage in all forms of illicit acts, underscores the need for a sustainable program that will engage youth and put them in a better and secured livelihood status.

At the heart of the sustainable development goals is the eradication of poverty and ensuring decent work and economic growth for the populace which is inclusive of the youth. To achieve these goals, the Nigerian government has put in place empowerment opportunities to ameliorate the rate of unemployment and harness the greatest resources (youths) of her nation to achieve inclusion, employment creation and improve the welfare of the youths. Among the various programs put in place is the agricultural youth empowerment scheme (AgricYES) which started in 2010 in the southwestern part of the country. The urge to improve the youth situation and make them participate in the agricultural value chain is premised on the need to improve their welfare, as a population that is deficiently provided for is devoid of efficient productivity (Jones et al., 2013). These were necessary coupled with the decline in oil prices which led to the outright contraction of the economy (IMF, 2017). This results in policymakers gradually exploring other economically sustainable and viable businesses of which the agricultural sector has been identified. After about 9 years of existence of the AgricYES program not much is known about the impact of the program on the welfare of beneficiaries. Emerging from the aforementioned are the following questions which represent the major thrust of this study:

1. What drives participation in the agricultural empowerment scheme?
2. Was the beneficiaries' poverty situation ameliorated?
3. What is the impact of the scheme on the beneficiaries' expenditure and poverty status?

Literature Review

Many studies have shown that government intervention had a positive effect on various variables of interest. Niringiye and Ayebale (2012) evaluated the impact of the Ubudehe program in Rwanda using descriptive statistics. Empirical findings from the program appeared to be consistent with the policies of the Rwandan government for fighting poverty and developing the country's economy. while the analysis was largely descriptive with beneficiaries giving an open-ended answer, it fails to give an accurate measure which a rigorous tool would do, and the potential selection bias that comes with program participation and impact are not eliminated. To solve this problem, Deininger and Liu (2013) in their study used a combination of propensity score matching (PSM) and triple difference to assess India's national rural employment guaranty program. The program was found to induce the accumulation of non-financial assets in the medium term.

Many studies have shown that government intervention had a positive effect on various variables of interest. A study in South Africa by Zhou et al. (2023) supported the use of government social protection as a safety net for low-income groups in South Africa with government intervention reducing the likelihood of a drop in household income and consumption. This welfare gain was found to be higher for households in the low and middle-income classes but not relevant in the case of assets requiring recurring expenses such as cars (Gadisi et al., 2020).

A similar result was found in Nigeria. while partial least squares structural equation modeling path modeling was utilized, Waziri et al. (2020) found a strong positive relationship between government intervention programs towards youth empowerment and poverty alleviation.

CONCEPTUAL FRAMEWORK

The conceptual pathway of the impact of the YES is presented in **Figure 1**. The decision of the government to put in place an intervention to empower and support youth stems from the previous circumstances and incidents of increased population growth, increased poverty, and economic recession which negatively affect youths' access to means of livelihood. These unanimously create diverse groups of unemployed graduates at various levels of education possessing different skills and talents. Government intervention in the form of the empowerment scheme is a means to improve people's livelihood, create employment, and reduce poverty. The livelihood structure identifies resources on which individual needs to be supported to acquire the asset and to improve their well-being. Government has access to resources and information while using interventions conducted in partnership with both public and private sectors that are people-oriented, participatory, dynamic, and sustainable to engage these diverse individuals. All these are construed as the inputs that are combined with the involvement and participation of youth to empower diverse individuals.

Participation in the empowerment scheme will have varying effects on youths and their means of livelihood as depicted in **Figure 1**. The various skills and training acquired at different levels of engagement would combine with the skills acquired in their various institution of learning to improve youth's livelihood., as individuals are then cumulatively endowed with knowledge, experience, and ability, which would be combined with infrastructures like market, storage facilities and roads, and natural endowments like land and water to achieve better livelihood status. The impact is seen in the immediate outcomes which include increased income, food security high productivity, reduced poverty and improved health. The prolonged participation in the government intervention program and putting the skills

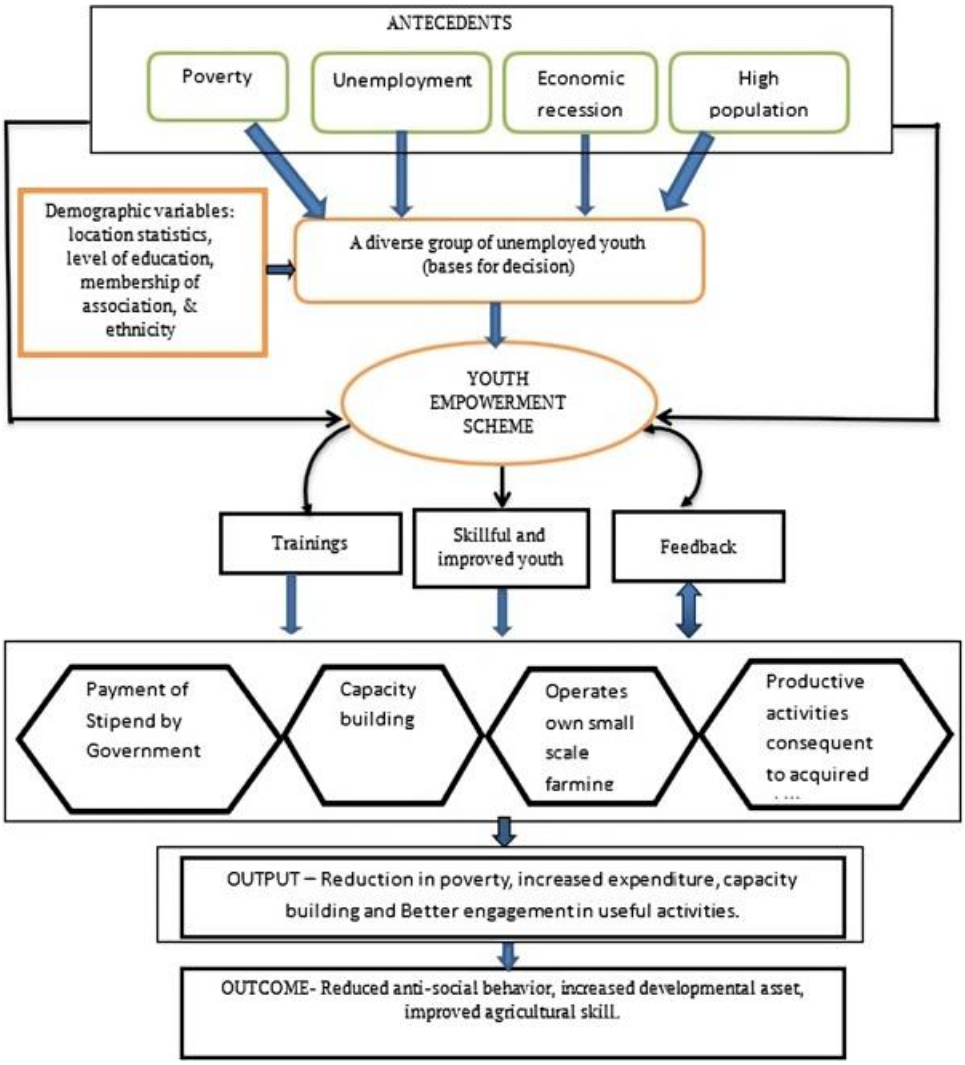

Figure 1. Empowerment impact pathway (adapted from Deane & Harre, 2014)

acquired to good use, given the social action and community-integrated nature of many YES, may also lead to positive impacts on organizations, communities, and societies as a result of youth action. In the long run, the scheme is expected to have the following impact: sustained output, increased developmental asset, increased academic performance, reduced anti-social behavior, increased long term economic well-being and increase in youth contribution to the GDP. The list is not exhaustive.

COUNTERFACTUAL FRAMEWORK

Table A1 in **Appendix A** shows the conceptual framework for the study. The utmost task in evaluating a program or any intervention is getting a credible estimation of the counterfactual which questions what would have occurred to the treatment had they not received (or its converse) the intervention. Counterfactuals cannot be seen or heard; we can only create an estimate of them. Creating a counterfactual means that the outcomes of participants are compared with the potential outcomes of the comparison group had they been exposed to the program. One practicable quick fix to this problem is to make an estimate of the counterfactual based on a set of nonparticipants and estimate the impact of the program as the difference in means of the treated and untreated. The two groups must be exactly alike aside from the fact that a set of them received the treatment. So, the major concern lies in getting an appropriate comparison group.

In this study, we denote Y_1 as the potential income of an individual if he were to participate in the YES intervention and Y_0 the likely earnings of an individual if not. We indicate participation status by a dummy variable, P. The impact of the intervention on an individual i, denoted by δ_i, is described as the difference between the likely outcome in case of the intervention and the potential outcome in the absence of it (Heinrich et al., 2010). This is represented by Eq. (1):

$$\delta_i = Y_{1i} - Y_{0i}. \quad (1)$$

Therefore, the observed outcome, Y, of any participant is a function of the two potential outcomes which is summarized, as in Eq. (2):

$$Y = PY_1 + (1 - P)Y_0, \quad (2)$$

where we observe Y_1 for participants and Y_0 for everyone else.

Generally, the average treatment effect (ATE), which is the mean impact of the intervention was achieved by considering the average impact of all individuals across the population. This is given, as in Eq. (3):

$$ATE = E(\delta) = E(Y_1 - Y_0). \quad (3)$$

The average treatment effect on the treated (ATT), which calculates the impact of the program on its beneficiaries is shown, as in Eq. (4):

$$ATT = E(Y_1 - Y_0|P = 1). \quad (4)$$

The average treatment effect on the untreated (ATU) calculates the impact that the program would have had on non-beneficiaries:

$$ATU = E(Y_1 - Y_0|P = 0), \quad (5)$$

where P is participation in the program (P = 1 if participated in the YES program and P = 0 if not), Y_1 is outcome (welfare estimators) of the program on the beneficiary if participated in it, and Y_0 is outcome on beneficiary if not participated in the program.

METHODOLOGY

The objectives of this study were achieved using descriptive statistics, logit regression model, the headcount index, and PSM.

Logit Regression Model

The determinants of participation of the beneficiary youth in the YES were derived using the logit regression model. The model postulates that the log-likelihood that an individual youth will engage in the program is a function of index D_i and that index D_i is a reverse of the standard logistic cumulative function of P_i given, as follows:

$$P(X_i) = \Pr\{D_i = 1|X_i\} = E\{D_i|X_i\}. \quad (6)$$

$$P_i(d) = F(D_i) = D_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_{ki} + \varepsilon_i, \quad (7)$$

where P_i is the probability that a youth will engage in YES.

The probability that a youth will not engage in YES is given, as follows:

$$P(d = 0) = 1 - P_i = \frac{1}{1+e^{\beta_0+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_{ki}}}. \quad (8)$$

Therefore,

$$\frac{P}{1-P(d=0)} = e^D = e^{e^{\beta_0+\beta_1 X_1+\beta_2 X_2+\cdots+\beta_k X_{ki}}}, \quad (9)$$

where $\frac{P}{1-P_i}$ is the odds ratio in favour of participation in YES. The estimating equation for factors determining the participation of youth in YES is given, as follows:

$$D = \begin{cases} D = 0 \\ D = 1 \end{cases} = D_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_{ki} + \varepsilon_i, \quad (10)$$

where D = (0, 1) signifies the engagement in the program (dependent variable), where D = 1 if exposed to treatment, D = 0 if otherwise, X_i is the pre-treatment characteristics (explanatory variables). These variables were anticipated to mutually determine the probability of participating in the program which is the independent variable. Following Stupnytskyy (2009), the following variables were in the model: X_1 is gender (female = 1, male = 0), X_2 is age in years, X_3 is square of age, X_4 is marital status (male = 1, female = 2), X_5 is household size (number), X_6 is average income of beneficiary (N), X_7 is savings (yes = 1, no = 0), X_8 is years of education of respondent (years), X_9 is ethnic (Yoruba = 1, others = 0), X_{10} is member of association (yes = 1, no = 0), X_{11} is asset index, and X_{12} is location (1 = Osun State, 2 = Lagos State).

Head Count Index

Following the approach of Okoruwa et al. (2015), the head count index was used by stating a counting measure to construct a deprivation vector. We replaced every poor income with 1 and the non-poor with zero. The head count index basically shows the proportion of the population that is regarded as poor (Foster et al., 2013), we indicated this as P_0 and expressed, as in Eq. (11):

$$P_0 = \frac{1}{N}\sum_{i=1}^{N} I(y_i < z), \quad (11)$$

where y_i is the income/expenditure, z is the poverty line, and I, which could be 1 if the bracketed (.) expression is true and 0 if otherwise.

Propensity Score Matching

To consistently estimate the impact of participation in the government agricultural empowerment scheme on youth welfare, we followed the approach used by Deininger and Liu (2013) by using the PSM which is a quasi-experimental method developed by Rosenbaum and Rubin (1983). With this method, the observed characteristics (covariates) between the control and treatment groups are balanced using the similitude of their predicted probabilities of receiving the treatment (named their "propensity scores") which was estimated using the logit regression model. This study made use of three different techniques of matching (Kernel-base, caliper, and nearest neighbor matching algorithm) as it is usually advisable to use more than one method of matching (Zhao, 2003), and the result compared. If the coefficients provided by the various techniques are robust, we might be assertive on the estimated outcome. The ATT was estimated by Kernel-based matching technique by using the weighted sum of the resultant matched control to match the resultant treated unit, assigning bigger weights to those with the closest PS among the matched control (Heckman et al., 1998). The kernel-based matching was used as the lead result because it lessens variance for the reason that lots of information concerning the treatment as well as control is utilized. After estimating the propensity score and choosing the matching technique, there are two

Table 1. Distribution of respondents by household socio-economic characteristics

Variables	Non-beneficiary (n = 647)	Percentage	Beneficiary (n = 296)	Percentage	Pooled (n = 943)	Percentage	Mean (SD)
Gender							
Male	375	57.96	192	64.86	567	60.13	
Female	272	42.04	104	35.14	376	39.87	
Age (years)							
⩽ 20	24	3.71	4	1.35	28	2.97	29.16 (3.65)
21-25	87	13.45	37	12.50	124	13.15	
26-30	390	60.28	171	57.77	561	59.49	
⩾ 31	146	22.57	84	28.38	230	24.39	
Mean	28.9		29.6		29.16		
Marital status							
Single	320	49.46	156	52.70	476	50.48	
Married	320	49.46	138	46.62	458	48.57	
Divorce	3	0.46	2	0.68	5	0.53	
Widow	4	0.62	0	0	4	0.42	
Educational level							
No-formal education	4	0.62	0	0.00	4	0.42	
Primary	25	3.86	8	2.70	33	3.50	
Secondary	191	29.52	65	27.96	256	27.15	
Post-secondary	427	66.00	223	75.34	650	68.93	
Household size							
⩽ 2	270	41.73	123	41.55	393	41.68	3 (1)
3-4	334	51.62	157	53.04	491	52.07	
5-6	43	6.65	16	5.41	51	6.26	
Average monthly income							
⩽ 25000	520	80.37	222	75.00	742	78.69	
25,000-50,000	84	12.98	47	15.88	131	1.89	
51,000-75,000	24	3.71	13	4.39	37	3.92	
76,000-100,000	7	1.08	10	3.38	17	1.80	
⩾ 100,000	12	1.85	4	1.35	16	1.70	
Ethnicity							
Yoruba	612	94.59	272	91.89	884	93.74	
Igbo	32	4.95	12	4.05	44	4.67	
Hausa/Fulani	1	0.15	1	0.34	2	0.21	
Others	2	0.31	11	3.72	13	1.38	

Note. SD: Standard deviation

necessary assumptions (conditional independence assumption and the presence of common support) that must be in place for identification of program effect under PSM. Having ensured that the CIA holds, and there is a sufficient overlap between the participants and non-participants, the treatment effect on the treated, that is, the impact of the program on the treated was calculated by estimating the mean of the changes in outcome between every treated and control units, as follows:

$$ATT = E_{P(X)|D=1}\{E[Y^T|D=1, P(X)] - E[Y^C|D=0, P(X)]\}. \quad (12)$$

Eq. (12) is simply written, as follows:

$$ATT = (EY_i|D=1) - (EY_0|D=1). \quad (13)$$

The welfare indicators include income (proxied by expenditure), poverty and asset ownership. So, $(EY_1 \mid D = 1)$ is the likely value of expenditure of beneficiary while partaking in the program and $(EY_0 \mid D = 1)$ is the counterfactual, that is the expected expenditure of the beneficiaries if they had not participated in the program. The choice of the PSM for this study was because of its benefit and relevance to the study. For instance, the YES program does not have baseline data, assignment to treatment was independent of treatment outcome and the treated and control individuals were ensured had the same pretreatment characteristics. Also, to ensure a good and practicable comparison of the treatment and control unit, and to reduce bias, a large sample of control unit was used.

SAMPLING TECHNIQUE

Data used in this study was based on a cross-sectional survey conducted in 2016 of youths who were beneficiaries of the government empowerment scheme and youths who were not beneficiaries for one reason or the other and have similar characteristics including living in the same environment with the latter. The survey covered two states (Osun State and Lagos State) in Southwestern Nigeria where there was active engagement in the agricultural YES. A multi-stage sampling procedure was employed in selecting the respondents for the survey. The first stage was the purposive selection of Osun State and Lagos State from the six states in the zone. This is because of the ongoing YES in the two states and their involvement in the agricultural aspect of the scheme. Secondly, using a simple random sampling, 22 local government areas (LGAs) out of 30 were carefully chosen from the 3 senatorial districts in Osun State while 12 LGAs out of 20 were randomly chosen out of the 3 senatorial districts in Lagos State, as depicted in **Table 1**.

Table 2. Distribution of the respondents by poverty profile

Poverty indices	Non-beneficiaries	Beneficiaries	Pooled
P_0	0.3542	0.0148	0.3690
P_1	0.0850	0.0015	0.0866
P_2	0.0253	0.0002	0.0255
Poverty line (₦) using 2/3 of MPCMHHE	9,796.64	9,796.64	9,796.64
% above poverty line	51.62	95.27	63.10
% below poverty line	48.38	4.73	36.90

Note. MPCMHHE: Mean per capita monthly household expenditure

Table 3. Parameter estimates for the covariates used in assessing participation of youths in YES

Variables	Coefficients	Marginal effect
Location	-0.427** (0.184)	-0.089
Gender	-0.103 (0.156)	-0.021
Age	0.487* (0.253)	0.102
Age squared	-0.008* (0.004)	-0.002
Marital status	-0.338** (0.161)	-0.071
Household size	-0.083 (0.064)	-0.017
Average Income	0.070 (0.091)	0.015
Average Savings	0.069 (0.154)	0.014
Education in years	0.155*** (0.036)	0.032
Ethnic	0.650*** (0.199)	0.136
Cooperative member	0.673*** (0.159)	0.145
Asset index	0.018 (0.041)	0.004
Constant	-10.410** (3.68)	
Summary statistics		
Chi-square (12)	79.86***	
Log likelihood	546.786	
Pseudo R^2	0.0681	
Number of observation	943	

Note. Statistical significance levels: *10%, **5%, & ***1% & figures in parentheses represent standard error

Afterward, 10 participants were selected randomly out of the list of participants in the local government: 20 non-participants from the same local governments in Osun State, and 8 participants in addition to 18 non-participants were chosen from the same local government in Lagos State. The disparity in the number selected between the two states was due to the population difference of participants in the two states and resource scarcity. Osun State was observed to have a larger population size of participants than Lagos State (data on non-participants were necessary since the evaluation of impact requires inference of counterfactual of what we anticipated the outcome value would have been had the program not existed). These gave a total sample of 972 respondents in the proportion of 316 beneficiaries and 656 non-beneficiaries, out of which 943 were found useful.

Data were collected on household characteristics, assessing the empowerment activities and benefits, household food and non-food expenditure, other individual assets, and the membership of association.

RESULTS AND DISCUSSION

Socio-Economic Characteristics of Respondents

The distribution of the socioeconomic and demographic characteristics, as seen in **Table 1**, shows that the respondents comprise more males, both for the beneficiaries (64.86%) and the non-beneficiaries (57.96%). The age distribution of the respondents revealed that the average age among the beneficiaries and non-beneficiaries is 30 years and 29 years, respectively. The marital status shows that the beneficiaries had more respondents (52.70%) with single status when compared with the non-beneficiaries (49.46%). Considering the educational status, the larger percentage of the respondents had post-secondary education. However, the percentage was higher among the beneficiaries by 9.34% when compared to the non-beneficiaries. The mean household size of the respondents (beneficiaries and non-beneficiaries) was 3 and the majority of the respondents had monthly income of ₦25,000 and below (both the beneficiaries and non-beneficiaries. The respondents were mainly Yorubas.

The Poverty Status of Respondents

The poverty status of the respondents was assessed using the head count index. Presented in **Table 2**, it could be seen that with the poverty line estimated at ₦9,796.64, the incidence of poverty for the beneficiaries was 1.48% while that of non-beneficiaries was 35.42%. This shows a high poverty incidence among the respondents, the incidence was particularly higher among the non-beneficiaries when compared to beneficiaries by 33.94%, hence, the non-beneficiaries of YES were poorer than the YES beneficiaries. This submission is consistent with findings by Okoruwa et al. (2015).

Factors Influencing the Participation of Youth in YES

To identify the factors that determine the participation of youths in YES, the logistic regression model was used. The parameter estimate of the logit regression of youth participation in the government empowerment scheme is presented in **Table 3**. From **Table 3**, the model has a pseudo R^2 and a log-likelihood value of 0.0681 and 546.79, respectively. The ratio test of the hypothesis that the coefficients of all the explanatory variables are likely to be zero had a chi-square of 79.86 and it was significant at 1%, implying that the model fit the data. Given this goodness of fit measures, it is concluded that the logit model used was appropriate. The dependent variable takes the value of one if respondents participate in the YES and zero if otherwise. The results showed that several variables influencing youth participation in the empowerment scheme were significant at varying levels of 1%, 5%, and 10%. These include age, years of education, ethnicity, asset index and membership of association which were positively associated with the probability to participate in the empowerment scheme. Location and marital status negatively influence the probability of participating in the YES. For instance, being a member of an association will increase the probability of

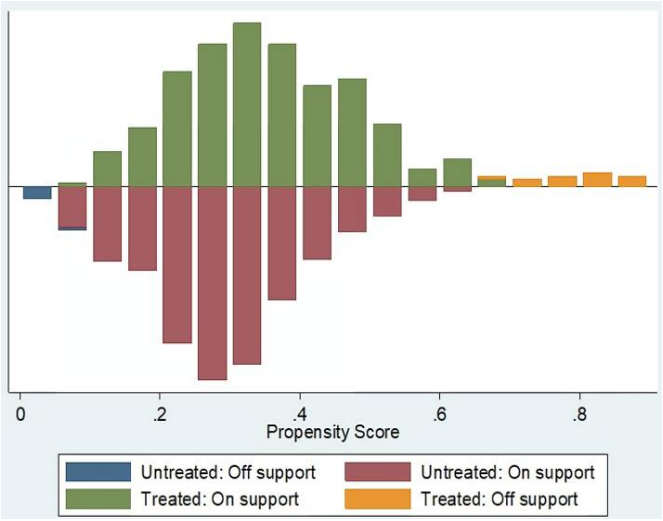

Figure 2. Density distribution of the estimated propensity scores (Source: Authors' own elaboration)

participation in YES by 0.145%. This finding is corroborated by Odoemenem and Obinne (2010). Conversely, one additional household member will decrease the probability of participating in the YES by 0.017%.

Impact of Agricultural YES on the Welfare of Beneficiaries

The impact of the YES on the welfare of the beneficiaries was estimated using the PSM model and the welfare indicators include poverty, expenditure, and asset ownership of the respondents. The result shows that the propensity score being a probability has a mean that ranges between an interval of 0 and 1. Among the beneficiaries, the predicted propensity scores range between 0.0886 and 0.8826 with a mean of 0.3711 while among the non-beneficiaries, it is between 0.0250 and 0.6497 with a mean of 0.2887. The density distribution of the propensity scores as shown by the common support graph in **Figure 2** shows the propensity score distribution with the bottom half and the upper-half for beneficiaries and non-beneficiaries, respectively. The frequency of the propensity score distribution is given by the *y*-axis. Graphical analysis of the density distributions of the estimated propensity scores shows the existence of a substantial overlap for the two groups, hence satisfying the condition for common support.

Estimation of the Treatment Effect: Matching Algorithm

The impact of the scheme on the welfare (captured with expenditure, poverty, and asset ownership) of the beneficiaries was calculated using different types of the matching algorithm (Kernel-based matching with bandwidth 0.03, kernel-based matching with bandwidth 0.06, single nearest neighbor matching, nearest 5 neighbor matching algorithms, Local linear matching, and Radius matching). According to Zhao (2003), it is better in practice to attempt different methods because the performance of different matching estimators varies according to the facts of the particular situation, and it depends basically on the structure of the data at hand. The ATT, ATU, and the ATE were derived to show.

The impact of participation in the scheme on the poverty status and expenditure of the respondents. An Epanechnikov kernel estimator with a bandwidth of 0.06 was chosen for discussion because it tended to result in estimates with greater precision compared with others. Thus, its choice was guided by various criteria (see **Appendix A**) such as the pseudo-R^2 test, insignificant number of variables after matching and reduced mean standardized bias after matching. A set of variables and matched sample size with smaller pseudo R^2 and smaller mean standardized bias was preferred and chosen for each matching algorithm. This ensures that the propensity score model was not mis-specified, and the conditional independence approach has not failed (Smith & Todd, 2005), hence, the matching process was satisfactory.

The ATT estimated by KBM (see **Table 4**) shows that participation in the youth empowerment program had a negative impact on the poverty status of beneficiaries; this implies that the poverty status of the beneficiaries was reduced with participation in the scheme. The participant's expenditure also increased with participation. In essence, the average treatment effect of participation in the YES reduced the poverty status of the beneficiary by 46.8%, and increased the beneficiaries' expenditure by ₦6,946.47. In addition, participation in YES also increased the asset ownership of beneficiaries (treated) by 3.9%. However, the impact on the asset index was not significant. The result shows that the program had a considerable impact as it reduced the poverty status of participants, it increased their expenditure and asset ownership. Overall, these result shows moderate welfare improvement for beneficiaries of the YES. Relative to the size of the scheme, these results were consistent and comparable

Table 4. The treatment effect of participation in youth empowerment scheme on poverty and expenditure (LOGIT MODEL)

Outcome	Sample	Poverty				Expenditure			
Matching algorithm		Treated	Control	Difference	t-statistics	Treated	Control	Difference	t-statistics
	Unmatched	0.043	0.516	-0.469	-15.5	19418.42	12427.43	6991.00	13.44
KBM[a]	ATT	0.046	0.515	-0.469	-17.3***	19315.01	12353.97	6961.04	11.48***
	ATU	0.043	0.233	-0.474		12426.29	18859.95	6433.66	
	ATE			-0.472				6595.54	
KBM[b]	ATT	0.046	0.514	-0.468	-17.9***	19315.01	12368.54	6946.47	11.6***
	ATU	0.516	0.043	-0.473		12427.43	18811.61	6384.18	
	ATE			-0.472				6555.29	
NNM[a]	ATT	0.047	0.524	-0.476	-14.5***	19418.43	12089.31	7329.12	11.36***
	ATU	0.516	0.041	-0.475		12427.43	19179.19	6751.76	
	ATE			-0.475				6932.99	

Note. Statistical significance: *10%, **5%, & ***1%; KBM[b]: Kernel based matching with band width 0.06 and common support; & NNM[a]: Five nearest neighbor matching with replacement and common support

with findings by Gebrehiwot and Van der veen (2015), Perova and Vakis (2009) who have shown a positive impact of programs on outcome variables. A sensitivity check was done on the PSM result to determine if the average treatment effect may be affected by unobserved variables to prevent hidden biases. The critical value less than 2 indicates a high sensitivity to unobservable (Duvendack & Palmer-Jones, 2011), it was observed (**Appendix B**) that the Hodges Lehmann point estimate relatively had low values implying that the treatment effect of the participation in empowerment scheme are thus sensitive to unobserved characteristics.

CONCLUSIONS AND RECOMMENDATIONS

This study used the logit model and PSM to estimate the impact of the program on the welfare of youths in Southwestern Nigeria.

1. Findings from the study revealed that age, years of education, and membership of a social group are significant in determining participation in the scheme.
2. Also, it was revealed that youths participating in the government empowerment scheme have reduced poverty, and increased asset ownership and expenditure than the non-beneficiaries. This suggested that participation in the agricultural YES is an effective scheme in increasing the welfare of participants hence, it is recommended as an effective economic-driven development program to increase the welfare of youth, reduce poverty, and reduce youth vulnerability to various other vices in Nigeria. This will further improve on the parlous state of the Nigerian economy.
3. The government should therefore invest further in such programs by enabling the extension of the program to other youth, women groups, and other segments of the society to bridge the high unemployment and poverty among Nigerians.

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APPENDIX A

Table A1. Covariate balance indicators before and after matching

Matching algorithm	Model type	Pseudo-R^2 before matching	Pseudo R^2 after matching	LR X^2 (p-value) before matching	LR X^2 (p-value) after matching	Mean standardized bias before matching	Mean standardized bias after matching
KBM[a]	Logit	0.068	0.008	79.87 (p = 0.00)	6.31 (p = 0.90)	15.7	3.8
	Probit	0.068	0.007	79.87 (p = 0.00)	5.80 (p = 0.92)	15.7	3.6
KBM[b]	Logit	0.068	0.005	79.87 (p = 0.00)	4.05 (p = 0.98)	15.7	3.2
	Probit	0.068	0.007	79.87 (p = 0.00)	5.29 (p = 0.95)	15.7	3.6
NNM[a]	Logit	0.068	0.011	79.87 (p = 0.00)	9.14 (p = 0.69)	15.7	6.2
	Probit	0.068	0.009	79.87 (p = 0.00)	7.41 (p = 0.83)	15.7	5.7
NNM[b]	Logit	0.068	0.019	79.87 (p = 0.00)	14.56 (p = 0.27)	15.7	7.8
	Probit	0.068	0.014	79.87 (p = 0.00)	11.88 (p = 0.46)	15.7	6.5
RM	Logit	0.068	0.019	79.87 (p = 0.00)	14.56 (p = 0.27)	15.7	7.8
	Probit	0.068	0.011	79.87 (p = 0.00)	8.31 (p = 0.76)	15.7	4.6
LLR	Logit	0.068	0.024	79.87 (p = 0.00)	19.72 (p = 0.07)	15.7	10.0
	Probit	0.068	0.014	79.87 (p = 0.00)	11.88 (p = 0.46)	15.7	6.5

Note. KBM[a]: Kernel based matching with band width 0.03 and common support; KBM[b]: Kernel based matching with band width 0.06 and common support; NNM[a]: Five nearest neighbor matching with replacement and common support; NNM[b]: Single nearest neighbor matching with replacement and common support; RM: Radius matching with caliper 0.02 and common support; & LLR: Local linear matching with common support

APPENDIX B

Table B1. Matching algorithm and its values

Matching algorithm	Outcome variable	ATT (probit)	ATT (logit)	Critical level of hidden bias (probit)	Critical level of hidden bias (logit)
KBM[b]	Poverty (head count)	-0.472	-0.468	1.9	1.9
	Expenditure (PCE)	6,983.96	6,946.47	1.7	1.7
KBM[a]	Poverty (head count)	-0.472	-0.469	1.8	1.8
	Expenditure (PCE)	6,983.91	6,961.04	1.7	1.7
NNM[a]	Poverty (head count)	-0. 457	-0.476	2.6	2.8
	Expenditure (PCE)	7,186.23	7,329.12	1.8	2.0