

Article

Impact of Youth-in-Agribusiness Program on Employment Creation in Nigeria

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Abstract: The increasing rate of youth unemployment in Africa, particularly in Nigeria, remains among the challenges to social and economic stability. Accordingly, the Nigerian government implemented several interventions, including the Youth-in-Agribusiness (YIA) program to reduce youth unemployment. However, the effect of these programs on gainful employment creation is yet to be documented. Therefore, this study examined the impact of the YIA program on creating gainful employment among the youth. Multistage random sampling was used to obtain cross-sectional data from 668 youth in Southwestern Nigeria. Propensity score matching and endogenous switching probit techniques were used for the estimations. Results indicated that variables such as educational attainment, access to training, non-agricultural activity, membership in a youth organization, access to credit, productive resources, and youth location were significant and positively influenced youth decision to participate in the YIA program. Furthermore, participation in the YIA program has a significant positive impact on gainful employment among the youth. Therefore, the study recommends that strengthening social capital such as youth organization, credit scheme (financed by private and government), vocational training, and educational system is vital in enhancing participation in the YIA program and eventually gainful employment of youth.

Keywords: impact; youth; agribusiness; employment; propensity score matching; endogenous switching probit; Nigeria



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1. Introduction

The African Youth Charter, which Nigeria is a member of, used the 15–35 age group to define youth [1]. According to the International Labour Organisation statistics, there are about 1.3 billion youth aged 15–24 globally as of 2019 accounting for one out of every four people (17.6%) worldwide. This is an increase of about 300 million youth population since 1999 [2]. Thus, this has made the youth unemployment crisis a huge and steady concern of government and policymakers in developing countries since the 1960s, and youth development has become central to national development strategies [3]. More worrisome is the fact that the world youth unemployment rate has risen lately. About 68 million youth aged 15–24 were jobless in 2019, an increase of 7.6 million since 2017 [2].

According to the United Nations, 226 million youth aged 15–24 lived in Africa in 2015, representing nearly 20% of Africa's population, making up one-fifth of the world's youth population. In Nigeria, the youth comprise around 34% of Nigeria's populace [4,5]. This implies that the fastest growing and most significant youth population in the world is in Africa [6].

The high population of youth has a lot of advantages if harnessed adequately (availability of productive activity/job). It can stimulate and transform Africa's economy [7]. However, Africa's youth unemployment rate (20%) remains among the highest globally [2]. That said, the rate of unemployment among the youth varies from one country to the other. The youth unemployment rate in Nigeria appears to be the highest at 37%, followed by South Africa (25.2%) and Ghana (14%) [8]. Although Nigeria's overall unemployment rate has decreased lately (22%), the youth unemployment rate is still very high at 38% [5]. In terms of numbers, the population of Nigeria under the age of 30 is reported to be over half of the total Nigerian population, and about 64 million of these youth are unemployed, while an additional 1.6 million are under-employed [9].

The consequences of the high youth unemployment rate, particularly in Nigeria, are the high increase in youth migration, terrorism, cultism, kidnapping, prostitution, and cyber fraud, among others. The migration of youth from Africa to Europe and America through the Sahara Desert to connect the Mediterranean Sea has led to the loss of lives in the desert, sea, or youth ending up at slave camps in Libya. These issues have been top of the breaking news globally in recent years [10]. The Migration Project [11] revealed that about 16,850 migrants (Nigerians inclusive) died in the Sahara Desert and the Mediterranean Sea on their journey to Europe in 2014 alone. Additionally, 1 out of 36 migrants died while crossing in 2017, many of the youth sold into the slave markets, and females ended up as sex slaves in Libya during their migration journey.

One major solution to the consequences of the youth unemployment rate is to create jobs for the youth. It is believed that increased youth employment could play an essential role in addressing these problems [12,13]. It is also important to bear in mind that the kind of job to be created for the youth should be the type that can push them out of poverty and also improve their livelihoods. This means that the youth must be "gainfully employed". This is because, according to ILO [2], over one-third of young (15–24 years) workers (employed) in less and developed countries lived in poverty in the year 2018.

One sector that has over the years been identified to have the needed capacity to provide employment opportunities to the youth is agriculture [14]. Agriculture has been a leading sector for employment opportunities in Nigeria over several decades. The agricultural sector is observably significant over other sectors such as manufacturing, service, and oil industry due to its uniqueness in entrepreneurship and self-employment. The profession's requirement for energy, creativity, and innovation makes it suitable for the 15–35 age group [15]. However, in a study conducted by Naamwintome and Bagson [16], they found a movement away from farming resulting in limited youth participation in agriculture. The same study found that minimal access to productive resources such as land hinders young people's agriculture engagement even though farming was perceived to be profitable. People's attempts at making youth to be employed through agriculture will require other initiatives/approaches.

Several programs and initiatives have been put in place by the Nigerian government, at the federal level and some at the state level to create job opportunities for the young people in the agricultural sector. In particular, the Youth-in-Agribusiness (YIA) program is an initiative for practical training and setting up of business for youth in different fields of agriculture such as crop and animal production and agro-processing. The YIA program includes the Fadama empowerment youth program, and Ogun Women and Youth Empowerment Scheme (OGW-YES). The Federal and Ondo State government jointly funded the Fadama-YIA program, while the Ogun State government funded the OGW-YES. However, the Fadama and OGW-YES programs are both central to youth development and providing a solution to the unemployment crisis.

Although the YIA program in Nigeria is designed and conceptualized to generate employment for the youth, few studies have been conducted on the YIA program [17,18]. However, to date, no study has examined the performance of the program, particularly its core aim of creating employment for the youth. Therefore, there is a huge gap in the literature concerning the impact of the program on “gainful employment” (Gainful employment is defined in this study as a minimum sustainable amount of money a young person earns monthly) creation for the youth in Nigeria. Without filling this gap, it will be difficult to ascertain if programs of such nature could be adapted to solve the current high youth unemployment rate in Nigeria. Thus, this study aims to fill this gap in the literature and also provide appropriate policy recommendations as to the fitness of the program or any other programs of its kind in eliminating or reducing youth unemployment in Nigeria in particular and in Africa in general.

Furthermore, many past studies have examined youth participation in agriculture. However, some of these studies focused on perception [19,20], prospects and challenges [16,21,22], and technical efficiency [17]. Others examined the influence of factors such as access to credit, formal education, land ownership on youth participation in agriculture [18,23–25]. The above-mentioned studies only estimate correlation and not causality. No study to the best knowledge of the authors has focused on examining the impact of any treatment on youth gainful employment. Thus, it is difficult to identify from the literature what works in the case of youth employment. In this study, we examine the impact/causality of youth participation in an agricultural program on creating gainful employment using robust econometrics estimation techniques such as the Propensity Score Matching (PSM) and the Endogenous Switching Probit Models. These two models are adopted as a check or validity check and the results will enable us to give a consistent and robust impact estimate of the program on gainful employment among the participating youths, eliminating the error of overestimating or underestimating the impact of the program.

The findings from this study will assist the policymakers in examining its commitment to programs (such as YIA) concerning employment creation among the youth. Specifically, in this paper, we created the notion of being “gainfully employed” by comparing the income of the participants in the YIA program with the nationally approved minimum wage for those that are working for the Federal and State government in Nigeria. This is to be able to put the youth in the YIA program at the same employment and salary level as the national staff. We, therefore, evaluate the YIA program on its capacity to create “gainful employment” for the youth through agriculture.

The rest of the paper is organized as follows. Section 2 discusses the literature review. Section 3 presents the conceptual framework. The methodology is presented in Section 4. The results and discussion are presented in Section 5. Finally, Section 6 contains the summary, conclusion, and policy recommendation.

2. Literature Review

The global job prospect for young people has been diminishing in recent years, with an unemployment rate of about 13.0% in 2016 to 13.7% in 2020 [2,13]. However, there is significant unemployment variation across the continents, ranging from 9% in Northern America, 15% in Europe, 18% in Asia, and 20% in Africa [2]. According to African Development Bank (AfDB) [7], of approximately 420 million youth aged 15–35 in Africa, most are either unemployed or in precarious jobs.

The jobs created annually in Africa are relatively low. An estimated 10 to 11 million youth enter the labor market each year, but the creation of formal jobs is three million [7]. Mader [26] opined that unavailability or limited job opportunities are the main factors hindering youth development in Africa rather than the young people being lazy or lacking the qualifications or skill to work. However, International Fund for Agricultural Development (IFAD) [6] reported that policies and investments aimed at rural transformation and youth development should be based on three fundamental foundations, which are: “produc-

tivity”, “connectivity” and “agency”. The report emphasized that individuals, especially youth, are heading towards a life that should integrate these foundational elements. Young people aspire to become prosperous and connected individuals (social networks) who are in control of their future, which makes these elements an essential factor when thinking about rural youth growth [6].

Therefore, effective policies or programs (such as the YIA program) oriented towards sustainable livelihood opportunities have been introduced in Africa to address youth development [27]. The Youth-in-Agribusiness program has been identified as a significant framework for land and agricultural restructuring mechanism that could promote young people’s interests in the agricultural sector of the economy [17]. Meanwhile, agricultural development is one of the fundamental tools for economic growth; there needs to be more focus on young people’s participation in agriculture [28]. For this reason, recent agricultural research, most especially in low and developing countries, focuses on youth participation in agriculture.

Tiraieyari and Krauss [20] investigated the perception of young people involved in an urban agricultural program in Malaysia using the Volunteer Functions Inventory (VFI) and Theory of Planned Behaviour (TPB) approach. Factors such as attitude (optimism about agriculture), subjective norms (support by family and friends), perceived barriers, and carrier motive were found to be significant and positively influence youth involvement in an urban agriculture program in Malaysia. Similarly, Maritim, Kirimi [23] found out that access to credit, land, and perceived benefits were significant and positively influence youth involvement in Agribusiness in Kericho county, Kenya. On the other hand, Naamwintome and Bagson [16] examined the opportunities and challenges of young people involved in agriculture in the Sisala area of Ghana. The study showed that there is a movement away from farming resulting in limited youth participation in agriculture. They found out that the factor hindering young people’s involvement in agriculture is minimal access to productive resources such as land, even though farming was perceived to be profitable.

Using Multiple Linear Regression (MLR) and Pearson Product Moment Correlation (PPMC), Adesina and Eforuoku [18] analyzed the factors influencing YIA program participation in Ondo, State, Nigeria. The result from the MLR indicated that attitude, household size, farm size, years of involvement in the YIA program positively influence YIA program participation, while constraints such as inadequate training facilities negatively influence participation. The PPMC findings also revealed a significant relationship between socio-economic characteristics (i.e., experience in farming and household size) and YIA program participation. In a study on the technical efficiency of young people’s involvement in the YIA program in Ondo state, Nigeria, Muhammad-Lawal, Omotesho [21] observed different efficiency levels among the young people. The authors also observed that land, labor, agrochemicals, and planting materials are the key factors affecting youth production performance in the program.

The growing body of empirical literature on youth participation in agriculture and impact evaluation has failed to evaluate the impact of youth involvement in an agricultural program on creating gainful employment. Therefore, this study intends to close this research gap by providing information on the gainful employment effect of YIA program participation. Such vital information could influence policies addressing youth development and unemployment in Africa.

3. Conceptual Framework

This study employs the sustainable livelihoods framework (SLF) as spearheaded by the United Kingdom, Department for International Development [29]. The SLF approach is an important concept that focused on emerging thoughts of how individuals live to provide a minimum basic need for survival. In every part of the world including Nigeria, individuals are endowed with natural (e.g., land, water), human (e.g., aptitude, expertise, information, experience, and well-being), financial (e.g., wages, savings, credits), social (e.g., communication, networks, cooperatives), physical (e.g., shelter, energy), and psychological

(e.g., hope, optimism, resilience, and confidence) capital that constitute livelihood assets required to make a living. These are constraints on which their welfare is optimized [30,31].

The SLF framework is widely used as a practical tool for designing projects, programs, and evaluation plans [30–32]. Therefore, the framework supports this study as it is related to factors that hinder or improve the livelihood opportunities of individuals (as in the case of youth unemployment). Youth in Nigeria have differences in access to livelihood assets, infrastructure, and institutional amenities. These differences can be viewed in terms of location (rural/urban), income levels, and personal endowment (skills).

Youth participation in an agribusiness program is a critical agricultural development that can enhance the livelihood of youth, thereby reducing unemployment and promoting food sufficiency. It has been argued that most educated youth (including those from rural areas) aspire to have formal employment and dislike venturing into farming or any agricultural-related entrepreneurial jobs [33]. The perception of youth on agriculture as a dirty or aged rural individual occupation would change when they are well informed on the prospects and opportunities in agriculture, as well as receiving training/empowerment that could create employment for the youth. The YIA program is expected to influence young people's understanding and perception of agriculture as an occupation and a source of livelihood [19]. Thrassou et al. [34], emphasized the significance of "internal resources" (knowledge, capital) and "network ties" (marketing links and information) in business performance, especially for small and medium scale enterprises. The possession of these basic skills by the youth who participated in the YIA program could influence the sustainability and performance of their business.

4. Methodology

4.1. The Study Area, Sampling Framework, and Data Collection Technique

The study was conducted in two states (Ogun and Ondo) in Southwest Nigeria. Farming is the predominant occupation in the study area. The two states are also part of the major producers of cash crops in Nigeria such as cocoa, cotton, coffee, palm oils and kernels, tobacco, rubber, and timber [35]. Other crops produced include rice, yam, maize, vegetables, and fruits. The map of the study area is shown in Figure 1.

In selecting the youth (between 15 to 35 years) that participated in the YIA program and those that did not participate, a multistage random sampling technique was employed. The sampled youth were selected from the list of youth participating in the YIA program obtained from the respective offices of the ministry of agriculture in Ogun and Ondo States. In the first stage, Ogun and Ondo states were purposively selected based on prior knowledge that the YIA program was implemented in the State in the past and still ongoing in some parts of the States. The second stage involves the selection of seven local government areas (LGAs) in each State purposively based on prior knowledge that both male and female youth in the LGAs were actively involved in the agribusiness intervention programs. The third stage involves the random selection of five communities in each of the seven LGAs in each State. Finally, 5–10 youth (both participants and non-participants) were selected randomly from the communities. A total of 668 participants and non-participants youth were used for the study.

The study utilizes two principal data collection techniques, namely, qualitative and quantitative. The qualitative technique was Focus Group Discussions (FGDs) and the quantitative data were collected using a well-structured questionnaire administered to the selected youths by well-trained enumerators. The use of two or more data collection methods allows triangulation of the information obtained [36]. We conducted twelve (12) FGDs in two stages as a preliminary step for the survey. The first stage was conducted among the project stakeholders in both states (officials of the state ministry of agriculture). The second stage was the ten FGDs (five in each State) amidst the youth farmers. During the FGDs, all relevant information on the YIA program, beneficiaries, prospects, challenges of the businesses, and different locations of the youth were obtained. The information

provided by the participants during the FGD was used to modify the questionnaire and plan the field survey.

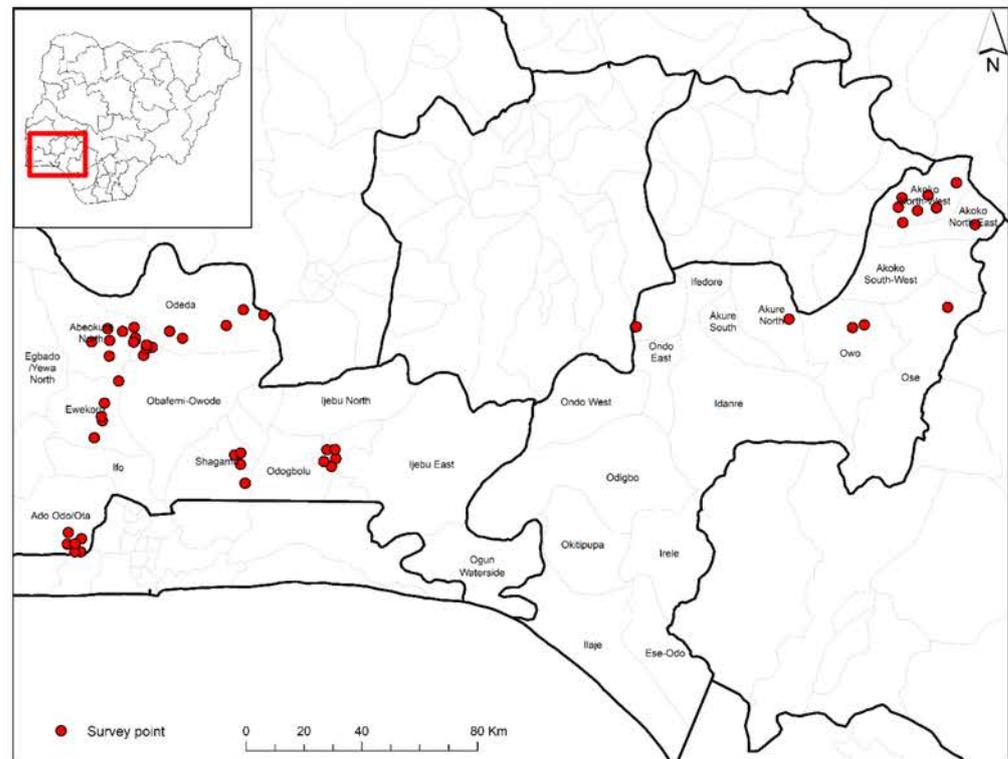


Figure 1. Map showing the study area. Source: IITA-GIS unit (Using the GPS coordinates of the sampled youth).

The cross-sectional data were collected through the use of a questionnaire coded using the “Surveybe” software and administered with smartphones/tablets. The questionnaire consisted of both open and close-ended questions. The “Surveybe” software helped to enhance the reliability, data quality and eliminate the problem of missing data.

4.2. Analytical Framework and Estimation Strategy

The YIA program was implemented in Ogun and Ondo State of Nigeria to minimize unemployment rates. The program targeted both graduate and non-graduate youth who were interested in agriculture. Interested youth from different LGAs of the states applied for the program through each LGAs office or the State Ministry of Agriculture. The selection of the applicants is based on a “quota system”, a method of allocating a particular share among a population. A quota was given to each focal LGAs/Wards amidst all the selected applications submitted for the program. This is to ensure that no LGA/ward is left out of the program and it is a kind of system to balance the distribution of the applicants among the LGAs. The selected youth were then trained (practically) in their respective field (crop or/and animal production) of choice for a period of three to nine months. The length of the training varied depending on the time required to master the skills and ability to establish their own business. After training, the participants were allocated land for the establishment of their businesses. Incentives such as storage facilities and livestock structures (houses), inputs such as seeds, fertilizers, foundation stock (for animal production), feeds, etc., were provided for the youth. The youth could take ownership of their businesses and also source for available markets and sell their farm produce. The YIA program provisions for setting up youth businesses are generally small to medium scale. Thus, youth are expected to expand their business over time from profits generated from the business.

Following McFadden [37], we analyzed the decision of youth to participate in the agribusiness intervention program as a question of preference within the utility context. We assumed that if the predicted net utility (gainful employment) of participation (T_i^P) is greater than that of non-participation (T_i^N), a utility-optimizing youth would be involved in the YIA program. Thus, a youth decides to be involved in the YIA program if the predicted net utility $T_i^* = T_i^P - T_i^N > 0$. The unobserved net utility is represented as a function of observable elements represented in the latent variable model as

$$T_i^* = \sigma F_i + \varepsilon_i, T_i = 1 \text{ if } T_i^* > 0 \quad (1)$$

where T_i is a binary indicator variable that equals 1 for youth i in case of participation and 0 otherwise, σ is a vector of parameters to be estimated, F_i is a vector of socioeconomic characteristics such as age, gender, education, etc., and ε_i is an error term. In this study, we adopted gainful employment as the youth performance indicator. However, participation in the YIA program might not be voluntary/random but could be a function of the youth's self-selection into the program. The decision to participate might differ among the youth because of the differences in observable characteristics among the youth such as age, gender, family background, education, political connection, membership of any organization. The differences might result in bias estimates if not controlled for. Therefore, the Propensity Score Matching (PSM) econometric technique was used to correct this estimation bias in the study. The causal impact of the YIA program on gainful employment was estimated using the PSM.

Rosenbaum and Rubin [38], who introduced the concept of PSM, opined that the propensity score could be used to eradicate self-selection bias through matching (adjustment) between the treated (participants) and untreated (non-participant) groups. The impact estimation based on matched samples is less biased and more accurate in comparison to estimates based on complete samples (Rubin and Thomas, 2000). The PSM is specified as:

$$S(X) = Pr[D = 1|X] = E[N|X]; \quad S(X) = F\{h(X_i)\} \quad (2)$$

where $S(X)$ is a propensity score, and Pr is the probability of involvement in an agribusiness intervention program (with treatment, $N = 1$ and 0 otherwise) dependent on X a vector of covariates observed (pre-treatment characteristics). $F\{\cdot\}$ can be a logit or probit model that assumes a normal or logistic cumulative distribution. A logit or probit model is suitable for predicting YIA participation being a choice-dependent variable. Thus, we used the probit model to estimate the expected probabilities (propensity scores) of youth involvement in the program.

$$ATT = E(\Delta_i|N_i = 1) = E(G_{1i}|N_i = 1) - E(G_{0i}|N_i = 0) \quad (3)$$

where N_i denotes participation in the program by youth i , and takes two values: $N_i = 1$ if the youth is a participant and $N_i = 0$ if the youth is a non-participant. G_{1i} is the outcome indicators of participants i , G_{0i} is the outcome indicators of non-participants i , and $E(\Delta_i|N_i = 1)$ is the predicted treatment effect.

The outcome indicator for gainful employment was defined as a minimum sustainable amount of money a young person earns monthly (₦30,000); which is the nationally approved minimum wage in Nigeria (₦ is the symbol for Nigerian Naira currency. At the time of the survey, 1US\$ is equivalent to ₦365). This was used as a threshold to categorize the youth as gainfully employed or not. Therefore, gainful employment is a binary variable that is equal to one if a young person earns ₦30,000 and above and 0 otherwise. In order words, if a young person earns ₦30,000 and above monthly, the person is gainfully employed, but if otherwise, the person is not.

The Endogenous Switching Probit Model (ESPM), an Instrumental Variable (IV) based approach was employed as a validity check for the PSM estimates. The ESPM helps to precisely control the unobservable characteristics of the youth (i.e., those not handled using the PSM model), such as the innate ability of the youth that might influence their decision

to participate in the program. Thus, the endogenous switching approach helps to solve both the bias selection of the sample and the issue of endogeneity [39,40], allowing for interaction between participation in the YIA program and other covariates [41]. Recent studies have utilized the ESPM in agricultural research [42,43]. The endogenous switching probit model is suitable for this study because it has the advantage of estimating a binary dependent outcome variable (i.e., gainful employment).

The estimation of ESPM requires a valid instrument. An exclusion restriction is vital for reliable identification of the ESPM. We followed economic theory and empirical literature in the choice of the instrumental variable. It was noted that the young person that belongs to a youth organization has better access to information about the YIA program and thus has a better chance of being selected to participate in the YIA program. Participation in the YIA program would be almost impossible without being a member of a youth organization. Thus, there is a robust correlation between being a member of a youth organization and participating in the YIA program. However, just being a member of a youth organization, in this case, cannot make the youth to be “gainfully employed” without participating in the YIA program. Youth can only be “gainfully employed” if he/she participate in the YIA program. Thus, membership of youth organizations satisfied the exclusive restriction assumption.

Following Lokshin and Sajaia [44] and Ayuya, Gido [42], the ESPM is specified in two stages. The first stage addresses the endogeneity problem due to self-selection using a probit selection model in which the youth are categorized into participants and non-participants. The second stage of the probit model solves the gainful employment outcome. In the ESPM, consider a youth with two binary outcome equations (if gainfully employed or not) and the criterion function P_i (YIA participation binary variable of youth) which determines the regime encountered by the youth. Therefore, the two outcome equations can be specified as follows:

$$P_i^* = \beta Z_i + u_i \quad (4)$$

Regime 2 (non-participants): $P_i = 0$ if $P_i^* \leq 0$

$$E_{1i}^* = \lambda_1 G_{1i} + e_{1i} \quad E_{1i} = I(E_{1i}^* > 0) \quad (5)$$

$$E_{0i}^* = \lambda_0 G_{0i} + e_{0i} \quad E_{0i} = I(E_{0i}^* > 0) \quad (6)$$

where E_{1i}^* and E_{0i}^* are the unobservable (latent) variable for gainful employment of participants and non-participants, respectively. E_{1i} and E_{0i} are binary values of the observed gainful employment, taking the value of 1 if the young person is gainfully employed, and 0 if otherwise. Z_i is a vector of explanatory variables that determines a switch (participation in YIA program) between participants (regime 1) and non-participants (regime 2). G_i represents a vector of exogenous variables assumed to influence gainful employment. β and λ are vectors of parameters to be estimated. u_i and e_i are the random disturbances associated with the YIA program participation and the gainful employment outcome. The observed gainful employment is defined as $E_i = E_{1i}$ if $P_i = 1$ and $E_i = E_{0i}$ if $P_i = 0$. Assuming that u_i and e_i are jointly normally distributed with a mean of zero, the correlation matrix is given as:

$$\Omega = \begin{pmatrix} 1 & \rho_0 & \rho_1 \\ & 1 & \rho_{10} \\ & & 1 \end{pmatrix} \quad (7)$$

where ρ_0 and ρ_1 are the correlations between e_0 , u and e_1 , u respectively, while ρ_{10} is the correlation between e_0 and e_1 .

As posited by Lokshin and Sajaia [44], a full information maximum likelihood (FIML), represents an effective method for estimating the endogenous switching probit model. The participation and gainful employment outcome equations (Equations (4)–(6)) are estimated

simultaneously to yield consistent standard errors. Following Lokshin and Sajaia [45] the logarithm likelihood function of the FIML estimator is specified as:

$$\begin{aligned} Ln(\xi) = & \sum_{P_i \neq 0, E_i \neq 0} \psi_i \ln \{ \Phi_2(G_{1i}\lambda_1, Z_i\beta, \rho_1) \} \\ & + \sum_{P_i \neq 0, E_i \neq 0} \psi_i \ln \{ \Phi_2(-G_{1i}\lambda_1, Z_i\beta, -\rho_1) \} \\ & + \sum_{P_i \neq 0, E_i \neq 0} \psi_i \ln \{ \Phi_2(G_{0i}\lambda_0, Z_i\beta, -\rho_0) \} \\ & + \sum_{P_i \neq 0, E_i \neq 0} \psi_i \ln \{ \Phi_2(-G_{0i}\lambda_0, Z_i\beta, \rho_0) \} \end{aligned} \quad (8)$$

where ψ_i is an optional weight for the i th youth and P_i and E_i are participation and gainful employment variable. G_i is a vector of exogenous variables assumed to influence gainful employment. Z represent a vector of explanatory variables; β and λ are vectors of parameters to be estimated and Φ_2 is the cumulative function of a bivariate normal distribution. In ensuring that the estimated ρ_1, ρ_0 are bounded between -1 and 1 , the FIML directly estimates $\text{atanh } \rho_j$, which is given as:

$$\text{atanh } \rho_j = \frac{1}{2} \ln \left(\frac{1+\rho_j}{1-\rho_j} \right) \quad j = 0, 1 \quad (9)$$

where ρ_j denotes the coefficient of correlation between u_i of Equation (4) and e_i Equations (5) and (6), respectively. After the parameters of the models were estimated, we computed some post estimation statistics for the impact of YIA program participation on gainful employment, which is as follows; (i) The average treatment effect on the treated (ATT) (ii) The average treatment effect on the untreated (ATU) (iii) The marginal treatment effect (MTE).

The effect of the treatment on the treated (TT), which is the expected effect of the treatment on youth with observed characteristics g who participated in the program can be expressed as:

$$TT(x) = \Pr(E_1 = 1 | P = 1, G = g) - \Pr(E_0 = 1 | P = 1, G = g) = \frac{\Phi_2(G_{1i}\lambda_1, Z\beta, \rho_1) - \Phi_2(G_{0i}\lambda_0, Z\beta, \rho_0)}{F(Z\beta)} \quad (10)$$

where $\Pr(E_1 = 1 | P = 1, G = g)$ are the observed predicted probabilities of gainful employment for participants and non-participants while $\Pr(E_0 = 1 | P = 1, G = g)$ are the counterfactual predicted probabilities of gainful employment for both groups of youth.

The effect of the treatment on the untreated (TU), which is the expected effect of the treatment on youth with observed characteristics g who did not participate in the YIA program, is generated as:

$$TU_{ESPM}(x) = \Pr(E_1 = 1 | P = 0, G = g) - \Pr(E_0 = 1 | P = 0, G = g) = \frac{\Phi_2(G_{1i}\lambda_1, -Z\beta, -\rho_1) - \Phi_2(G_{0i}\lambda_0, -Z\beta, -\rho_0)}{F(Z\beta)} \quad (11)$$

The treatment effect (TE) is the expected effect of the treatment for the youth with observed characteristics g randomly drawn from the population, is given as:

$$TE_{ESPM}(x) = \Pr(P = 1, G = g) - \Pr(P = 0, G = g) = F(G_1\lambda_1) - F(G_0\lambda_0) \quad (12)$$

where F is a cumulative function of the univariate normal distribution.

The marginal treatment effect (MTE) is the effect of the participation in the YIA program on youth with observed characteristics g and unobserved characteristics \bar{u} , given as:

$$MTE_{ESPM}(x, \bar{u}) = \Pr(P = 1 | G = g, u = \bar{u}) - \Pr(P = 0, | g = g, u = \bar{u}) = F \left(\frac{G_1\lambda_1 + \rho_1\bar{u}}{\sqrt{1 - \rho_1^2}} \right) - F \left(\frac{G_0\lambda_0 + \rho_0\bar{u}}{\sqrt{1 - \rho_0^2}} \right) \quad (13)$$

The average treatment effect on the treated (ATT) is the mean effect of participation in the YIA program on the youth who participated in the YIA program. The ATT is expressed as:

$$ATT_{ESPM} = \frac{1}{N_P} \sum_{i=1}^{N_P} TT(g_i) \quad (14)$$

where N_P is the number of sampled participants and non-participants of the YIA program respectively; with $P = 1$ i.e., number of treated youth (YIA participants) and TT is treatment effect on the treated.

The average treatment effect on the untreated (ATU) is the mean effect of participation in the YIA program on the youth who did not participate in the YIA program. The ATU is given as:

$$ATU_{ESPM} = \frac{1}{N_P} \sum_{i=1}^{N_P} TU(g_i) \quad (15)$$

where N_P is the number of sampled participants and non-participants of the YIA program respectively; with $P = 1$ i.e., number of untreated youth (YIA non-participants) and TU is treatment effect on the untreated.

5. Results and Discussion

5.1. Description and Summary Statistics of the Youths

Table 1 presents the descriptive statistics of the variables used in the analysis.

Table 1. Description and summary statistics of variables.

Variable	Description	Full Sample ($n = 668$)	Participants ($n = 146$)	Non-Participants ($n = 522$)	t -Test
Explanatory					
Age	Age of the youth (years)	31.02	31.08	31.01	−0.15
Gender	1 if male, 0 otherwise	0.71	0.76	0.69	−1.66 *
Education	Years of formal education	12.06	13.50	11.66	−3.60 ***
Training	1 if attended any training; 0 otherwise	0.74	0.92	0.69	−5.79 ***
Non-agricultural activity	1 if engaged in non-agricultural work; 0 otherwise	0.38	0.51	0.35	−3.50 ***
Credit access	1 if access to credit; 0 otherwise	0.28	0.47	0.23	−5.73 ***
Ext. access	1 if access to extension service; 0 otherwise	0.26	0.36	0.23	−3.21 ***
Awareness	1 if aware of YIAP; 0 otherwise	0.48	1.00	0.33	−17.06 ***
Membership YO	1 if membership in youth organisation; 0 otherwise	0.32	0.68	0.22	−11.37 ***
Ogun State	1 if Ogun State; 0 if Ondo State	0.50	0.48	0.50	0.37
Productive asset	Value of productive asset (Naira)	37,705	87,367	23,815	−4.98 ***
Income	Profit generated from previous production season (Naira)	2,652,351	5,591,328	1,830,339	−0.87
Explained					
Gainful employment	1 if average monthly income is ₦30,000 and above; 0 otherwise	0.35	0.53	0.27	−6.83 ***

Source: Author's 2020. *** and * denotes significance level at 1% and 10%. The sample t -test was estimated using an unequal option.

The t -test statistical technique was used to estimate the descriptive statistics of the respondents. This method was used to test if there are indeed differences between both groups regarding the explanatory variables. As discussed earlier, participation in the YIA program was modeled as a choice variable where participants and non-participants take the value of 1 and 0, respectively. The results revealed significant differences in both binary and continuous variables for the sampled respondents (Table 1). The participant and non-participant of the YIA program have a similar average age of 31 years. The majority (71%) of the sampled youth are male. The average years for formal education of the respondents

is 12 years. This indicates that a large proportion of the sampled youth has an average of secondary/high school education, indicating their ability to read and write. The number of respondents that participated in training (92%) was significantly higher than that of non-participants (69%). Access to education and training are the essential human capital that enhances the skills and productivity of an individual, most especially the youth. Thus, youth that is educated and has attended agricultural or other agribusiness training have proportional benefits over their counterparts in participating in the YIA program. These findings are in tandem with Angba [46], and Adesina and Eforuoku [18], that increased access to formal education enhances participation in the YIA program. About 38% of the youth engaged in a non-agricultural activity (i.e., artisanal job, trading, teaching, and local transportation business) as an alternative means of livelihood.

Youth organizations are vital institutional factors where individuals discuss and share/exchange information and ideas. Youth organizations are focused on youth development, strengthening young people's social and human resources, develop skills and build self-confidence [6]. The membership of YIA participants in youth organizations is significantly higher than that of the non-participants of the program. About 68% and 22% of participants and non-participants have affiliation in a youth organization, respectively. The sampled youth had low access to credit (28%) and extension services (26%). However, participants (47%) have greater access to credit compared to the non-participants (23%). The transformation process of subsistence to commercial farming requires a significant amount of capital as agriculture/agribusiness is known to be capital intensive. Therefore, the limited access to credit might influence the engagement of youth in agribusiness. In the same vein, more participants (37%) also have access to extension services compared to the non-participants (23%). This reported access to extension service delivery to the youth could have promoted awareness creation and the subsequent participation in the YIA program in the study area. Hence, about 48% of the respondents are aware of the YIA program. It is believed that no youth can participate in the program without being first aware of the program's existence in the first place.

The mean income (measured as the total profit generated from the previous production season or year) of the participants and non-participants is ₦5,591,328 and ₦1,830,339, respectively. The average income of the youth farmers in our study is significantly higher (₦2,652,351 vs. ₦285,790) than that of Olanrewaju, Osabohien [47] who analyzed the effect of the Anchors borrower program on youth rice farmers in Nigeria. A plausible reason for the difference in income is that the authors focused only on rice youth farmers while our study focused on youth farmers that engaged in crop (more than one) and animal production. Thus, the engagement of youth in one or more agribusiness could enhance their income. Additionally, the number of sampled youth in Olanrewaju, Osabohien's [47] study was relatively low compared to ours (174 vs. 668). Similarly, 53% of participants are classified as having gainful income compared to the non-participants (27%). The average monetary value of the productive assets (such as farm inputs and tools used in the production process) for the participants (₦87,367) is statistically and significantly higher than that of the non-participants (₦23,815).

Youth Engagement in Agribusiness Activities

Figure 2 shows the youth-run agribusiness enterprises in the study area. The majority (73%) of the youth are engaged in crop production (i.e., maize, rice, yam, and vegetable farming). On the other hand, about 27% of the youth are involved in animal production (i.e., poultry and catfish farming) and agro-allied services (i.e., farm consultancy and sales of farm inputs). Our findings are similar to Adesina and Eforuoku [18], who reported that youth participated mostly in crop production in Ondo State, Nigeria. Maize production, which is the largest enterprise practiced by the youth, is an important sub-set of the agricultural sector because it is a staple crop for human, animal, and industrial use. The engagement of youth in these enterprises could generate sustainable income for them. Additionally, the current ban on imported rice in Nigeria by the government in 2016 serves

as an opportunity for youth engaging in rice production to generate more revenue as there is a readily available market for their produce. All other enterprises practiced by the youth are also an essential source of income as they tend to provide the necessary and dietary needs of the populace.

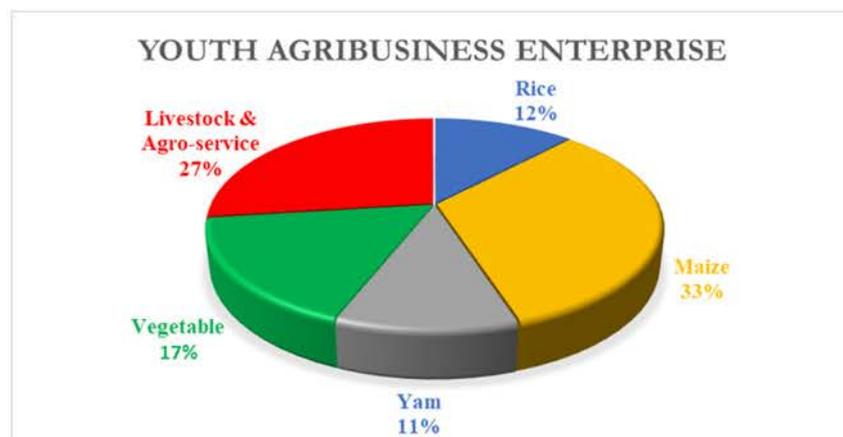


Figure 2. Distribution of agribusiness enterprises practiced by the youth in the study area. Source: Author's computation

5.2. Determinants of YIA Program Participation

The factors influencing the youth's participation in YIA in the study area are presented in Table 2. The coefficient and marginal effect from the maximum likelihood estimates of the probit model were used in elucidating the influence of the socioeconomic characteristics of respondents on their decision to participate or not in the YIA program. However, the marginal effect is more suitable than the coefficient in explaining probability model magnitude. This is because the sign and magnitude of the marginal effect define the direction and size of the probable effect of socioeconomic variables on their decision to participate or not [48]. Hence, the marginal effect is used in elucidating the results of the model. The pseudo- R^2 , statistical significance of the log-likelihood (LR) ratio, and chi-square probability in Table 2 showed that the specified model is compatible and best fit for the model used in the study.

Table 2. Probit model estimates of YIA program participation.

Variable	Coefficient	Robust Standard Error	Marginal Effects
Age	−0.015	0.015	−0.004
Gender	0.115	0.145	0.027
Education	0.026 *	0.013	0.006 **
Training	1.003 ***	0.235	0.187 ***
Membership Youth Org.	1.075 ***	0.128	0.302 ***
Non-agricultural activity	0.234 *	0.128	0.058 *
Access to credit	0.476 ***	0.139	0.126 ***
Access to extension	0.025	0.156	0.006
Productive asset	3.160 ***	7.840	7.590 ***
Ogun State	0.344 **	0.139	0.083 **
Constant	−2.560 ***	0.472	
Pseudo- R^2	0.263		
LR χ^2 (10)	109.01 ***		
Observation	668		

Source: Author's 2020. ***, ** and * denote significance level at 1%, 5% and 10%.

The results indicate that seven of the ten variables used in the model are statistically significant in explaining the decision of youth respondents to participate in the YIA program (Table 2). Years of education, training attendance, membership in a youth

organization, having a non-agricultural activity, access to credit, own productive asset, and based in Ogun State are the variables that significantly influence youth's decision to participate in the YIA program. Both states (Ogun and Ondo) cannot be included in the model because of multicollinearity. Therefore, Ogun state is used as the reference category for the location variable.

The education coefficient is positively and statistically significant and explains the probability to participate in the YIA program. The partial effect of a unit increase in years of education on the conditional probability of YIA program participation is 0.026, which suggests that an additional year of youth schooling will lead to a 2.6 percent increase in YIA program participation. This means that the more educated the youth are, the more they are likely to participate in the YIA program. A plausible explanation for this is that educated youth might have more access to information (via school or the internet) on the benefits of participating in the YIA program than the less educated youth and they could also be opened to learn new things and develop new ideas. This finding supports those of Nnadi and Akwiwu [49], who observed that education increases the probability of young people's involvement in rural agriculture in Imo State, Nigeria. In contrary to our findings, Twumasi, Jiang [24] and Agwu, Nwankwo [50] reported a negative effect of education on agricultural participation by youth in Ghana and Abia State, Nigeria, respectively. It is worthy to note that both Twumasi, Jiang [24] and Agwu, Nwankwo [50] focused on youth's perception of agriculture. Therefore, the youth are not trained/exposed to agribusiness programs. Thus, our findings support the notion that if youth are aware and well informed about agricultural opportunities, they are more likely to engage in agriculture.

Similarly, training was also found to significantly increase the likelihood of participating in the YIA program. Enrollment in capacity-building training pre-exposes youth to opportunities in the trained field. This result confounds with that of Auta, Abdullahi [20], who observed that training on agricultural activities, small business, and leadership are one of the major priorities of rural youth to participate in agriculture in Nigeria.

Being a member of a youth organization (YO) has a positive and significant influence on the probability of YIA program participation. This implies that youth who have affiliation with YO are more likely to participate in the YIA program. The primary aim of youth organizations is targeted towards the welfare and development of youth. Additionally, YO has connections with leaders of the community, government, and non-governmental organizations (NGOs). Thus, they could be more aware of any initiatives/programs (such as YIA) geared towards youth development. Contrary to this result, Adesina and Eforuoku [18] found no significant relationship between youth association membership and YIA program participation in Ondo State, Nigeria.

The coefficient of non-agricultural activity was significantly positive in increasing the likelihood of participation in the YIA program. Youth engaged in non-agricultural activity such as trading and artisanal jobs could have been exposed to the opportunities or profitability in agriculture against other businesses. Therefore, participating in the YIA program could help them enhance their farming skills and provide additional funds needed in starting up an agribusiness. This finding disagrees with Kimaro and Towo [51], who indicated that inadequate off-farm work increases youth participation in agriculture in rural Tanzania.

Endowment in factors of production such as land, capital, and other productive inputs are essential in starting up an agribusiness. The productive asset variable was found to have a positive and statistically significant effect on YIA program participation. This implies that youth with more productive assets are more likely to enroll in the YIA program. A plausible explanation for this is that the youth might see the program as an opportunity to utilize/convert their assets into a business activity that will generate sustainable income for them and thus help them to upgrade their financial status. Our finding is consistent with that of Douglas, Singh [52], who revealed a positive relationship between access to productive assets such as land and youth participation in farming in Swaziland.

Access to credit has a significant positive effect on participation in the YIA program. This indicates that the youth that has access to credit are more likely to participate in the YIA program. The different financing institutions (both private and public) that disburse credits or loans to individuals have advisory personnel who educates the borrower on the conditions and other information related to the loans. Therefore, youth that has access to credit might get information on YIA programs from these financial institutions. Additionally, youth with access to credits might be motivated to participate in programs that would boost their current business. The positive association of access to credit is in tandem with Twumasi, Jiang [24] and Maritim, Kirimi [23] for agribusiness youth participation in Ghana and Kericho County, Kenya, respectively. The location variable, Ogun State, has a positive and statistically significant effect on YIA program participation, which suggests that youth in Ogun state are more likely to participate in the YIA program. Ogun State shares a boundary with Lagos State, which is the highest populated state in Nigeria. The majority of the youth in Ogun state migrate to Lagos for greener pastures. However, the rate of unemployment among the inhabitants of this State is high. Therefore, youth might see the program as an opportunity for sustainable employment.

5.3. Impact of the Youth-in-Agribusiness Program on Creating Gainful Employment

The correlation between participation and gainful employment outcome variables is complex theoretically, and there are empirical drawbacks concerning the impact estimation problem. In this study, two econometric approaches, namely propensity score matching (radius, nearest neighbor, and kernel-based matching) and endogenous switching probit were used to address the research questions.

5.3.1. Propensity Score Matching

Before estimating the causal effect of the YIA program on gainful employment using the PSM, some diagnostic tests were performed to guarantee the consistency and reliability of the matching process. The common support condition was tested to ensure that the covariates do not differ after estimating the propensity score for participants and non-participants. Figure 3 presents the density distribution of the estimated propensity scores for participants and non-participants of the YIA program.

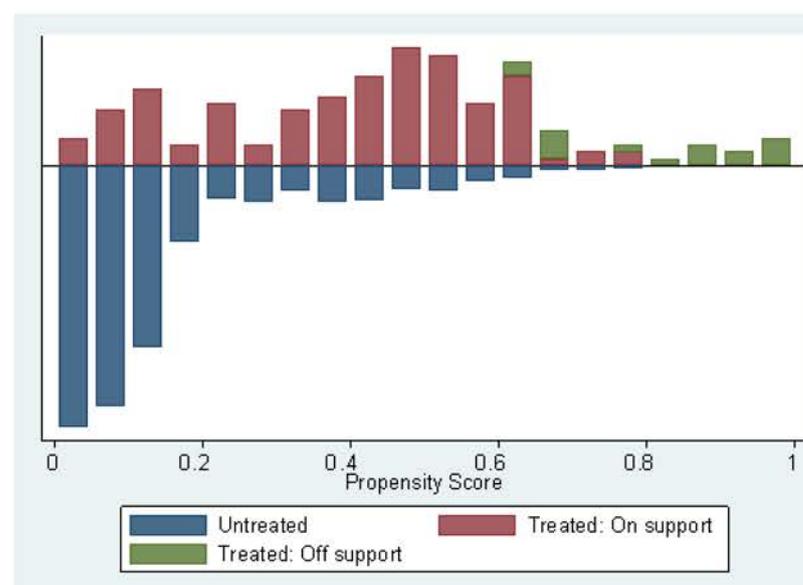


Figure 3. Distribution of propensity score and common support. Treated: On support means that participants of the YIA program have an acceptable reference group (non-participants). Treated: Off-support applies to YIA program participants who do not have an acceptable reference group (non-participants). Source: Author's computation

The histogram in Figure 3 indicates that the common support condition was fulfilled, as there was significant variation in the distribution of propensity scores for both participants and non-participants. The study further tested for balancing property for the matching process to be sure of the common support condition quality. The test was done to ensure that both groups of participants and non-participants are similar in pre-exposure characteristics. The results of the balancing property of the covariates are presented in Table 3.

Table 3. Test of equality of means of variables before and after matching.

Variable	Unmatched Sample			Matched Sample			% Reduction Bias
	Participants	Non-Participants	Diff: p -Value	Participants	Non-Participants	Diff: p -Value	
Age	31.08	31.01	0.883	30.96	30.94	0.965	60.1
Gender	0.76	0.69	0.098 *	0.74	0.72	0.702	69.8
Education	13.50	11.66	0.000 ***	13.31	12.50	0.221	56.1
Training	0.92	0.69	0.000 ***	0.91	0.87	0.214	79.0
Non-agricultural activity	0.51	0.35	0.000 ***	0.48	0.45	0.635	81.3
Membership YO	0.62	0.18	0.000 ***	0.57	0.56	0.710	97.9
Access to credit	0.47	0.23	0.000 ***	0.43	0.46	0.585	85.6
Access to ext.	0.36	0.23	0.001 ***	0.32	0.34	0.657	80.1
Productive asset	87,367	23,815	0.000 ***	35,818	35,082	0.934	98.8
Ogun State	0.49	0.50	0.709	0.52	0.52	0.962	83.0

Source: Author's 2020. ***, * denotes significance level at 1% and 10% respectively.

The results show that none of the variables was significant after matching, suggesting that the matching quality was satisfactory for all covariates used in the model (Table 3). Thus, the two groups of participants and non-participants have similar characteristics and features concerning their covariates. In addition, the description of the overall covariate balancing test is provided in Table 4. The Pseudo- R^2 indicates the significance of the explanatory variables in explaining the probability of YIA program participation. The p -values of the probability ratio test were also used to indicate the joint significance of equality between the participants and non-participants in covariates' distribution.

Table 4. Overall matching quality indicators before and after matching using Nearest-neighbour matching.

Sample	Pseudo R^2	LR (χ^2)	$p > (\chi^2)$	Mean Standardized Bias	Bias	Total % Bias Reduction
Unmatched (before matching)	0.263	184.54	0.000 ***	36.4	117.3	
Matched (after matching)	0.015	5.28	0.872	6.7	28.7	75.5

Source: Author's 2020. Note: *** denotes significance level at 1%.

Results show that there is a remarkable reduction of the Pseudo- R^2 value from 0.263 (26.3%) before matching to about 0.015 (1.5%) after matching (Table 4). The likelihood ratio test p -values show that the joint significant was accepted for the unmatched samples (p -value = 0.000) but rejected after the samples were matched (p -value = 0.872). The standardized mean bias for overall reduced from 36.4 before matching to about 6.7 after matching respectively, causing an overall bias reduction of 75.5. The reduced Pseudo- R^2 and mean standard bias, the high overall bias reduction, and the insignificant p -value of the likelihood ratio test after matching indicate the success of the matching process between participants and non-participants.

The estimates of the mean average treatment effect on the treated (ATT) for PSM using the three matching estimators (RM, KBM, NNM) are presented in Table 5. The results show that all the PSM estimates have a positive and statistically significant effect

of gainful employment on YIA program participation (Table 5). Specifically, the PSM estimates indicated that participants of the YIA program are more gainfully employed than non-participants. The estimates ranged from 0.166 to 0.192, implying that participation in the YIA program can increase gainful employment among the participants by about 16.6 to 19.2 percent. These findings suggest that involvement in the YIA program could increase youth gainful employment opportunities in the study area. Our findings corroborate with Baiyegunhi, Majokweni [32] who reported that participation in outsourced agricultural extension programs significantly influences the income of farmers in KwaZulu-Natal, South Africa. The results that emanate from this study revealed that participation in an agricultural program is vital in creating gainful employment and subsequently improving the livelihood of individuals.

Table 5. Impact of YIA program participation on gainful employment-PSM.

Estimation Methods	ATT for Outcome Variables	t-Test
Propensity matching score (PSM)		
Radius matching (RM)	0.166 (0.035)	4.698 ***
Nearest neighbour matching (NNM)	0.192 (0.050)	3.673 ***
Kernel-based matching (KBM)	0.187 (0.049)	3.841 ***

Source: Author's 2020. *** denotes significance level at 1%. The standard errors are in parenthesis.

5.3.2. Endogenous Switching Probit Model (ESPM)

The ESPM model was used to complement the PSM to verify the robust estimate of the causal impact of the YIA program. This is because the PSM results might be biased due to their unaccountability for unobserved factors. The results from Table 6 shows that the full information maximum likelihood estimates of the ESPM are fit for controlling unobserved selection bias in the study.

Table 6. Full information maximum likelihood (FIML) estimates of the endogenous switching probit model.

Variable	Participation		Gainful Employment			
			Participants		Non-Participants	
	Coefficient	RSE	Coefficient	RSE	Coefficient	RSE
Age	−0.014	0.014	−0.014	0.032	0.051 **	0.021
Gender	0.114	0.143	−0.081	0.354	−0.178	0.200
Education	0.025 **	0.012	0.003 **	0.032	0.002	0.017
Training	1.007 ***	0.194	−0.840	0.612	0.411	0.138
Membership YO	1.076 ***	0.126				
Non-agricultural activity	0.235 *	0.130	−0.080	0.288	−0.165	0.201
Access to credit	0.475 ***	0.138	0.740 **	0.308	0.645 ***	0.213
Access to Extension	0.032	0.154	0.471	0.320	0.281	0.202
Productive asset	3.160 ***	9.850	−2.540	5.460	6.130 **	1.770
Ogun state	0.349 **	0.142	−1.199 ***	3.999	0.033	0.039
Constant	−2.576 ***	0.473	−0.597 **	1.301	−0.005	0.150
ρ_1			−0.110	0.318		
ρ_0					0.226	0.351
LR test	0.47					
Wald chi-square (10)	134.10 ***					
Loglikelihood	−428.790					
Observation	668					

Source: Author's 2020. ***, **, * denote significance level at 1%, 5% and 10%. RSE denote robust standard errors.

The estimated correlation coefficients for participants ρ_1 were negative while that of non-participant ρ_0 were positive. The negative sign of the covariance term (ρ_1) for the correlation between participants and gainful employment suggests a positive selection bias. This implies that youths that participate in YIA are more likely to be gainfully employed due to unobserved factors. This result is in tandem with Ayuya, Gido [42] but inconsistent

with Ma and Abdulai [43] and Ojo and Baiyegunhi [53]. The estimates for the average treatment effects (ATE), which show the impact of youth participation in the YIA program on “gainful employment” are presented in Table 7.

Table 7. Impact of YIA program participation on gainful employment-ESPM.

Outcome Variable	Treatment Effect	Average Treatment Effect (ATE)
Gainful employment	Participating youth (ATT)	9.33 (0.0133) ***
	Non-participating youth (ATU)	17.16 (0.0079) ***
	Marginal Treatment Effect (MTE)	17.53 (0.0015) ***

Source: Author’s 2020. *** denotes significance level at 1%. The robust standard error is in parenthesis.

Accounting for both observed and unobserved factors that could influence YIA Program participation, the ESPM was employed to robustly estimate and validate the result of the PSM. The analyses are focused on the two most important variables the ATT and the ATU. However, we included the MTE to estimate the impact of the YIA program on youths that are indifferent between participating and not participating. As opined by Lokshin and Sajaia [44], non-linearities might be observed in the ESPM if there is a missing instrumental variable (IV) in the participation equation. Therefore, membership in a youth organization, which was used as an IV in the participation equation, was found to have a positive and statistically significant influence on YIA participation.

The results show that the probability of not being gainfully employed for the youth that participated in the YIA program would have been 9.33% more had the youth not participated in the YIA program. This implies that participation in the YIA program has the probability of increasing “gainful employment” among the participating youth by 9.33%. This is the average treatment effect on the treated (ATT), which is statistically significant at the 1% confidence level. Similarly, the probability of being gainfully employed would have been 17.16% for the youth that did not participate in the YIA program had they participated. This implies that the non-participating youth would have realized a higher rate of “gainful employment” if they had participated in the YIA program under the given condition of participation. This is the average treatment effect on the untreated (ATU) which is also statistically significant and implies that non-participating youth would be better off if they participated in the YIA program. Conversely, the findings indicated that the youth who are indifferent between participating and not participating in the YIA program (i.e., they are at the margins or near the threshold of participating) would have been 17.53% gainfully employed had they participated in the YIA program. This is the marginal treatment effect (MTE) which is also statistically significant at the 1% confidence level.

A piece of vital evidence from the impact estimate (ATT) is the difference between PSM and ESPM estimates. PSM estimates roughly doubled the estimate from ESPM. The increase in the PSM estimates might be due to its inability to control for unobserved factors associated with YIA participation, thus, over-estimating the impact and proving that failure to control for the unobservable bias could lead to erroneous policy recommendations.

6. Conclusions and Recommendations

Engagement of youth in a productive and lucrative activity such as agribusiness is imperative in enhancing social stability, reducing unemployment, and migration of youth from Africa. YIA program is an empowerment program targeted to improve the livelihood of the youth. Extant studies have been conducted on youth participation in agriculture, but there is limited/no study that has address the impact of the YIA program on creating gainful employment. Therefore, this study bridges the research gap by evaluating the determinant and gainful employment impact of participation in the YIA program.

The PSM and ESPM estimates revealed that participants of the YIA program are more gainfully employed than non-participants. The empirical findings from this study generally affirm the significance of YIA program participation on gainful employment creation. Hence, it is recommended that a policy that supports and promotes subsequent

YIA program participation should be put in place. Specifically, since the program incorporates vocational training as one of its main components, it is recommended that practical entrepreneurship or practical business development studies should be incorporated into the curriculum of secondary schools and tertiary institutions. This could stimulate the perception of agriculture as a business and high-earning occupation, thus an alternate to white-collar jobs. In addition, vocational or capacity-building training should be organized frequently by stakeholders, donors, government, or non-governmental organizations. Training could be followed up by empowerment (provision of funds/facilities for setting up of youth business). This could increase participation in the YIA program and subsequently provide gainful employment for youth.

The positive and statistical significance of the access to credit variable suggests the need for policy geared towards strengthening both private and governmental institutions in making loan/credit conditions more attractive to youth for setting up their agribusiness. Flexible loan agreement terms and low-interest rates could increase YIA participation. Lastly, strengthening and encouraging social capital (such as youth organization) in society could offer pathways to perception, and attitudinal changes among youth concerning agriculture. Therefore, this could help to increase the awareness, participation in the YIA program, and eventually gainful employment of youth. The study was limited to the southwestern region of Nigeria due to the timeframe of the survey and the security issue in the northern and southern part of Nigeria, where other YIA programs have taken place. Further studies could explore the status quo of participation in and efficacy of YIA programs in these areas.

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References

1. UNECA. *Africa Youth Report in Addressing the Youth Education and Employment Nexus in the New Global Economy*; United Nations Economic Commission for Africa: Addis Ababa, Ethiopia, 2011.
2. ILO. *Global Employment Trends for Youth 2020: Technology and the Future of Jobs*; International Labour Office Publications: Geneva, Switzerland, 2020.
3. Bennell, P. Promoting Livelihood Opportunities for Rural Youth; IFAD Governing Council Roundtable: Generating Remunerative Livelihood Opportunities for Rural Youth. In *Knowledge and Skills for Development*; IFAD: Rome, Italy, 2007.

4. Anyanwu, J.C. Does Intra-African Trade Reduce Youth Unemployment in Africa? *Afr. Dev. Rev.* **2014**, *26*, 286–309. [CrossRef]
5. NBS. *Unemployment and Underemployment by State; Quarter 3, 2018 Report*; National Bureau of Statistics: Abuja, Nigeria, 2019.
6. IFAD. *Creating Opportunities for Rural Youth*; Rural Development Report; IFAD: Rome, Italy, 2019.
7. AFDB. The High Five Agenda: Jobs for Youth in Africa. In *Improve the Quality of Life for the People of Africa*; African Development Bank: Abidjan, Ivory Coast, 2018.
8. United Nations. *Millennium Development Goals Report 2009*; United Nations: New York, NY, USA, 2009.
9. Ojo, L.B.; Abayomi, A.A.; Odozi, A.F. Entrepreneurship Education: A Viable Tool for Youth Empowerment in Nigeria. *Acad. J. Interdiscip. Stud.* **2014**, *3*, 11–20. [CrossRef]
10. UNHCR. *Desperate Journeys—Refugees and Migrants Arriving in Europe and at Europe’s Borders*; United Nation of High Commissioner for Refugee: The Hague, The Netherlands, 2019.
11. Migration Project, From Nigeria to Libya and Europe: The Risks on the Journey. 2019. Available online: <https://www.themigrantproject.org/nigeria/from-nigeria-to-libya-and-europe/> (accessed on 25 May 2019).
12. AFDB. The High Five Agenda: Jobs for Youth in Africa. In *Catalyzing Youth Opportunity across Africa*; African Development Bank: Abidjan, Ivory Coast, 2016.
13. ILO. *Global Employment Trend for Youth Paths to a Better Working Future*; International Labor Organisation Publications: Geneva, Switzerland, 2017.
14. World Bank. *Youth Employment in Sub-Saharan Africa*; World Bank: Washington, DC, USA, 2019.
15. Brooks, K.; Zorya, S.; Gautam, A.; Goyal, A. *Agriculture as a Sector of Opportunity for Young People in Africa*; World Bank: Washington, DC, USA, 2013. [CrossRef]
16. Naamwintome, B.A.; Bagson, E. Youth in agriculture: Prospects and challenges in the Sissala area of Ghana. *Net J. Agric. Sci.* **2013**, *1*, 60–68.
17. Muhammad-Lawal, A.; Omotesho, O.; Falola, A. Technical efficiency of youth participation in agriculture: A case study of the youth-in-agriculture programme in Ondo State, South-Western Nigeria. *Niger. J. Agric. Food Environ.* **2009**, *5*, 20–26.
18. Adesina, K.T.; Eforuoku, F. Determinants of participation in youth-in-agriculture programme in Ondo State, Nigeria. *J. Agric. Ext.* **2016**, *20*, 104–117. [CrossRef]
19. Gangwar, R.; Kameswari, V. Attitude of rural youth towards agriculture as a means of livelihood. *J. Appl. Nat. Sci.* **2016**, *8*, 879–882. [CrossRef]
20. Tiraieyari, N.; Krauss, S.E. Predicting youth participation in urban agriculture in Malaysia: Insights from the theory of planned behavior and the functional approach to volunteer motivation. *Agric. Hum. Values* **2018**, *35*, 637–650. [CrossRef]
21. Adesugba, M.; Mavrotas, G. *Youth Employment, Agricultural Transformation, and Rural Labor Dynamics in Nigeria*; IFPRI Discussion Paper 1579; International Food Policy Research Institute (IFPRI): Washington, DC, USA, 2016.
22. Auta, S.J.; Abdullahi, Y.M.; Nasiru, M. Rural Youths’ Participation in Agriculture: Prospects, Challenges and the Implications for Policy in Nigeria. *J. Agric. Educ. Ext.* **2010**, *16*, 297–307. [CrossRef]
23. Maritim, K.D.; Kiriimi, D.; Njeru, E.M. Assessment of Factors Influencing Youth Participation in Agri-Business in Kericho County, Kenya. *Int. J. Bus. Manag.* **2019**, *7*, 210–219. [CrossRef]
24. Twumasi, M.A.; Jiang, Y.; Acheampong, M.O. Determinants of agriculture participation among tertiary institution youths in Ghana. *J. Agric. Ext. Rural. Dev.* **2019**, *11*, 56–66. [CrossRef]
25. Yunusa, M.P.; Giroh, D.Y. Determinants of youth participation in food crops production in Song local government area of Adamawa State, Nigeria. *Manag. Econ. Eng. Agric. Rural. Dev.* **2017**, *17*, 427–434.
26. Mader, P. Better Jobs and Livelihoods for Young People in Africa—A Spotlight on Demand. In *K4D Emerging Issues Report*; Institute of Development Studies: Brighton, UK, 2018.
27. Price, R.A. *Youth Employment Needs in Nigeria*; K4D Helpdesk Report 691; Institute of Development Studies: Brighton, UK, 2019.
28. Fatunla, G.T. Socio-Economic Issues in the Education of Children of Migrant Fishermen in Nigeria. *J. Sustain. Agric.* **1997**, *9*, 31–61. [CrossRef]
29. DFID. *Sustainable Livelihoods Guidance Sheets*; Department for International Development: London, UK, 2001.
30. Nguezet, P.M.D.; Okoruwa, V.O.; Adeoti, A.I.; Adenegan, K.O. Productivity Impact Differential of Improved Rice Technology Adoption among Rice Farming Households in Nigeria. *J. Crop. Improv.* **2012**, *26*, 1–21. [CrossRef]
31. Ellis, F.; Kutengule, M.; Nyasulu, A. Livelihoods and Rural Poverty Reduction in Malawi. *World Dev.* **2003**, *31*, 1495–1510. [CrossRef]
32. Baiyegunhi, L.; Majokweni, Z.; Ferrer, S. Impact of outsourced agricultural extension program on smallholder farmers’ net farm income in Msinga, KwaZulu-Natal, South Africa. *Technol. Soc.* **2019**, *57*, 1–7. [CrossRef]
33. Elias, M.; Mudege, N.; Lopez, D.E.; Najjar, D.; Kandiwa, V.; Luis, J.; Yila, J.; Tegbaru, A.; Ibrahim, G.; Badstue, L.B.; et al. Gendered aspirations and occupations among rural youth, in agriculture and beyond: A cross-regional perspective. *J. Gen. Agric. Food Secur.* **2018**, *3*, 82–107.
34. Thrassou, A.; Vrontis, D.; Crescimanno, M.; Giacomarra, M.; Galati, A. The requisite match between internal resources and network ties to cope with knowledge scarcity. *J. Knowl. Manag.* **2020**, *24*, 861–880. [CrossRef]
35. FORMECU. *Forest Resource Survey, Geomatics*; Forestry Management Evaluation and Coordinating Unit of Federal Department of Forestry: Abuja, Nigeria, 1998.

36. Bless, C.; Higson-Smith, C.; Kagee, A. *Fundamentals of Social Research Methods: An African Perspective*; Juta and Company, Ltd.: Cape Town, South Africa, 2006.
37. McFadden, D. The measurement of urban travel demand. *J. Public Econ.* **1974**, *3*, 303–328. [[CrossRef](#)]
38. Rosenbaum, P.R.; Rubin, D.B. The central role of the propensity score in observational studies for causal effects. *Biometrika* **1983**, *70*, 41–55. [[CrossRef](#)]
39. Hausman, J.A. Specification Tests in Econometrics. *Econometrica* **1978**, *46*, 1251. [[CrossRef](#)]
40. Heckman, J.J. Sample Selection Bias as a Specification Error. *Econometrica* **1979**, *47*, 153. [[CrossRef](#)]
41. Alene, A.D.; Manyong, V.M. The effects of education on agricultural productivity under traditional and improved technology in northern Nigeria: An endogenous switching regression analysis. *Empir. Econ.* **2007**, *32*, 141–159. [[CrossRef](#)]
42. Ayuya, O.I.; Gido, E.O.; Bett, H.K.; Lagat, J.K.; Kahi, A.K.; Bauer, S. Effect of Certified Organic Production Systems on Poverty among Smallholder Farmers: Empirical Evidence from Kenya. *World Dev.* **2015**, *67*, 27–37. [[CrossRef](#)]
43. Ma, W.; Abdulai, A. IPM adoption, cooperative membership and farm economic performance. *China Agric. Econ. Rev.* **2019**, *11*, 218–236. [[CrossRef](#)]
44. Lokshin, M.; Sajaia, Z. Impact of Interventions on Discrete Outcomes: Maximum Likelihood Estimation of the Binary Choice Models with Binary Endogenous Regressors. *Stata J. Promot. Commun. Stat. Stata* **2011**, *11*, 368–385. [[CrossRef](#)]
45. Lokshin, M.; Sajaia, Z. Maximum Likelihood Estimation of Endogenous Switching Regression Models. *Stata J. Promot. Commun. Stat. Stata* **2004**, *4*, 282–289. [[CrossRef](#)]
46. Angba, A.O. Effect of rural-urban migration of youths on agricultural labour supply in Umuahia North Local Government Area of Abia State, Nigeria. *J. Agric. Soc. Res.* **2004**, *3*, 77–83. [[CrossRef](#)]
47. Olanrewaju, O.; Osabohien, R.; Fasakin, J. The Anchor Borrowers Programme and youth rice farmers in Northern Nigeria. *Agric. Financ. Rev.* **2020**, *81*, 222–236. [[CrossRef](#)]
48. Bello, L.O.; Baiyegunhi, L.J.S.; Danso-Abbeam, G. Productivity impact of improved rice varieties' adoption: Case of smallholder rice farmers in Nigeria. *Econ. Innov. New Technol.* **2020**, 1–17. [[CrossRef](#)]
49. Nnadi, F.; Akwiwu, C. Determinants of Youths' Participation in Rural Agriculture in Imo State, Nigeria. *J. Appl. Sci.* **2008**, *8*, 328–333. [[CrossRef](#)]
50. Agwu, N.M.; Nwankwo, E.E.; Anyanwu, C.I. Determinants of agricultural labour participation among youths in Abia State, Nigeria. *Int. J. Food Agric. Econ.* **2014**, *2*, 157–164.
51. Kimaro, J.P.; Towo, N.N. Determinants of rural youth's participation in agricultural activities: The case of Kahe East ward in Moshi rural district, Tanzania. *Int. J. Econ. Commer. Manag.* **2015**, *3*, 33.
52. Douglas, K.; Singh, A.; Zvenyika, K. Perceptions of Swaziland's youth towards farming: A case of manzini region. *For. Res. Eng. Int. J.* **2017**, *1*, 1–8.
53. Ojo, T.; Baiyegunhi, L. Determinants of climate change adaptation strategies and its impact on the net farm income of rice farmers in south-west Nigeria. *Land Use Policy* **2020**, *95*, 103946. [[CrossRef](#)]