**Binary logit analysis of social economic variables and youths’ participation in agriculture**

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**Abstract**

On a large scale albeit due to conflicts, climate change, acts of terrorism in Sub-Sahara Africa and some other peculiar factors the oddities of food shortage and hunger keep rising in recent years; making it an issue of global concern. To ameliorate the situation, successive governments in Nigeria have invested tremendously in agriculture but to no avail. Making the situation worse is the fact that young people that would have embraced technology in farming are seemingly not seeing desired results; hence they abstain and prefer to seek new ways of sustenance. The general opinion is that youths of this prefer white collar jobs to farming. It is in view of the above reasons that this study chose to investigate factors that could motivate Nigerian youths into agriculture. Hence, we decided to use frequencies, percentage counts, and binary logit to analyse data. Findings are that youths’ involvement in agriculture is over 90%. Age, marital status, and level of education all play some role in who participate in agriculture. The results show that publicity of government pro-youths’ agro allied programmes and the availability of fertile land would more than all the other tested factors influence youths’ involvement in agriculture. Hence, government is better informed to properly channel public fund.

**Keywords**: food, hunger, logistic, variables, probit

**JEL Classifications**: Q01, Q10, Q18, O55, E2, E23, E26

**Contribution/Originality**

This study investigated the social-economic factors that could inspire Nigeria youths in Kogi State to involve in agriculture. The study established that provision of fertile land and rich publicity of government backed agricultural policies would enhance youth participation in food production. The research shows that provision of fertile lands would mostly motivate the youths to farming. Descriptive analysis of data shows that despite the not so good quality of the available land in Kogi, more than 90% of youths in Kogi involve in one or two types of agri-business. This study, apart from being the first of its kind on Kogi youths, it is the most current on the topic in Nigeria. It will be a good informative base for policy makers in the state.

**Introduction**

Food and its provision constitute one of the most essential necessities of human existence. Therefore, as human population increases globally, there ought to be commensurate increase in global production of food (West et al., 2014). To realise this, it is expected of youths in every country to maximally take part in the organic provision of foods such that would engender healthy consumption, food security and growth. Haven been used to healthy consumption and growth; undoubtedly the issue of food security is gradually gaining wider recognition and concern globally (Adebayo et al., 2016). In consonant with this view, Allee et al. (2021) assets that food security is presently prioritised in the United Nations’ sustainable development agenda. In agreement, West et al. (2014) emphasise that achieving justifiable universal food security has already become a challenge. It is generally believed that global hunger has begun to rise in recent years, returning to levels from a decade ago (Molotoks et al., 2021); hence, the need to proffer lasting solutions to the observed relatively decreasing global food supply. In contributing to finding a way out, Forum and Security (2018) suggest youths’ massive involvement in agriculture.

In literature, there have been postulations and theories that are in support of youths’ involvement in agriculture. For instance, some prior research on youth engagement were grounded in attachment theory and youth development theory. Explaining this from the outset, youth development theory base on building resilient communities where youths are motivated by adult support, while attachment theory attempts to explain the function and need of long-term meaningful relationships, which ensure proper social and emotional development of youngsters in their communities. Indeed, youths have fabulous potentials to engender economic growth and development.

In Nigeria, government already established numerous projects over the years to improve food production via youth involvement (Ogunmodede et al., 2020), but the impact has been negligible. Amaechi (2019) opines that the problem of food shortage in Nigeria ensued from a moment of neglect due to crude oil discovery. Presently, the economy is faced with food shortage and youth unemployment (Fasoyiro and Taiwo 2012). Afande et al. (2015) is of the belief that 70 percent of the population in Kenya is under age of thirty, but their participation in agriculture keeps decreasing. Thus, youths’ lack of enthusiasm for agriculture should be of genuine concern (Aphunu and Atoma 2011). As declared by Tiraieyari and Krauss (2018) sufficient data show that drawing the youth to agriculture has become a task for a lot of countries.

Nevertheless, contrary to the opinion of Afande et al. (2015) and Tiraieyari and Krauss (2018) on youths’ abstinence from agriculture, Mohammed and Isah (2017) claim that almost 70 percent of the Nigerian youths is employed in agriculture. Further, Alabi et al. (2019) examined the involvement of youth in agriculture in Ogun state, Nigeria and report that a lot of youthss involve in various agricultural sectors in the area. To the best of our knowledge, no study has been done on the socio-economic factors that motivate Kogi State youths into agriculture; hence this study. Kogi youths, given the abundance of mineral deposits that being tapped, are exposed to multiple means of livelihood among which is farming. They are educated and enlightened, in addition to the fact that the state is central to almost all the far regions of Nigeria. Meanwhile, Nor et al. (2015) highlight lack of in-depth research to address the roles youths could play in the development of agriculture. Findings are that very few empirical studies have been published on socio-economic factors that could influence these young people to participate in modern agriculture ventures.

Concluding, Aphunu and Atoma 2011) is of the view that next generation of progressive citizens will largely be made up of youths that continue to wax strong in agriculture. Hence, more attention should be focused on developing high quality preservation and packaging mechanisms to boost production of food across Africa. What should be further considered is creatively designed cogent financial structure in aid of agriculture as viable investible business. This would nullify Ojo (1989) cited by Falaye et al (2016) report of existing financial structure in Nigeria that does not engender growth. Moreover, two research questions raised to propel the study are that if Kogi State’s youths could be inspired into partaking in farming; and which social-economic factor(s) mostly stimulate the youths into agriculture. Hence, the study’s hypotheses are that half of Kogi State youths cannot be motivated to partake in agriculture; and that no motivational socio-economic factor can stimulate half of the youths into agriculture. In this regard, the primary goal of this study is to find if half of the study participants could engage in agriculture or related ventures, and to examine socio-economic factors that motivate Kogi youths into agriculture in order of influence.

**Methods**

Study is exploratory: it set out to partake in solving socio-economic problems of food insecurity. It equally qualifies as an action research. The issue of food security is focal and so prioritized as one of the United Nations’ Sustainable Development Goals. Meanwhile, research questionnaire was used to collect categorical data for study, and we utilized SPSS to run binary logit regression in finding if some government backed socio-economic factors do motivate the youth into agriculture or related businesses. Using stratified and convenience sampling methods, we collected data via cross-sectional survey of three randomly selected agrarian local government areas in Kogi State. These are Ijumu, Yagba West and Kabba-Bunnu local government areas. In each of the selected areas, we obtained data from five towns/villages with the use of an average of 20 copies of the questionnaire in each of the communities surveyed. In Kabba-Bunu, the communities that were surveyed include Kabba, Okebukun, Olle-Bunu, Okedayo and Iluke. In Yagba West local area, the communities surveyed include Egbe, Odo-Ere, Ejiba, Odo-Eri and Igbaruku. Iyara, Iyamoye, Ayetoro-Gbede and Odokoro-Gbede were surveyed in Ijumu local government area.

The collected data were from among the youth population that reside and earn their daily livelihood in the various local government council areas under study. Copies of the questionnaire were distributed for data collection at palace-squares, social gatherings, town-hall meetings, motor parks, private and public establishments, and on the streets. The targeted respondents ranged between young school leavers aged 15 and above to 55 years old able bodied men and women.

We engaged Cochran’s formula as cited in Hemanta et al. (2012) for calculating sample size when the population is infinite:

*n0 =* $\frac{z^{2}pq}{e^{2}}$

Where:

n0 = the sample size

z = the selected critical value of desired confidence level

p = estimated proportion of an attribute present in the population

q = 1 – p

e = desired level of precision

Hence, with 95% confidence level and 0.1 level of precision (e), we estimated 96 samples per local government surveyed and attempted to obtain data from 100 participants in each of the local government areas covered by study. We utilized 300 copies of the questionnaire structured in conformity with the guiding moral dictates of Landmark University Research Ethics Committee. One-hundred copies of the questionnaire were utilized in each of the municipal council areas. For effectiveness, research assistants collected data in the areas selected via stratified sampling. The questionnaire was structured into six sections to obtain information relative to study participants’ demographic data, employability factors, awareness of agriculture as a viable employer, problems that youths encounter in agriculture, youth migration, and inspiring youths' involvement in agriculture. To collect the necessary data, 32 simple questions were created. The phone number of each respondent was sought on the questionnaire to guarantee that the research assistants did honest job devoid of unethical obtainment of data from respondents without the obtainment of express verbal consent to participate in the survey. Investible monies into agriculture, agricultural policies, facilities in place to increase farm yields, and agriculture-oriented enlightenment initiatives are among the variables of the study as discussed in Falaye et al. (2022).

Priori expectation

The factors that the government of Kogi already engaged to motivate the youths into agriculture include loanable funds made available by government, publicity of government policies directed towards improving farming, availability of fertile land that could be permanently used for farming, amenities made available to boost, harvest, and store farm yields, and education relating to improving agriculture. We perceived these factors do not really inspire the youths into agriculture, and were conceptualised as stated below.

Conceptual logistic regression model:

**Yi = *B0  + Bi* (*f + p + l + a + t) + e***

Where:

Yi = Dependent binary variable (interested =1; not interested = 0)

*f* = Funds availability that could be invested into agriculture

*p* = Publicity of policies directed towards improving farming

*l* = Fertile land that could be permanently used for farming

*a* = Amenities made available to boost, harvest, and store farm yield

*t* = Trainings relating to improving agriculture

*B0* = Constant

*Bi* = Regression coefficient

*e* = Stochastic error term

Dependent binary variable = involvement in agriculture (interested = 1; not interested =0)

Independent variables = publicity (awareness); education (training); land (fertile-land); funds (loan-facility); amenities (power-supply, improved-seedlings, fertilizer/agrochemicals, machinery)

**Results and discussion**

**Statistics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | Gender | Age bracket | Marital status | Nature of job | Religion | Education attained | Nature of employment | Interested in Agriculture |
| Valid | 265 | 265 | 265 | 264 | 263 | 261 | 186 | 265 |
| Missing | 0 | 0 | 0 | 1 | 2 | 4 | 79 | 0 |

**Table 1: Frequency distribution of types of agriculture engaged in**

|  |  |  |  |
| --- | --- | --- | --- |
|   |  | Frequency | Percent |
| Crop farming |  | 63 | 23.8 |
| Livestock farming/animal rearing |  | 31 | 11.7 |
| Poultry farming |  | 20 | 7.5 |
| Fish farming |  | 6 | 2.3 |
| Food Processing |  | 8 | 3 |
| Food Packaging |  | 5 | 1.9 |
| Others |  | 87 | 32.8 |
| Total |  | 220 | 83 |
| Missing |  | 45 | 17 |
| Total |  | 265 | 100 |

Table 2 below shows the frequency distribution of predictor variables that motivate the youths to agriculture. These factors include the study variables like funds that could be invested into agriculture; publicity of government policies directed towards improving farming; fertile land that could be permanently used for farming cash crops; amenities made available to boost, harvest, and store farm yields; and periodic trainings relating to improving agriculture.

**Table 2:** Frequency distribution of independent variables

|  |  |  |
| --- | --- | --- |
|  | Frequency | Percent |
| Awareness | 51 | 19.2 |
| Training | 49 | 18.5 |
| Fertile Land | 64 | 24.2 |
| Loan facility | 54 | 20.4 |
| Power Supply | 8 | 3 |
| Improved seedlings | 4 | 1.5 |
| Fertilizer/agrochemicals | 8 | 3 |
| Machinery | 24 | 9.1 |
| Others | 1 | 0.4 |
| Missing | 2 | 0.8 |
| Total | 265 | 100 |

Among the expected agriculture motivating variables, fertile land ranks highest, having 64 (24.3%) respondents in its favour. Thus, availability of fertile land is considered as the most motivating factor among the sampled motivating variables in agriculture. Next to it are funds that could be invested into agriculture on a large scale, such that could engage the youths in mechanised farming. This variable garnered a total of 54 (20.5%) respondents out of 263. One other identified youth motivating factor is publicity of agriculture programmes that could motivate the youths, which government could put on air as radio jingles or mild television advertisements periodically. This has a total of 51 (18.6%) respondents. Then, we have agro-allied trainings and requisite machinery that could measure the youths up to modern agricultural techniques. These pulled the totals of 49 (18.6%) and 24 (9.1%) respondents respectively. The other motivating variables include regular power supply to enable optimum functioning of electrical agricultural equipment; and farm inputs like fertilizers and improved seedlings. Responses in favour of these three variables are 8 (3.0%), 8 (3.0%), and 4 (1.5%) respectively. The last of the variables under consideration in the study is the support extended to the engaging youths by members of their immediate families or the community where they practice agriculture. This is pulled just 1 (0.4%) of the entire respondents.

|  |  |
| --- | --- |
| Omnibus Tests of Model Coefficients |  |
|   |   | Chi-square | df | Sig. |
| Step 1 | Step | 3.377 | 8 | 0.908 |
|   | Block | 3.377 | 8 | 0.908 |
|   | Model | 3.377 | 8 | 0.908 |

The overall model is not statistically significant, X2 (8) = 3.38, p > .05

Model Summary

|  |  |  |  |
| --- | --- | --- | --- |
| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
| 1 | 9.763a | 0.013 | 0.262 |
| a. Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found. |

We calculate pseudo R2 values using Cox & Snell R Square and Nagelkerke R Square values, which explains variation. The explained variation in the dependent variable based on our model ranges from 01.3% to 26.20%.

Table 3: Model Summary

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **MOTIVATORS** | **Step** | **-2 Log likelihood** | **Cox & Snell R Square** | **Nagelkerke R Square** |
| Awareness | 1 | 63.449a | 0 | 0 |
| Training | 1 | 66.925b | 0 | 0 |
| Fertile Land | 1 | 78.546c | 0 | 0 |
| Loan facility | 1 | 71.938d | 0 | 0 |
| Power supply | 1 | 8.376e | 0 | 0 |
| Improved seedlings | 1 | 5.545f | 0 | 0 |
| Fertilizer/agrochemicals | 1 | 5.742g | 0 | 0 |
| Machinery | 1 | 33.271h | 0 | 0 |

Table 4: Variables in the Equation



Owing to the fact that the sample size (265) is large enough, we did not subject the predictor variables to Box-Tidwell collinearity test to find if the interaction term of the continuous independent variables is statistically significant. Rather, we used the Wald test to determine statistical significance for each of the independent variables. The statistical significance test shows that only awareness (p = .009) and fertile land (p = .017) added significantly to the model/prediction, but training (p = .319), loan facility (p= .219), power supply (p= .273), improved seedlings (p= 1.0), agro-chemicals (p= .097), and machinery (1.0) did not add significantly to the model. This as seen in the table shows that should all the other variables remain constant, awareness of agro related government policies would likely impact on youth participation 2.187 times more positively. In the same vein, provision of fertile land would likely impact on youth participation 1.905 times more positively.

**Discussion of results**

Binary regression analysis shows that from among the independent variables regressed, variations in both ‘awareness’ and ‘fertile-land’ could significantly motivate the youths in Kogi State to agriculture. Moreover, the obtained results show that training, loan facilities, electric power supply, improved seedlings, agro-chemicals, and machinery may not add significantly to operationalization of the model. Despite the not so good quality of the available land in Kogi, unexpectedly more than 90% of youths in Kogi involve in one or two types of agriculture or agro-allied business.

Meanwhile, the obtained results seem synonymous with that obtained by Aphunu and Atoma (2011) and Nor et al. (2015). Aphunu (2011) investigated rural youths’ involvement in agricultural production activities in central agricultural zone of Delta State, Nigeria. The study analysed data using percentages, means and correlation coefficient. Findings show that more than half of the youths (52.3%) are mainly farmers, involved mostly in arable crop production. On its part, Nor et al. (2015) examined the factors that pre-dispose Malaysian youths toward agricultural entrepreneurship. Study used empirical tests such as factor analysis and logistic regression model on data gathered. Results prove that majority of the respondents have a positive inclination towards agro-entrepreneurship; and that awareness as a variable has an imminent statistically significant relationship on youth penchant towards agricultural entrepreneurship. Ahiwe et al. (2021) too was able to identify the need for more youths’ involvement in poultry keeping aspect of agriculture. The study observed that there is an increasing demand for animal protein in Nigeria. To meet up with the increase in demand for food, more youths’ involvement in Agriculture is needed.

**Conclusion**

The binary regression results truly reflect the generic characteristics of the study population in that Kogi State situates in not so arable land; quite a reasonable distant from the real southern states of Nigeria that domicile in the savannah, even though the population is agrarian. Study concludes that a good advertisement of any agriculture enhancement policy would most probably motivate the youth populace into agriculture. Hence, we conclude that government should engage the services of soil scientists to research more into engendering the fertility of available lands in Kogi State, such that would yield bountiful harvests and thereby contributorily motivate the youths into farming. Besides, we suggest more investments in livestock breeding and poultry keeping.

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**Appendix**

**Chart i:** Gender distribution of participants

**Chart ii**: Age distribution of participants

Chart iii: Marital distribution of participants

Chart iv: Religious affiliation distribution of participants

Chart v: Education attained distribution of participants

Chart vi: Occupation distribution of participants

|  |
| --- |
| **Test of Normality** |
|  | Kolmogorov-Smirnova | Shapiro-Wilk |
| Statistic | df | Sig. | Statistic | df | Sig. |
| PROFITS | .451 | 58 | .000 | .396 | 58 | .000 |
| a. Lilliefors Significance Correction |

Kolmogorov-Smirnov test and Shapiro-Wilk test both produce 0.000 result. The tests’ results of p-value < 0.05 proves that data used are not normally distributed; hence we transformed data.

**Appendix 2**

**Demographic data on Kogi youths**

**Statistics**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | Gender | Age bracket | Marital status | Nature of job | Religion | Education attained | Nature of employment | Interested in Agriculture |
| Valid | 265 | 265 | 265 | 264 | 263 | 261 | 186 | 265 |
| Missing | 0 | 0 | 0 | 1 | 2 | 4 | 79 | 0 |

**Gender**

|  |  |  |
| --- | --- | --- |
|  | **Frequency** | **Percent** |
| **MALE** | **137** | **51.7** |
| **FEMALE** | **128** | **48.3** |
| **Total** | **265** | **100** |

**Age bracket**

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| 15 – 25 | 196 | 74 |
| 26 – 35 | 65 | 24.5 |
| 36 – 55 | 4 | 1.5 |
| Total | 265 | 100 |

**Marital status**

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| Married | 226 | 85.3 |
| Single | 36 | 13.6 |
| Divorcee | 2 | 0.8 |
| 5 | 1 | 0.4 |
| Total | 265 | 100 |

**Religion**

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| Christianity | 4 | 1.5 |
| Islam | 25 | 9.4 |
| Traditional Worshiper | 231 | 87.2 |
| No Religion | 3 | 1.1 |
| Missing | 2 | 0.8 |
| Total | 265 | 100 |

**Education attained**

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| Postgraduate | 1 | 0.4 |
| Graduate | 92 | 34.7 |
| Undergraduate | 74 | 27.9 |
| NCE/OND/Diploma | 35 | 13.2 |
| School Cert/SSCE | 41 | 15.5 |
| Primary School | 17 | 6.4 |
| No School | 1 | 0.4 |
| Missing | 4 | 1.5 |
| Total | 265 | 100 |

Interest in agriculture

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| NO | 1 | 0.4 |
| YES | 264 | 99.6 |
| Total | 265 | 100 |

**Nature of employment**

|  |  |  |
| --- | --- | --- |
|   | Frequency | Percent |
| Government job | 10 | 3.8 |
| Organised private sector job | 18 | 6.8 |
| Self employed | 74 | 27.9 |
| Government job plus personal business | 39 | 14.7 |
| Organised private job plus personal business | 31 | 11.7 |
| Others | 14 | 5.3 |
| Missing | 79 | 29.8 |
| Total | 265 | 100 |

Organic provision of food undoubtedly requires more commitment of capable hands, and these capable hands majorly domicile among the youths across nations. Constructive youths’ involvement in agriculture is a reasonable way out of global food shortage (Forum and Security, 2018).

The youths are known to be very strong and agile enough when ably led by elders to champion any due course that could salvage growth and national development. Any strong army o youths that is well led and ably fortified should be strong enough to successfully combat to submission whatever vagaries of hunger in nations and communities provided the socio-economic variables are most favourable to farming. Even if not completely favourable, such unfavourable variables should be identified and tackled to submission.

Hence, identifying socio-economic variables that impact on youths involvement in agriculture has proofed to be the main domain of scholars and researchers globally. [[cite authors that wrote on this globally]]. [[cite authors that wrote on socio-economic variables]]. [[note the various variables of interest to the authors and the methodologies used]]

Peculiarities of Kogi State

Kogi is in the middle-belt region of Nigeria. It is rich in mineral resources like iron and lime-stone, and thrives on farming too, just like any other state in the Savanah belt. Moreover, not much is known about the socio-economic factors of influence on the youths relative to agriculture. This study seeks to investigate and publish the socio-economic variables of influence on Kogi youths relative to farming. The three local government areas covered by the study are the main agriculture hub in Kogi State where arming and related activities are carried out. In literature, the use of binary logit regression is not common among methods used by previous researchers on the same topic.

Criteria for selection of respondents

In the words of Aduroja (2021) the average age of farmers, in Africa and in the US, is said to be around 60; and this is in consonant with 2008 world bank’s report (Thomas and Fadipe, 2008) that Nigerian farmers’ average age is between 46 and 60. The 2008 world bank report is of the view that farmers’ average age is 60 in Africa, 57 in the US, and 52 in Brazil.

The variables in detail

The variables of study include dependent and independent variables. The involvement or interest of the youths connotes the dependent variable, while influence variable is made of the socio-economic characteristics of influence that impact on the youths’ interest in agriculture or any in its value-chain. These independent variables include …

Thus, apart from the fact that the independent variables are discreet, which gives room for the use of binary logit regression analysis, the study participants could involve in agriculture and may not.

Limitations of study

Time constraint due to schedule of academic rigors prevented us as individual researchers to obtain data personally and directly from the participants. We engaged graduates as research assistants to obtain data.

Paucity of funds curtailed the population of participants, communities, and local government areas included in the survey.