

*Original Research Article***Determinants of lack of credit access among indigenous vegetable producers in Nigeria: Implications for policy interventions**

Victoria Adeyemi **Tanimonure**, Olabisi Damilola **Omodara**, Oreoluwa Grace **Fayemi**, Joy Amaka **Osifo**

Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Nigeria

Correspondence to:

O.D. Omodara (MPhil.), Department of Agricultural Economics, Obafemi Awolowo University, Ile-Ife, Nigeria
e-mail: omodarao@oauife.edu.ng

Abstract

In this study we assessed the determinants of lack of credit access among the Indigenous Vegetables (IVs) farmers based on primary data collected in a cross-sectional survey. Using descriptive statistics and logistic regression analysis, the results revealed that more females were involved in the indigenous vegetable production with average age of 40 years, seven household members, eight years of formal education and cultivating 0.76 acre of land. Only 8% had access to credit and 76% did not have contact with extension agents. The mean monthly income from indigenous vegetables production, off-farm income and savings were about ₦35,000 (US\$96.83), ₦15,000 (US\$42.12) and ₦13,000 (US\$38.57), respectively. Further, lack of credit access significantly depended on gender ($\beta = 0.15$, $P < 0.05$), educational level ($\beta = 0.11$; $P < 0.05$), farming experience ($\beta = 0.73$; $P < 0.05$), off-farm income ($\beta = 0.23$, $P < 0.05$), saving habits ($\beta = 0.25$; $P < 0.01$) and annual numbers of extension contact ($\beta = 0.94$, $P < 0.01$) of indigenous vegetable farmers. Therefore, improved access to formal education, extension supports, creation of gender-specific credit scheme and farm-based organisation (FBO) for indigenous vegetables farmers to sustain credit accessibility were advocated.

Key words: credit policy; binary logit model; access to loan; farm-based organisation; socio-economics; off-farm income; gender

INTRODUCTION

Vegetables whose consumptions are historically traditional and customary to certain people or communities are referred to as indigenous vegetables (IVs) (Isitor et al., 2016). Some IVs are region-specific. According to Ayanwale et al. (2011), Ayanwale and Amusan (2014), and Amujoyegbe et al. (2015), teteabalaye (*Amaranthus viridis*), tete green (*Amaranthus caudatus*), worowo (*Solanecio biafrae*), ogunmo (*Solanum aethiopicum*), igbagba (*Solanum macrocarpon*), odu (*Solanum nigrum*), water leaf (*Talinum triangulare*) and bitter leaf (*Vernonia amygdalina*) occupied a significant position in the food basket of the southwestern Nigerian.

These vegetables contribute significantly to the income generating capacity and livelihood sustenance of rural farmers, especially the women folk. Like some exotic types, IVs contain some special nutritional and medicinal benefits. As good sources of dietary fibre, vitamins and essential minerals, they are very effective in preventing and treating certain non-communicable diseases (Amujoyegbe et al., 2015; Finelib, 2018). Despite their importance,

IVs production in Nigeria is threatened by both environmental challenges and human efforts (WHO, 2014; Amujoyegbe et al., 2015).

In the tropics, many wetland sites and important habitats of indigenous crop species continue to be degraded and lost due mainly to encroachment for conversion into rice fields, fish ponds, and extended settlements (Siwakoti and Tiwari, 2007; Amujoyegbe et al., 2015). The introduction of improved agricultural techniques also contributed to disappearance of indigenous vegetables in some areas in which many indigenous crop species are treated as weeds (Siwakoti and Tiwari, 2007). In 2015, the *in-situ* conservation and domestication of several important indigenous species commenced in indigenous communities of Osun State (Amujoyegbe et al., 2015). This was with a view to enhancing the cultivation and sustaining the conservation of indigenous plant species by ethnic communities for the future generations.

Also, poor investment capacity and dysfunctional markets for financing are serious challenges facing IVs production (WHO, 2004). Credit as a crucial

input provides needed resources, which farmers cannot source from their own available capital (Ololade and Olagunju, 2013). The role of credit can also be appraised from the perspective of the quality of problems emanating from the lack of it. Problems such as lack of access to investible funds and lenders' insensitivity to gender needs can alter potential profitability and productivity growths in IVs production systems (Muhanji et al., 2011). Whereas in a modern vegetable farm, guaranteeing agricultural credit may not be sufficient but effective access and efficient use of such credit is as well important for output boost (Muhanji et al., 2011).

Several interventions aimed at facilitating farmers' access to credit have failed to deliver. Among these are the special palliative schemes to resolve some of the credit related problems facing Nigerian farmers. These include Agricultural Credit Guarantee Scheme Fund (ACGSF); Agricultural Credit Support Scheme (ACSS); Commercial Agricultural Credit Scheme (CACSS) and Fadama Development Project (Olagunju and Ajiboye, 2010; Ayegba and Ikani, 2013). The realisation of this insufficient progress prompted the government to make provision for farm-based organisations (FBOs) that can facilitate group access to credit in the current national credit policy (Dzadze et al., 2012; FMARD, 2016). Despite the advances made in broadening farmers' access, most notably, smallholder vegetable farmers still do not have sufficient access to affordable credit (Olagunju and Ajiboye, 2010). Inadequate rural banks supply or their unwillingness to meet credit need of rural farmers largely account for the wide influence of informal lending institutions on agricultural production (Olagunju and Ajiboye, 2010). Till date, no effective credit policy support and there is paucity of credit institutions that can guarantee financial assistance for vegetable producers (Olagunju and Ajiboye, 2010). Bottlenecks encountered during credit acquisition process further weaken farmers' credit interest (Ibrahim and Aliero, 2012; Ezech and Anyiro, 2013).

There is evidence that IV farmers differ in individual characteristics, farm size, off-farm activities, access to and use of external inputs such as credit (Sebopetji and Belete, 2009; Dzadze et al., 2012; Amujoyegbe et al., 2015). From the farmers' perspective, credit is scarce, expensive and heavily skewed towards the larger, corporate firms while banks' loan processing often takes too long time (Ibrahim and Aliero, 2012; Mills and McCarthy, 2014), thereby, smallholder farmers lack access to investible funds (Muhanji et al., 2011; Ayegba and Ikani, 2013).

Keeping up with the focus, the hypothesis of the study is that farmers' socio-economic characteristics do not significantly influence probability that IV farmers will not be able to access credit. From the hypothesis, the aims are to examine

the determinants of lack of credit access and identify constraints IV farmers face in accessing credit. The outcome of this study will, no doubt, point out the areas in which farmers, government and non-government programmes need to focus in order to increase IV farmers' access to credit.

MATERIALS AND METHODS

The study was conducted in Osun State. A multi-stage sampling technique was employed in this study. At the first stage, five Local Government Areas (LGAs) were selected randomly from the 30 LGAs of the State, which were, Ife central, Ayedade, Ife north, Ede north and Ede south LGAs. At the second stage, two communities were picked at random from each of the five selected LGAs. At the third stage, 10 farmers cultivating IVs were chosen from each of the ten communities purposively, making a total sample of 100 vegetable farmers. The primary data employed in this research were obtained with the aid of a well-structured questionnaire on the socio-economic characteristics of the vegetable farmers, type of credits, farmers' credit records and the constraints vegetable farmers face in acquiring credit from financial institutions. We initially carried out a pilot survey of ten respondents in Ile-Ife community to validate the reliability of the questionnaire. The information obtained with the instrument were subjected to internal reliability test (Cronbach's alpha), the result was satisfactory. This instrument was then used to survey the entire respondents. The information elicited was subjected to descriptive statistics and logistic regression using Stata package, version 15.0.

The Logistic Regression Model (LRM)

LRM is a binary choice model that estimates the log odds of an outcome as a linear combination of the predictor variables. The binary options in the dependent variable are mutually exclusive and can assume either a value of 0 or 1 at a point in time (NCSS, 2018). Suppose two outcomes of a binary variable are assigned numerical values of 0 and 1, in which 0, a negative option indicates "no access" and 1, a positive option stands for "access", the mean of this variable will then be the proportion of positive responses (NCSS, 2018). If p is the proportion of observations with an outcome of 1, $1-p$ is then the probability of an outcome of 0. Notably in LRM, change in probability of the outcome variable is not a linear function of the change in value of independent variable (X_i). In other words, the probability of a success ($Y_i = 1$) given the predictor variable (X_i) is a non-linear function, specifically in a logistic function. Probability method is therefore, not a reliable means to predict outcome response for a logistic regression. Logistic regression equation can then be written in terms of an odds ratio for success $p/(1-p)$ and logarithm of

the odds of occurrence or log odds where the Log-odds is a linear function of the predictor variables (Long, 1997; NCSS, 2018). By linearizing the predictors, regression coefficients return to conventional interpretation method. And the expected value of the logit (log-odds) when $X_i = 0$ or logit difference/marginal effects are estimated. Mathematically, the logit model is a non-linear model that is estimated using the Maximum Likelihood and is expressed as follows:

$$P_i = F(Z_i) = F\left(\beta_0 + \sum_{i=1}^n \beta_i X_i\right) = \frac{e^{Z_i}}{1 + e^{Z_i}} \quad \text{Eq (1)}$$

Where:

- P_i in this studyprobability that an individual lacks credit access given X_i
- X_i ith explanatory variables
- e base of natural logarithms which is approximately equal to 2.718
- β_i parameters to be estimated.

Natural logarithms of the equation give transformed odds ratio:

$$Z_i = \text{logit}(p) = \ln\left(\frac{P_i}{1 - P_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + e_i \quad \text{Eq (2)}$$

Where:

- Z_iindicator of indigenous vegetable farmers' access to credit financial services or not
- Pprobability of the event's occurrence
- X_i vector of explanatory variables
- β_0 constant
- β_i corresponding vectors of regression
- e_i is disturbance term

$$Z(\text{prob of 1 or 0}) = \beta_0 + \beta_1 (\text{GENDER}) + \beta_2 (\text{AGE}) + \beta_3 (\text{EDU}) + \beta_4 (\text{HHSZ}) + \beta_5 (\text{WKMEMHLD}) + \beta_6 (\text{FARMEXP}) + \beta_7 (\text{COOPMEM}) + \beta_8 (\text{SAVINGS}) + \beta_9 (\text{FARMINC}) + \beta_{10} (\text{OFFFARMINC}) + \beta_{11} (\text{FARMSZ}) + \beta_{12} (\text{EXTCONT}) + \beta_{13} (\text{LOANINT}) + e_i \quad \text{Eq (3)}$$

Where:

- GENDERsex of respondent (Male or Female)
- AGEAge of respondent (years)
- EDU Years of Formal Education (Years)
- HHSZhousehold size
- WKMEMHLD...Number of household members working
- FARMEXP.....Farming Experience (Years)
- SAVINGS.....savings Habits (amount saved in Naira)
- COOPMEMcooperative membership (belong = 1 or Not belong = 0)
- FARMINC.....Farm Income (Naira)
- OFFFARMINC....off-farm income (Naira)
- FARMSZ.....Farm Size (Hectares)
- EXTCONTannual numbers of extension contacts
- LOANINTinterest rate on loan received (percentage).

The *a priori expectation* for coefficients of EDU, FARMEXP, FARMSZ, EXTCONT were expected to be positively correlated to lack of credit access while that of OCCUPATION; SAVINGS, WKMEMHLD, FARMINC, OFFFARMINC, LOANINT were expected to be negatively correlated. However, coefficients of GENDER, AGE, HHSZ were expected to either be positive or negatively related to lack of credit access depending on productive age, female predominance in IVs production, and household responsibilities of the farmers.

RESULTS AND DISCUSSION

Socio-economic characteristics of IV producers

Table 1 presents the summary of socioeconomic characteristics of the IV farmers. The result showed that their mean age is 40 ± 16 years and the majority (46%) was between 21–40 years. This implies that most people involved in IV production were young and within their economic useful life. Both male (42%) and female (58%) genders were engaged in IVs production. However, IV production is dominated by the female gender. This establishes a rationale for special capturing of gender specificity in any intervention targeting at IV production. On the average, IVs producers had 7 ± 3 household members. About one-third (36%) had between 11–15 years of formal education. Only 8% of the sample respondents had access to credit and most (76%) of the IVs farmers lacked extension contact. More so, about 48% of the farmers cultivated between 0.01 and 0.5 acre of land, an average of 0.76 ± 0.8 acre of land and monthly income of $\text{₦}34,858 \pm \text{₦} 28,787$ (US\$96.83 \pm US\$79.96) per farmer. Approximately 39% of the farmers realised between $\text{₦}10,000$ – $\text{₦}30,000$ (US\$27.78–US\$83.33) per month from vegetable production. Also, an average of $\text{₦}15,165 \pm \text{₦}22,606$ (US\$42.12 \pm US\$62.74) was realised from off-farm activities monthly. With a range of $\text{₦}13,886 \pm \text{₦}15,000$ (US\$38.57) savings per month. In general, more than half (54%) saved below $\text{₦}10,000$ (US\$27.78) monthly.

Factors influencing poor access to credit among indigenous vegetable farmers

Table 2 presents the result of the estimated logit regression model on factors that influenced lack of access to credit among the farmers. The log likelihood (-15.57) indicated the overall significance of the model. Coefficients of marginal effects in the logit regression showed that lack of access is influenced by gender, education level, farming experience, amount of off-farm income; saving habits and number of extension contacts among the IV farmers.

In agreement with *a priori expectation*, the result also showed that respondents' gender was negative but statistically significant at $P < 0.05$. This is suggesting

Table 1. Socio-economic characteristics of IV farmers in Osun State

Variable	Frequency	Percentage
Age (years)		
<21	9	9.0
21–40	46	46.0
41–60	33	33.0
>60	12	12.0
Mean (± S.D.)	40.54	15.67
Gender		
Male	42	42.0
Female	58	58.0
Household size		
1–5	30	30.0
6–10	57	57.0
11–15	10.0	10.0
16–20	3.0	3.0
Mean (± S.D.)	7.37 (3.45)	
Year(s) of education		
0	19	19.0
1–5	22	22.0
6–10	15	15.0
11–15	36	36.0
16–20	8	8.0
Mean (± S.D.)	8.10 (6.07)	
Credit Access		
No	92	92.0
Yes	8	8.0
Number of extension contacts (per year)		
0	76	76.0
1	9	9.0
2	12	12.0
3	3	3.0
Mean (± S.D.)	0.42(0.82)	
Farm size (acre)		
0.01–0.50	48	48.0
0.51–1.00	24	24.0
1.01–1.50	12	12.0
1.51–2.00	14	14.0
>2.00	2	2.0
Mean (± S.D.)	0.76 (0.80)	
Vegetable farm income per month (₦)		
<10,000	15	15.0
10,000–30,000	39	39.0
30,001–50,000	15	15.0
50,001–70,000	29	29.0
>70,000	2	2.0
Mean (± S.D.)	34,858.00(28,787.00)	
Monthly off-farm income (₦)		
<10,000	57	57.00
10,000–30,000	28	28.00
30,001–50,000	9	9.00

Table 1. continued

Variable	Frequency	Percentage
50,001–70,000	4	4.0
>70,000	2	2.0
Mean (± S.D.)	15,165.00 (22,606.00)	
Annual personal savings (₦)		
<10,000	54	54.0
10,001–30,000	31	31.0
30,001–50,000	11	11.0
50,001–70,000	4	4.0
Mean (± S.D.)	13,886.00 (15,000.00)	

Source: Field survey, 2018.

Table 2. Estimates of logit regression model for factors influencing lack of access to credit among indigenous vegetable farmers

Variables	Odd ratio	St. error	P> z	Marginal effect
GENDER	-0.0675930	0.0620590	0.014	-0.1520515**
AGE	-1.0019050	0.0023954	0.970	-0.0000911
EDU	0.7995160	0.0051232	0.037	0.0107087**
HHSZ	-1.1628520	0.0100232	0.471	-0.007221
WKMEMHLD	0.8759663	0.0609453	0.917	0.006338
FARMEXP	0.2181909	0.0389068	0.049	0.0728618**
SAVINGS	-1.6896240	0.0102683	0.014	-0.025103**
COOPMEM	0.2725353	0.0784047	0.427	0.0622178
FARMINC	0.6793185	0.0402032	0.645	0.0185059
OFFARMINC	0.6355334	0.0082517	0.009	0.0216946*
FARMSZ	0.8941394	0.0500557	0.915	0.0053553
EXTCONT	-7.172604	0.0336358	0.005	-0.0942977*
LOANINT	0.3140315	0.0657630	0.399	0.0554348
CONSTANT	29.241580	248.85910	0.696	

Prob > χ^2 = 0.0273; Log likelihood = -15.572201; Pseudo R² = 0.4397; * implies P < 0.01, and ** implies P < 0.05 significant levels.

that 1.0% increase in the number of male farmers will lead to 15.2% decrease in the likelihood that IV farmers will lack access to credit. In other words, increasing female participation is a very likely factor for lacking access to credit in IV production. This implies that women folks are more deprived of access to credit in indigenous vegetable production than men. This calls for policy measures to ameliorate the impact of this lack of credit access on the farm output. The finding is consistent with Sebopetji and Belete (2009) that men access credit more often than women, however, it contradicts the findings by Ibrahim and Aliero (2012) who discovered that gender does not affect credit access. Contrary to the *a priori* expectation, years of education of the farmers was significant ($P < 0.05$) and positive. By implication, 1.0% increase in the years of education will lead to more than a proportionate increase (1.1%) in the probability that IV farmers will lack access to credit. This result differs from findings of Ibrahim and Aliero (2012). However, additional education may not remove the need for loan facilities completely among IV farmers, but rather, enhances

farmers' income generating capacities and thereby ease out credit bottleneck. Similarly, in agreement to the *a priori* expectation, coefficient of farming experience was significant ($P < 0.05$) and positive. Our findings show that 1.0% increase in years of experience in IV production will result into 7.3% corresponding increase in the probability that an IV farmer will lack access to loan. This implies that more experienced farmers are not likely going to access credit. This may probably be due to the long-term practice of IV production that had helped farmers discover other means to source for productive capital other than loan services. The findings agree with Dzadze et al. (2012).

In the same manner, coefficient of savings habit was significant and agreed with the *a priori* expectation, ($P < 0.05$) but negative. It shows that 1.0% increase in the amount of money saved by a farmer will yield a corresponding 2.5% decrease in the likelihood that such farmer will lack access to credit. In other words, a unit improvement in the farmers' saving habit could serve as incentive to accessing credit facilities. This means that farmers that save more income have

Table 3. The constraints to credit acquisition among IV farmers

S/N	Constraints	Percentage of cases*
1.	Reluctance of commercial banks to grant loans	54%
2.	Small output size	56%
3.	Non-membership of related associations (cooperatives)	30%

* means multiple response options.

higher tendencies to access loan for IV production. This could probably be that such farmers desire to take loan possibly to argument capital formation obtained through personal savings to diversify the production portfolio. It may also be because they have more incentive to expand the farm business if other businesses they engage in are more profitable. This result validated findings by Dzadze et al. (2012) that good saving record serves as a form of economic security and provides farm household with financial history on which financial institutions could base lending decisions.

Further, in line with the *a priori* expectation, off-farm income was positively and significantly correlated ($P < 0.01$) to lack of access to credit. According to Table 2, if earnings from off-farm sources increase by 1.0%, the likelihood that an average IV farmer will lack access to credit will also increase by 2.2%; meaning that probably IV farmers that have other sources of income outside vegetable production may not necessarily need to borrow cash to finance vegetable production. Going by this, it may then imply that some IV farmers diversify their income portfolio to support financial needs in the farm. This finding agrees with report by Sebopetji and Belete (2009).

Finally, the number of extension contacts had a negative significance ($P < 0.01$). The implication is that 1.0% increase in annual farmers' contacts with extension agents will result into 9.4% decrease in the likelihood that an IV farmer will lack access to credit services. Succinctly put, the more contacts farmers have with extension agents, the better their chances of having access to credit. This means that extension visit is an active tool to enhancing access to credit among IV farmers. This could also mean that extension activities among IV farmers so far had focused on the renewed conservation and domestication of IVs and underutilised IVs in Osun State (Amujoyegbe et al., 2015).

Constraints faced by the farmers in credit acquisition

Table 3 reports constraints faced by IV farmers in credit acquisition, the result showed that about 54% submitted that the commercial banks were unwilling to grant loans especially to farmers of their kind. This situation may be due to several reasons including poor education status and lack of collateral among the respondents (Ibrahim and Aliero, 2012). About

56% reported small farm and output sizes. It is worthy of note that many lending institutions have little or no faith in the profitability potential of IV farms due to small size of farm they cultivate, poor public acceptance and high perishability of IVs. In addition, 30% have problem of socio-inclusiveness. A high proportion of the farmers did not belong to any associations or cooperatives, which also limited their access to loan granting opportunities either on a group or an individual basis. This implies that IV farmers are yet to tap into national credit policy by forming or joining existing farmers' groups, which can improve access to productive resources. This study concurs with Dzadze et al. (2012) that there should be advocacy for more farmers group among IVs farmers.

CONCLUSION AND RECOMMENDATIONS

This study investigated determinants of lack of access to credit among IV farmers in Osun State and found that many IV farmers lacked access to credit and therefore were socially exclusive. It was further realised that portfolio diversification provides justification for self-financing of vegetable farms. Lack of credit access was then influenced by gender, education status, number of extension contact received in a year, amount saved per year, and amount of off-farm income realised per annum by the indigenous vegetable producers.

On the basis of these findings, it is therefore imperative that IV farmers are given incentives to diversify income sources and extension agents support farmers in their quest to discover accessible loan sources to finance their farms. In view of this, during an extension visit, experienced IV farmers should be re-oriented on credit needs and enlightened about how to access credit. Vegetable farmers should be encouraged to join cooperative societies or form active groups that can access fund from the credit support programmes provided by the State and Federal Governments. Also, since IV production is predominantly gender-specific, advocacy for gender consideration among farmers during loan acquisition process is therefore recommended. Arising from this, with the support of ministries of women affairs and agriculture, gender development centres, and other stakeholders, the Nigerian government should make effort to introduce policy measures that provide for gender-related special loan scheme and develop a profitable portfolio diversification strategies for small holding IV farmers.

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