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# Application of Probit Analysis in the Decision of Youths to Participate in Vegetable Production

**Nsikak-Abasi A. Etim[1], Dorothy Thompson[2], Edet J. Udoh[1]**

[1]*Department of Agricultural Economics and Extension, University of Uyo, Nigeria*
[2]*Department of Home Economics, University of Uyo, Nigeria*

**Corresponding Author: Nsikak-Abasi A. Etim*
*Email: etimbobo@gmail.com*

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*Abstract*

*Youths are successor farming generation and therefore the future of food security. At present, they constitute about 60% of Nigeria's population and have over the years contributed significantly to national development. Unfortunately, the present environment makes it difficult to explore their full potentials in production through participation in agriculture. The ageing smallholder farmers are less likely to increase capacity needed to sustainably expand agricultural production. There is therefore a pressing need to engage the youth in ways that they can see a promising future in agriculture as well as influence them to build capacity through effective involvement in agricultural production. Several factors however, have continued to hinder capacity building and effective participation of youths in vegetable farming. An empirical study was conducted to estimate the factors affecting the willingness of youth to participate in small scale waterleaf production. The representative waterleaf producers were selected using the multi stage sampling procedures.With the aid of questionnaire, primary data were obtained from 100 farmers. Univariate probit regression model was used to analyze the data. Results of analysis indicated that the most critical factors affecting the participation of youths in waterleaf production were age, educational qualification, size of household members, and farm income. Results indicated that youths who have acquired some form of education were more willing to be involved in waterleaf production. Findings further indicated that youth in families with higher income from farming activities were more willing to participate in waterleaf production.*

## Introduction

In Nigeria, majority of the poor reside in rural communities where agriculture is the predominant occupation of majority of participants. Etim, 2007; Etim,2011). But agriculture being the key to poverty reduction requires substantial amount of Labour. Etim and Udoh (2013); Etim (2014) and farm labour to a greater extent rely heavily on an active population or productive workforce who are mostly youths that are valuable resources of any country. According to Maina & Maina (2012) and Kwenye and Sichone (2016), substantial contribution by youth and sustenance of agricultural productivity are vital for the economic growth of any country. The fact that youths readily accept innovations and because the farming population is obsolete, there is need to engage youths meaningfully in agricultural production (Ahaibwe *et al*., 2013). Earlier empirical studies by Etim *et al*.,(2011), Etim and Udoh (2018) agree that farming population is deteriorating resulting in labour shortage for agricultural production thereby limiting the ability of rural farmers to enlarge their



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production. Adefalu *et al.,* (2009) and Kwenye and Sichone (2016) suggested that to ensure the sector is not at risk of further decay, agricultural production practices should not be left in the hands of older farmers currently engaged in agricultural production. Valerie (2009) also recommended that older farmers should be substituted by younger ones in order to perpetuate agricultural production.

Waterleaf is a vegetable crop which is a source of income to farmers (Udoh and Etim, 2006) is mostly produced and eaten by people from the Southern part of Nigeria particularly in Cross River and Akwa Ibom States (Etim and Edet, 2014). Earlier studies by Udoh (2005); Udoh and Etim (2006) suggest that women are the predominant producers of waterleaf within the southern region of Nigeria who employ large mandays of labour in various production practices. But to increase output and ensure the sustainability of water leaf production, the willingness of youth to engage in water leaf production deserves attention. Therefore, this study was conducted to empirically estimate the factors affecting the willingness of youths to participate in waterleaf production.

## Methods

The study was conducted in Uyo. The city became the capital of the state on September 23,1987 following the creation of Akwa Ibom State. from erstwhile Cross River State. It is bordered by Abak, Itu, Uruan, Ibesikpo-Asutan and Etinan Local Government Areas. Uyo people speak Ibibio and are from Ibibio stock. The population of Uyo is approximately 427,873 people (National Population Commission, 1991) with Ibibio language as its major indigenous language. It comprises 4 clans viz: Oku, Etoi, Offot and Ikono. There are 2 distinct seasons:- the short dry season and the long rainy season. Uyo is located in the tropical rainforest region. The area is characterized by heavy rains with annual precipitation ranging between 2000-3000mm per annum.

Multistage sampling technique was used to select the representative waterleaf farmers for the study. The first stage was the random selection of 2 out of the 4 clans in Uyo. The second stage involved the selection of 10 villages per clan to make up 20. Thirdly, 5 waterleaf farmers were randomly selected per village to make a total of 100 farmers. With the aid of oral interview and questionnaires, information were elicited from the farmers.

Using the univariate Probit regression model, critical factors most likely to affect the decision of youths to participate in farming activities were identified. This model has been empirically used in the literature (Falusi, 1975; Rahm and Huffman, 1984; Hailu 1990; Etim and Benson, 2016). Mathematically, the model is represented as

$$\phi(\beta xi) - \int_{-}^{\beta xi} \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-t^2}{2}\right) dt$$

Where - ∞ (βxi) is normally distributed and represents the probability that the ith individual will participate in a given activity, β is a vector of unknown coefficients; Xi is a vector of characteristics of the ith individual; t is a random variable distributed as a standard normal deviate, exp. is the exponential function. The probability of participating in agricultural activity is the area under the standard normal distribution curve lying between – ∞ and βxi. The larger the value of βxi, the more likely an individual is willing to participate in agricultural activity.

The univariate PROBIT model was employed to identify key factors likely to affect willingness of youths to participate in waterleaf production. Identification of key factors reported by youths to affect their decision to participate in waterleaf farming would be useful for policy formulation.



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The empirical model for decision to participate in waterleaf production is specified as Yi* = P ($Y_i$ = 1) = βxi + εi

Where $Y_i$ is the "willingness to participate (WTP) in waterleaf production; $Y_i$* is the estimated value of $Y_i$ ($Y_i$* =1) if $Y_i$> 0, and εi is the error term which follows a normal distribution (mean μ = 0, variance σ =1). P is the probability function, β is the vector of parameters to be estimated. $X_i$ is the matrix of explanatory variables that affects the ith youth's decision to participate in waterleaf production.

The dependent variable $Y_i$ or WTP takes a value of 1 for farmers who are willing to participate in waterleaf farming and 0 otherwise.

Table 1. Description of Variables used in the Analysis determinants of Participation in Waterleaf Production

| **Dependent WTP** | **Decision to participate in Waterleaf Production (1=Yes, 0 = No)** |
|---|---|
| Sex | Sex of the farmer (Dummy = 1 if male, 0 if female) |
| Age | Age of the farmer in years |
| Marital Status | Marital status of the farmer (Dummy = 1 if married, 0 if otherwise) |
| Education | Number of years of formal education |
| Household Size | Number of family members |
| Extension contact | Access to extension contact (Dummy = 1 if yes, 0 = no) |
| Farm Income | Amount of Income to household in naira |
| Membership Social Group | Membership of social organization ( Dummy = 1 if yes, 0 = no) |

## Results and Discussion

The summary statistics of some explanatory variables is presented in table 2. The mean age of farmers was 31 years whereas the maximum age was 54 years. Finding implies that waterleaf farmers are within their active and productive years. The average number of years of schooling was 15 and the minimum years spent in school was 12 years. Result indicate that respondents were literate and had acquired some level education. The average, minimum and maximum number of years in waterleaf farming were 13, 5 and 20 years respectively. The table further reveals that the highest mandays of labour used was 201.72. Finding is synonymous with earlier empirical study by Udoh and Etim(2006) who reported that the intensive production practices in water leaf production is responsible for the substantial labour requirement.

Table 2. Summary Characteristics of Some Explanatory Variables Used

| **Description** | **Min value** | **Max Value** | **Mean** |
|---|---|---|---|
| Age( years) | 20 | 54 | 31 |
| Education ( years) | 12 | 15 | 13 |
| Household size | 2 | 8 | 4 |
| Farming Experience(yrs) | 5 | 20 | 13 |
| Farm Income (Naira) | 10,000 | 15,000 | 8,000 |
| Labour ( mandays) | 28.17 | 201.72 | 120.48 |

### Determinants of Youths Decision to Participate in Waterleaf Production

Results of the Akaike information criterion (AIC) in an indication of that the distribution best fits the data in the model. The effect of age on the decision of youths to engage in agricultural production could either be positive or negative. The age variable in this study had a



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coefficient of 0.2231 and is positively significant at (p<0.01). This could be attributed to the fact that as the youths grow older, there is more consciousness on the importance of agricultural production with age based on experience. In this study, age is used as proxy for experience implying that youths with who have acquired accumulated years of observation and experimentation in various agricultural techniques will be more likely to engage in waterleaf production faster than youths with less farming experience . With a marginal effect of 0.0341, a unit increase in age of the youth will result in 3.41 percent rise in the probability of increasing capacity through participating in waterleaf production. This finding is in conformity with earlier empirical results of Nnadi and Akwiwu (2005) (2008).

Education variable has a coefficient of 0.2030 and is positively significant (p<0.01) implying that youths who have acquired some form of formal education are more likely to participate in waterleaf production and adopt new ideas faster than the uneducated ones. This finding is in conformity with earlier empirical results of (Madukwe, 1995; Bamire & Ayanwale, 1995; Etim et al., 2013; Etim and Benson, 2016; Etim & Udoh, 2018). Result of this study suggest that education is an asset for adoption decision and education also stimulates the timing and readiness to participate in farming activities and adoption of agricultural innovations (Weir and Knight, 2006; Odendo et al.,2010, Etim & Udoh,2018;Ohajianya and Onu, 2005; Matthews-Njoku, 2005). Studies by Nkamleu & Adesina (2000) in Cameroon; Chirwa (2005) in Malawi; Chianu & Tsujii (2004) in Nigeria; Abdulai & Huffman (2005) in Tanzania, Lapar & Pandey (1999) in Philippines also had similar empirical result.

The coefficient of household size is positive and significant (p<0.10) implying that youths in larger sized household will be more willing to adopt new ideas and participate in waterleaf production and vice versa. With a marginal effect of 0.0803 indicate that a unit increase in household size will increase the probability to build capacity through participation in waterleaf production by 8.03 percent. The fact that there are more household members is an indication of availability of labour for participation in waterleaf production. Finding is contrary to recent empirical result of Etim & Udoh (2018).

Farm income has a coefficient of 0.1641 and is positively significant (p<0.05) implying that young women in households with higher income from farming were more likely to adopt new farming techniques and willing to participate in waterleaf production. The marginal effect of farm income of 0.0771 means that a naira increase farm in the income of will result in7.71 percent rise in the probability to participate in waterleaf production. Finding corroborate with earlier empirical result of Etim & Benson (2016); Etim & Udoh (2018).

Table 2. Probit Model Estimates of the Determinants of Youths Decision to participate in Waterleaf Production

| **Variable** | **Coefficient** | **Standard Error** | **z-test** | **P-value** |
|---|---|---|---|---|
| Constant | 0.06923 | 0.5620 | 1.232 | 0.0101 |
| Sex | 0.2982 | 0.3181 | 0.9374 | 0.2010 |
| Age | 0.2231 | 0.0816 | 2.7341 | 0.0341*** |
| Marital Status | 0.4220 | 0.2921 | 1.4447 | 0.0100 |
| Education | 0.2030 | 0.0541 | 3.7523 | 0.0120*** |
| Household size | 0.9112 | 0.4580 | 1.9895 | 0.0803* |
| Access to Extension Contact | 0.0661 | 0.2990 | 0.2111 | 0.0122 |
| Farm Income | 0.1641 | 0.0811 | 2.0234 | 0.0771*** |
| Social Organization Membership | 0.0096 | 0.6440 | 0.0149 | 0.0082 |
| Diagnostic Analysis | | | | |



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| | | | | |
|---|---|---|---|---|
| Log-likelihood g | -3.01324 | Akaike | criterion | 20.31540 |
| Schwarz criterion | 34.76521 | Hannan- | Quinn | 32.21311 |

Note, *, **, *** represent significance at 10%, 5% and 1%.

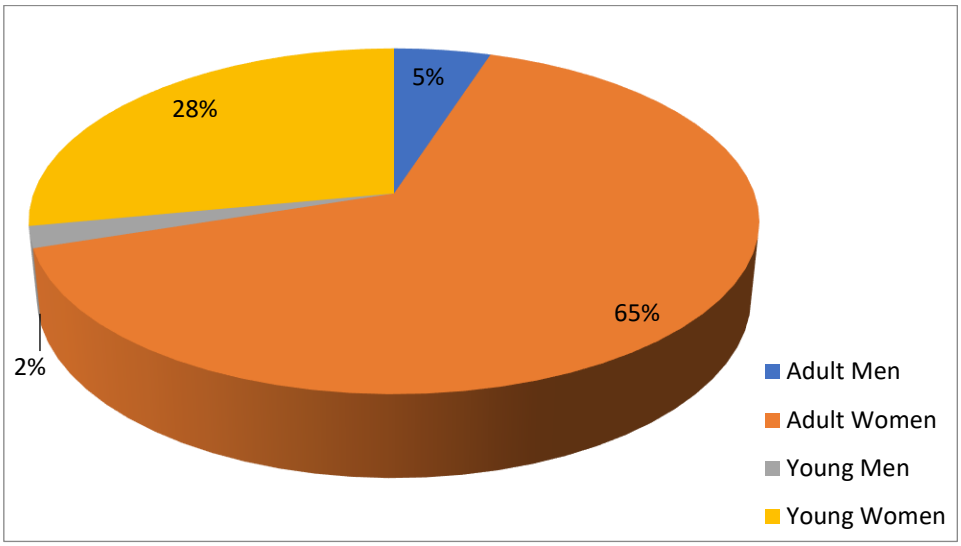


*Figure 1. Rate of Participation in waterleaf production by Gender Groups.*

Result on figure 1 shows that majority (65 percent) of older women were involved in waterleaf production whereas only 28 percent of young women were activity involved in waterleaf production. Only 7 percent of both young and older men participated in waterleaf farming.

## Conclusion

The study analyzed the factors influencing youth decision to be involved in small scale waterleaf production. Although these are many factors constraining youth involvement in farming generally, the study revealed that the most critical factors influencing the willingness of youths to participate in waterleaf production were age, educational level household size and farm income. Policies to encourage youth participation in farming should be vigorously pursued in the face of ageing farming population.

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