



***The World's Largest Open Access Agricultural & Applied Economics Digital Library***

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search  
<http://ageconsearch.umn.edu>  
[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from AgEcon Search may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

*No endorsement of AgEcon Search or its fundraising activities by the author(s) of the following work or their employer(s) is intended or implied.*



## **Assessment of Women Participation in Vegetable Production Activities in ADP, Zone III, Taraba State, Nigeria**

**S. H. G. Nakwe<sup>1</sup>, H. U. Mahmood<sup>2</sup>, A. A. Ndagh<sup>3</sup>, M. B. Bashir<sup>4\*</sup> and M. T. Kyaru<sup>4</sup>**

<sup>1</sup>Department of Crop Science, College of Agriculture, P.M.B 1025, Jalingo, Taraba State, Nigeria.

<sup>2</sup>Department of Agricultural Economics and Extension, Taraba State University, Jalingo, Nigeria.

<sup>3</sup>Department of Agricultural Economics and Extension, Modibbo Adama University of Technology, Yola, Adamawa State, Nigeria.

<sup>4</sup>Department of Agricultural Extension and Management, College of Agriculture, P.M.B 1025, Jalingo, Taraba State, Nigeria.

### **Authors' contributions**

*This work was carried out in collaboration between all authors. Authors SHGN and HUM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript.*

*Authors AAN and MBB managed the analyses of the study. Author MTK managed the literature searches. All authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/AJAEES/2018/44126

*Editor(s):*

(1) Dr. Fotios Chatzitheodoridis, Professor, Department of Agricultural Technology-Division of Agricultural Economics, Technological Education Institute of Western Macedonia, Greece.

*Reviewers:*

(1) Rubina Jabeen, Universiti Utara Malaysia, Malaysia.

(2) I. H. Eririogu, Federal University of Technology, Nigeria.

Complete Peer review History: <http://www.sciedomain.org/review-history/26093>

**Received 30 June 2018**

**Accepted 03 September 2018**

**Published 05 September 2018**

**Original Research Article**

### **ABSTRACT**

The study Assessed Women Participation in Vegetable Production Activities in ADP, Zones III, Taraba State, Nigeria. The Specific objectives were to describes the socio-economic characteristics of women vegetable farmers; identify the types of vegetables production activities participated by women; identify the types of vegetable mostly produced by women farmers; assess the level of participation of women in vegetable production activities and identify the problems affecting women participation in vegetable production in the study area. Null hypothesis was formulated that, there is no significant relationship between socio-economic characteristic of women vegetable farmers and

\*Corresponding author: E-mail: [bmbawuro@gmail.com](mailto:bmbawuro@gmail.com);

their participation. Primary data were obtained from 182 respondents using multi- stage purposive and simple random techniques. The data were analyzed using descriptive statistics and logit regression model was used to test the hypothesis formulated. The result of the socio-economic characteristics of the respondents revealed that majority of the respondents were young adult of less than 51 years of age, most of the respondents had acquired formal education and had large household size. All the women farmers were smallholder farmers cultivating less than 4 hectares of farmland. The result on the types of 2 vegetable farming activities carried out by women farmers in the study area shows that majority (98.35%) of them were involved in planting of vegetable, 95.60% of the respondents were engaged in land preparation\ tillage, 89.56% of the respondents participated in harvesting among others. The common vegetables produced by women in the area were identified as; okro 90.66%, spinach 74.18%, pumpkin 67.63%, fluted pumpkin 59.34%, moringa 56.59% among others. The findings further shows that women farmers highly involved in vegetable farming activities like land preparation/tillage  $\bar{X} = 3.2$ , planting  $\bar{X} = 3.7$ , weeding  $\bar{X} = 3.5$  and harvesting  $\bar{X}=3.5$ . The Logit regression analysis results reveals that educational level, household size, farming experience and income of women farmers have positive relationship with their level of participation in vegetable production. The major problems affecting women participation in vegetable production were identified as; inadequate funds 91.21%, high cost of input 76.37%, poor pricing of vegetables 68.68%, and problem of soil erosion 69.23% among others. It was recommended that women farmers should form or join cooperative societies in order to get financial support from government, NGOs and formal financial institutions to boost vegetable production in the study area. Also, government should subsidize the price of farm inputs in order to make them accessible and affordable to women farmers. In the same vein, better access of women to agricultural extension services should be emphasized.

**Keywords:** Assessment; participation; women; vegetable; production; ADP Zone III; Taraba State.

## 1. INTRODUCTION

Rural women play a vital role in Nigeria's Agriculture. Farming is operated by joint participation of male and female by farm families. However majority of women in rural families are illiterates, unskilled and traditionally bound. Nevertheless, they contribute to agricultural and rural development. Some of the agricultural activities performed by women include weeding, fodder cutting and chopping, livestock management, pre and post-harvest produce handling. Their productive efficiency in farming is extremely low due to low literacy and lack of skill [1].

It was reported by Faraja M. [2] that despite women's lack of skills, they are still primarily responsible for the farming in their household. The country's populations are dependent on the ability of women to fulfill their multiple roles as farmers, mothers, cooks, housekeepers, healthcare provider's water carriers, and fuel gatherers, food processors, produce vendors, artisan and more. When women are too exhausted to work well, food production suffers thereby contributing to hunger and malnutrition.

It was observed by Song Y. and Jiggins J. [3] that in rural communities, women could be

described as the "engine" of the rural areas. They are the working force that moves every form of activity in the community. They are engaged variedly in the basic process of production without the use of modern sophisticated methods. They also observed that majority of the world's agricultural producers are women and they produce over 50% of the food that is grown worldwide. In Sub-Saharan Africa for example women produce about 80% of both for consumption and for, sale. They concluded that in Nigeria, women are responsible for food processing and make a substantial contribution to food storage, transportation and marketing. Women perform such works as hoeing, sowing, weeding, harvesting, particularly in food crops. In the Eastern part of Nigeria for example, women are responsible for the growing of crops such as cassava, cocoyam, maize and vegetables, while the growing of yam (a principal crop) is somewhat reserved for men.

Rural women are the main producers of staple crops as well as the production of secondary crops such as legumes and vegetables. These vegetables, which are often grown in home gardens, provides essential nutrients and can often, be the only source of food during times of food shortage. Rural women are assuming a greater role in Agricultural production, yet their

contribution remains largely overlooked in development plans. Women remain largely unpaid for their domestic services, their household labour remains invisible in national economies [4].

Vegetables according to Kochlar S. L. [5] are plants or plant parts that are usually eaten with main meal and are commonly salted, boiled or used as desserts and salad and have been a major component for human diets all over the world. Even though they are not the major source of energy, they much-needed minerals and vitamins providing flavor and serve as a source of taste, thus increasing the appetite of the consumer. Barley L. H. [6] maintained that vegetables are products of herbaceous plants and usually of annuals whereas the fruits are products of woody plants.

Major vegetables produced in Nigeria include Onion, tomatoes, okra, pepper amaranthus, carrot, melon, corchorus olitorius (ewedu). Hibiscus sabdariffa (sobo), Adansonia digitata (Baobab leaves, pumpkin etc). In Nigeria enormous quantities of vegetables are produced and staggering figures are sometimes given as estimated annual production. For example figures like 3.8 million tons of onion, 6 million tons of tomatoes, [7] and [8]. Inspite of the enormous potentials of most of our local fruit and vegetables for industrial growth and development, very few large scale fruit and vegetable processing industries abound in Nigeria [9].

There has been a rise in the production of vegetable in general as a result of high public demand and consumer awareness of fresh vegetables consumption [10]. Vegetables are the most affordable and accessible source of micro nutrients and its production is increasingly recognized as a catalyst for rural development as a means of increasing and generating foreign exchange and supply components of a balance diet at a comparatively low price in Africa [11] and [10]. Aside, solving the problem of food shortages and malnutrition, post-harvest, conservation and processing, the establishment of industries dealing with vegetables will stimulate production, open new opportunities for investment, improve rural income and result in better quality food [12].

What Nigerians need to do is embark on massive production of these vegetables not only for higher nutritive value but for enhancing the

establishment of many processing industries. The development of the industrial uses will stimulate large scale production of the crops and enhanced diversification of entrepreneur to site processing plants in the rural areas which will improve the quality of life of the rural population [9]. Women constitute an important factor in vegetable production taking into consideration their role in agricultural production vis-à-vis vegetable production. The chief occupation of most women living in the rural areas is agriculture and they produce most of the vegetables consumed in rural areas [4]. This production is done using low level of technology which leads to low output and subsequently low income leaving the women poor. Despite the importance and contribution of vegetable to national development in terms of its health and economic benefits, women vegetable farmer's yield in Nigeria fall below global yield due to decline in unit of input such as capital, land, labour, management and other constraint [13].

It has been observed that despite the seemingly high level of women participation in vegetable production in the ADP, Zone III of Taraba State, their output are sold at exorbitantly high prices but does not translate into their quality of life because their living conditions portrays poverty.

The broad objective of the study is to assess women participation in vegetable production activities in ADP zone three in Taraba State, Nigeria.

The specific objectives are to:

- i. Describe the socio-economic characteristics of women vegetables farmers in the study areas.
- ii. Identify the types of vegetables production activities that women participate in the study area.
- iii. Identify the types of vegetables mostly produced by the women farmers
- iv. Assess the level of participation of women in vegetable production activities in the study area?
- v. Identify the problems affecting women participation in vegetable production in the study area. Furthermore, the null hypothesis which stated that there is no significant relationship between the socio-economic characteristic of women vegetable farmers and their level of participation was tested at 0.5 level of significance difference.

## 2. METHODOLOGY

### 2.1 The Study Area

Taraba State Agriculture Development Programme (TADP) consists of four agricultural zones namely; Zone I, Zone II, Zone III and Zone IV. The study will be carried out in Zone III which has its Headquarters at Takum. The zone lies within the geographical co-ordinates of Longitudes  $9^{\circ} 30' - 11^{\circ} 10'$  East and Latitude  $6^{\circ} 30' N - 8^{\circ} 10'$  North. It consists of four Local Government Areas namely; Donga, Kurmi, Takum, and Ussa. It has eight Extension Blocks, namely Donga and Mararraba in Donga Local Government Area, Baissa and Abong in Kurmi Local Government Area, Takum, Chanchanji, Kashimbilla in Takum Local Government Area and Kwesati in Ussa Local Government Areas respectively. The zone is made up of 63 cell areas evenly distributed in the block areas. Taraba State ADP Zone III is found at the South-Western part of the State, and share boundary with Cameroon Republic in the South, Benue State to the West and, Sarduna Local Government area to the South East, Gashaka Local Government, Bali to the East, Gassol Local Government to the North, and Wukari L.G.A to the West.

Using the National Population Commission proposed annual growth rate of 3.5 % which has

brought the projected population figure from 2006 Census. For each of local government that make up the ADP zone. These will be as follows: Kurmi – 124, 747, 339, Ussa – 125, 409,708, Donga – 182777.5 and Takum – 184466.793 which will bring the total projected population figure as at 2015 to 617, 403. The Zone enjoys a climates marked by dry and rainy seasons. The rainy season starts by early April to October, while the dry season manifest between November and March. The average rainfall is 1,350 mm. The climate allows the cultivation of vegetables and most staple food grain such as maize, groundnuts, rice, sorghum, millet, cassava and yam. Beside crops the inhabitants also keep livestock such as cattle, sheep, and goats, poultry and pigs. Communities living on the banks of river engaged in fishing and vegetable farming all year round. Other occupational activities include, cloth- weaving, dyeing, mat-making, carving and blacksmithing [14].

### 2.2 Sources of Data

The data for the study was sourced from primary and secondary sources. Primary data was sourced using structured questionnaire and secondary information was also obtained through textbooks, journals, seminar / conference proceeding and internet.

**Table 1. Selected women vegetable farmers in the study area**

Selected Zone	Block areas	No. of cells	25% of cells	Selected cells	No. of questionnaires that were
<b>Distributed</b>					
Zone 3	Takum I	7	2	Takum I	13
				TatiTakum	13
	Chanchanji	7	2	Chanchanji	13
				New Gboko	13
	Kashimbilla	8	2	Jenuwa	13
				Manya	13
	Kwesati	8	2	Lissam I	13
				Kpambo	13
	Donga	8	2	Akate	13
				Tunari	13
	Mararraba	8	2	Nyivu	13
				Kumbo	13
			2	Abong	13
			2	Ndaforo	13
<b>Total</b>	<b>7</b>	<b>45</b>	<b>14</b>		<b>182</b>

Source: Field survey, 2016

### 2.3 Sampling Procedure and Sample Size

The population of the study comprised of women vegetable farmers in ADP zone three (i.e. Takum, Ussa, Donga and Kurmi LGAs). A multi stage and simple random sampling techniques was employed in the selection of the respondents. In the first stage, the entire four local Government Areas of ADP zone three were selected. In the second stage, 25% of cells in each block in the zone were purposively selected from each of the selected local government areas. In the third stage, thirteen respondents were selected from each cell using simple random sampling which brought the total number of respondents to one hundred and eighty-two vegetable women farmers. This formed the sample size that was used for data collection.

### 2.4 Method of Data Analysis

Both descriptive and inferential statistics were used in analyzing the data. The descriptive statistics include: frequency tables, percentage and mean. These were used to achieve objectives I, ii, iii, iv and v of the study. Logic regression was used to test the hypothesis at 0.05 level of significance. The logic regression model formula as shown is specified below:

$$y = a + b_1 x_1 + b_2 x_2 + \dots + b_n x_n \quad (1)$$

Where

$Y$  = predicted women vegetables level of participation in vegetable production (to be proxied by the proportional level of participation in vegetable production)

$a$  = Regression constant

$b_1, b_2, \dots, b_7$  = Regression coefficient attached to variable  $X_1, X_2, \dots, X_7$  and

$X_1$  = Age (years)

$X_2$  = Educational level (Proxy by years of schooling)

$X_3$  = Household size (Number of persons in a household)

$X_4$  = Farm size (hectares)

$X_5$  = Farming experience (years)

$X_6$  = Source of Finance

$X_7$  = Access to extension services (Proxy by Yes = 1, No = 0)

### 2.5 Measurement of Respondent Level of Participation in Vegetable Production

The respondents' level of participation in vegetable production was measured using a

4- point rating scale of: High participation = 4, moderate participation = 3, low participation = 2 and not participation at all = 1. The mean score equal or greater than 2.5 implies being high participation in vegetable production, conversely mean score less than 2.5 implies the women farmers not being participated in vegetable production in the study area.

## 3. RESULTS AND DISCUSSION

### 3.1 Socio-economic Characteristics of Respondents (n=182)

The socio-economic characteristics of the respondents considered in this study include: Age, marital status, educational level, household size, farming experience, farm size, source of finance and access to extension education service and average annual income generated from vegetable production activities.

**Table 2. Age distribution of respondents**

Age (years)	Frequency	Percentage (%)
20-30	42	23.07
31-40	54	29.68
41-50	45	24.72
51 and above	41	22.53
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 2 shows the distribution of the respondents according to their age. The result reveals that majority (77.47%) of the respondents' are within the age range of between 20 years to 50 years. While only 22.53% of the respondents were above 51 years of age. This implies that most of the respondents are in their active and productive years capable of participating in vegetable production activities. This agrees with the findings of [15] reported that rural women throughout the world are engage in a range of production activities essential to household welfare, agricultural production and economic growth and this is usually carried out within their productive ages. The findings further shows that women vegetable farmers are mostly between the ages of 20-50 years with high concentration (43.85%) found between the ages of 31-50 years.

Table 3 shows that majority (54.40%) of the respondents were married, 22.50% were widowed, 13.20% were single (unmarried) while 9.90% were divorcees. This could be associated

with the burden or responsibility of feeding and caring for the family which might have necessitated most of the married women to participate in vegetable production activities in order to supplement some of the basic needs of the family. This corroborate with the observation of [16] who reported that in many traditional African society, the responsibility for feeding the family falls mainly on the women, and the findings of [17], which also reported that majority of the respondents are married because they are also responsible for managing the domestic economic activities such as vegetable gardening or raising chickens, which are designed to increase the family's food resources.

**Table 3. Respondents marital status**

Category	Frequency	Percentage (%)
Divorcees	18	9.90
Married	99	54.40
Single	24	13.20
Widowed	41	22.50
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

**Table 4. Respondents educational attainment**

Educational attainment	Frequency	Percentage (%)
No-Formal Education	46	25.20
Primary Education	36	19.80
Secondary Education	70	38.50
Tertiary Education	30	16.50
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 4 shows the educational qualification of the respondents in which most (38.50%) of the respondents are secondary school certificate holders, 25.20% have no any form of formal education, 19.80% had primary school certificate while 16.50% had tertiary education certificate. This shows that most of the women had basic education and therefore are able to read, write and comprehend basic instructions, so if they are visited by extension agents or they have access to extension services, they can comprehend and adopt innovations that will enable them to participate better in vegetable production activities. This agrees with the findings of [18] which reported that if female will have the same access to education as their male counterpart,

agricultural production activities will be profitable for the women folk and by extension the community as a whole. Ani, (2004) also reported in his findings that if rural development and total emancipation of the entire human race most be achieved, it must be recognized that a major part of economic growth lies in investment in the development of women in the rural communities through education.

Table 5 shows the household size of the respondents. The result reveals that 32.97% of the respondents had between 1 to 4 people per household, while majority 67.03% of the respondents had more than 5 persons per household. This implies that most of the women farmers had large household size which could positively enhance their participation in vegetable production activities, hence easy access to family labour, that way they do not spend much money to employ labour, but the size of the family help supplement for the labour that would have been paid for.

**Table 5. Respondents household sizes**

Household size	Frequency	Percentage (%)
1-4	60	32.97
5-10	112	61.54
11 and above	10	5.49
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016.

**Table 6. Respondents farming experience**

Farming experience	Frequency	Percentage (%)
1-5	40	21.98
6-10	50	27.47
11 and above	92	50.55
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 6 reveals 21.98% of the respondents had between 1 to 5 years of farming experience while 27.47% of the respondents had between 6 to 10 years of farming experience and 50.55% of them had between 11 and above years of farming experience. This implies that women vegetable farmers had many years of farming experience. This could positively influence their participation in farming activities. This is because many years of farming experience will enhance their management capability of the crop as well as reduce the fear of risk of failure, and the knowledge that have been acquired through

repeated vegetable production activities will enhance better production capabilities for higher yield and better livelihood.

**Table 7. Respondents farm size**

Farm size	Frequency	Percentage (%)
<1	141	77.50
1-2	29	15.90
3-4	12	6.60
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 7 reveals that majority (77.50%) of the respondent's farm size was less than 1 hectare followed by 15.90% of the respondents who had 1-2 hectares and 6.60% who had 3-4 hectares of land for vegetable cultivation; this implies that lands are not accessible to the women vegetable farmers. Land tenure system in the study area and the cultural belief that land is an exclusive preserve of the male members of the society, this implies that women don't really own land, and even when they do, it is under the supervision of a male member of the family and these lands are being used for arable crops and just a little portion is allocated to the women for vegetable production. This agrees with the study carried out by (USAID) [19] which reported that women have no legal ownership of land, so the lands which they cultivate are either legally owned by their husbands or father-in-law, Therefore, they do not control the lands and even their access to it is dependent on the male relative, the major constraint faced by women in vegetable production is inability to own land. In virtually all cases, land is owned by the male head of the family.

**Table 8. Respondents source of finance**

Source of income	Frequency	Percentage (%)
Co-operatives	7	3.80
Friends and	14	7.70
Relatives		
Bank Loan	17	9.30
Personal Savings	144	79.10
<b>Total</b>	<b>182</b>	<b>99.90</b>

Source: Field survey, 2016

Table 8 reveals that majority (79.10%) of the respondents' source of finance for vegetable production activities is from personal savings, followed by 9.30% whose source of finance is from bank loans, 7.70% had their sources of finance from friends and relations, while 3.80% of the respondents sources of finance for vegetable

production activities is from co-operatives. From the above findings, it is evident that most respondents use their little saving in vegetable production activities which might be an impediment to expanding the horizon of their production activities because Agricultural production generally is capital intensive. In Nigeria and the world over, agricultural credit has been an important instrument not only for fostering agricultural development but also for improving efficiency and expanding production. It is a known fact that credit makes it possible for farmers to take advantage of new machines, good seed, fertilizers, engage in other production activities profitably, all of which enables them to organize and operate large and more profitable agricultural business. This agrees with the findings of [20] which reported that, the need for providing agricultural credit to women farmers is universal, and agricultural credit has been an important instrument not only of fastening agricultural development but also for improving production and enhancing income and also at times for making up seasonal shortfalls.

**Table 9. Respondents access to extension services**

Access to eat services	Frequency	Percentage (%)
No	173	95.10
Yes	9	4.90
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 9 reveals that, majority (95.10%) of the respondents had no access to extension service delivery while 4.90% had access to extension service delivery. It is evident from the result that extension agents are not available to stimulate or encourage the development of vegetable production activities in the study area. Agricultural extension is all about disseminating agricultural technology and it is important to target women, so that the livelihood of the communities in the study area improves. This agrees with the findings of [21] which reported that targeting women in agricultural technology dissemination can have a greater impact on poverty than targeting men. The findings of this study also corroborates with the observations of [17] and [22], which reported that agricultural extension services often relates more specifically to farmers (who are usually assumed to be men) and their various problems since majority of the respondents had never been visited by extension agents that means they don't have access on information that will help change their attitude,

skills and knowledge to enable them engage in vegetable production activities profitably for improve livelihood. This agrees with [20] in his findings which reported that raising women's level of efficiency and achieving higher level of living for them will only be achieved through extension education which is an informal system of education that involves developing knowledge, skills and favours attitudes in women farmers and their family thus enabling them to benefit from research and technology.

The result shows that few women (4.90%) had access to extension service delivery and this implies that their chances of having contacts with extension agents will be less if they are not buoyant enough to afford inputs recommended by extension agent and this corroborates with the findings of [20] which reported that inability of the farmers to afford the inputs recommended by extension agent can lessen the chances of their having contacts with the extension agents.

**Table 10. Respondents average annual income**

Average income per annum (₦)	Frequency	Percentage (%)
15 – 40	34	18.68
41 – 60	60	32.97
66 – 90	44	24.18
91 – 115	16	8.79
116 – 140	20	10.99
141 – 165	4	2.20
166 and Above	4	2.20
<b>Total</b>	<b>182</b>	<b>100</b>

Source: Field survey, 2016

Table 10 shows the average annual income of the respondents in the study area. The result reveals that majority (75.73%) of the respondents earn between ₦15, 000 - ₦90, 000 as the average annual income they derived from vegetable production activities, 8.79% earn between ₦91, 000 – ₦115, 000, 10.99% earn between ₦116, 000 and ₦140, 000, 2.20% earn between ₦141, 000 – ₦165, 000 and ₦166, 000 and above as average annual income.

This result shows that majority of the respondents' annual average income from vegetable production activities are below the international poverty line of \$1 per day. This agrees with the findings of International Fund for Agricultural Development (IFAD), [23] which reported that, more than 1 billion people in the

world live on less than \$1 a day, 2.7 billion struggles to survive on less than \$2 per day.

Improving the respondent's skills in vegetable production activities will enable the women to use vegetable growing as a means of income generation, in addition it will help create a sustainable farming environment within the community. Poverty can be reduced among respondents by improving income generation activities like vegetable production activities. This agrees with the finding of [24] which reported that majority of people's livelihood in the rural areas depend on small scale Agricultural farming system, where vegetable sector is one of the main components. Such small scale farms are potentials to contributing to economic growth and reducing poverty in the world. The findings shows that vegetable farming is one of the most important rural activities that generate income and reduce poverty in the world; therefore improving household income is a critical issue for sustainable economic development in the world, particularly in developing country like ours. Enhancing the productive efficiency of vegetable farms helps to increase women vegetable farmers' income and contributes in reducing rural poverty.

### 3.2 Types of Vegetable Production Activities Participated by Women

The types of vegetable activities participated by women in the study area are identified and the result presented in Table 11.

**Table 11. Respondents types of vegetable production activities (n=182)**

Type of farming activities	Frequency	Percentage (%)
Land preparing/Tillage	174	95.60
Planting	179	98.35
Weeding	158	86.81
Fertilizer	136	74.73
Application		
Irrigation	100	54.95
Harvesting	163	89.56
Transportation	167	91.76
Marketing	173	95.05

Source: Field survey, 2016

The result on the type of vegetable production activities participated by women in the study area is presented in Table 11. The result reveals that 95.60% of the respondents participated in land

preparation/tillage for vegetable production, 98.35% of the respondents were involved in planting while 86.81% of the respondents participated in the weeding of vegetable farms. The result further shows that 74.73% were actively engaged in fertilizer application, 54.95% actively participated in irrigation of the vegetable. Also 89.56% of the respondents involved in harvesting, 91.76% of them fully participated in the transportation of vegetable and 95.05% were engaged in the marketing of vegetable in the study area. This implies that, women in the study area were actively involved in most of the farming operations for the production of vegetables. The participation of most of the women in most of the vegetable production activities could be attributed to their advantage of being young and also because most of them are married and are shouldered with the burden of feeding and caring for their families, while others also use the advantage of their large household sizes to supplement for labour requirement in vegetable production activities to increase their family food resources.

The result of these finding also shows that majority of the respondents' (74.80%) have a form of education which implies that, if they are targeted for technology dissemination, it will go a long way in helping them improve on vegetable production practices, because they will be able to comprehend what they are being taught by

extension agents. Farm sizes as seen in the finding has an implication on vegetable production activities because majority of the respondents (77.50%) have less than 1 hectare as farm sizes for vegetables production, the increase in farm sizes will not maximally increase women's participation in vegetables production activities.

In these findings, majority of respondents' sources of finance for vegetable production activities is from their personal savings. This little savings will not adequately provide what is required for vegetable production activities and so they are forced to produce within their limited resources and capability and that may keep them in perpetual circle of poverty. If the cycle of poverty must be broken, credit facilities must be made available and accessible to the women so that they can participate in vegetable production activities profitably from production to marketing. This result is in line with the findings of [21,19] and [25] which reported that, most women participate actively in all vegetable production activities from production to marketing.

### 3.3 Types of Vegetable Produced by Women in the Study Area

The types of vegetable produced by women in the study area were identified and the result presented in Table 12.

**Table 12. Distribution of respondents according to the type of vegetables produced by women in the study area (n=182)**

Types of vegetable	Frequency	Percentage (%)	Rank order
Okro	165	90.66	1
Spinach	135	74.18	2
Soriel	106	58.24	5
Jute	16	87.9	15
Scent	39	21.43	13
Curry	45	24.73	11
Tomatoes	101	55.49	8
Spring Onion	29	15.93	14
Bitter leaf	108	59.34	4
Fluted Pumpkin	62	34.07	10
Pumpkin	122	67.03	3
Moringa	103	56.59	6
Kumbi	96	52.75	9
Pepper	43	23.63	12
Garden egg	102	56.04	7

Source: Field survey, 2016

Table 12 shows the types of vegetable produced by women in the study area. The findings reveals that, majority (90.66%) of the respondents produced Okro which is ranked 1<sup>st</sup>, also 74.18% of the respondents produced Spinach (2<sup>nd</sup>) 67.03% of the respondents produced Pumkin (3<sup>rd</sup>), while 59.04% of the women farmers produced bitter leaf (4<sup>th</sup>). Other types of vegetable produced by the women in the study area includes Sorrel (58.24%), Moringa (56.59%), Garden egg (56.04%), Tomatoes (55.49%) Kumbi (52.75%), Fluted Pumkin (34.07%). The study further shows that 24.73% of the respondents produced curry, 23.63% of them produced Scent, 15.93% produced Spring Onion and 8.7% of the respondents produced Jute in the study area. This implies that women in the study area produced different types of vegetable. This will positively enhance their livelihood as it will also improve the nutritional status of the rural populace and in turn improve the quality of life in the area. This result agreed with the findings of [21] and [9] which reported that vegetables are most appealing and affordable source of micronutrients. Diet improvement increases a person's productivity, reduces health care related cost and therefore raises the productivity and income of the poor. Also vegetable production provides women with opportunities, leads to greater household food and nutrition security, increases women access to vegetable for themselves and their families, improves their health and work performance thereby contributing to higher incomes. The sale from garden surplus is often a major source of income for rural women used for crucial family needs.

From the findings, the reasons why okro ranked 1<sup>st</sup> could be because, okro is a widely consumed vegetable around the area and it is used in many different ways and combined with other vegetables because of its slimy texture. It can also be preserved by drying and that way reduced wastage. Even when it is strong and becomes hard and cannot be cooked fresh, it can be dried and prepared as soup. It helps to supplement family's food requirement during seasonal shortfalls. Spinach ranked 2<sup>nd</sup> probably because the duration of maturity is short and it can be produced more than once during the raining season and it is also widely consumed by all in the study area. Pumpkin leaf came 3rd in the ranking probably because it is dearly loved by the people in the area, it is one of the main vegetables that is consumed by the people and it is a special delicacy appreciated in almost every

family. Bitter leaf ranked 4<sup>th</sup> probably because it is a perennial vegetable and can mostly be found around their houses and can readily be harvested and hence more profitable.

Others like curry, pepper, scent, spring onions ranks low probably because they are not usually required for use in large quantity while cooking or rather they are used as spices or flavor enhancers, so that could be the reason for their low ranking.

### 3.4 Level of Women Participation in Vegetable Production

The level of women participation in vegetable is analyzed using 4 point rating scale and the result presented in Table 13.

The result in Table 13 indicates the various farming activities participated by women in vegetable production activities. The findings reveals the farming activities highly participated by women include: Land preparation/tillage ( $\bar{X}=3.2$ ), planting of vegetable ( $\bar{X}=3.7$ ), weeding ( $\bar{X}=3.5$ ), harvesting ( $\bar{X}=3.5$ ) and marketing of vegetable ( $\bar{X}=3.4$ ). While the farming activities lowly participated by women include: Fertilizer application ( $\bar{X}=2.5$ ), and transportation ( $\bar{X}=2.9$ ). The result further shows that women did not participates in chemical application ( $\bar{X}=2.2$ ), and irrigation ( $\bar{X}=2.0$ ). This implies that women are actively involved in vegetable production in the study area. The non-participation of women in chemical application and irrigation might be attributed to the fact that these farming activities requires skills such as handling of sprayers and water pumping machines and are also expensive which might not be accessible or affordable by women in the study area. The result confirmed to the findings of [26,25] and [27], which reported that vegetable cultivation absorbs more women labour compared to other crops and that women participate more in vegetable production than men in Osun State. Therefore it is not out of place to mention that in many cases, housewives entirely manage the vegetable production system up to harvesting and marketing.

### 3.5 Problems Affecting Women Participation in Vegetable Production

The major problems affecting women participation in vegetable production activities were identified and the result presented in Table 15.

**Table 13. Mean rating of the level of women participation in vegetable production**

Farming activities	Total score	Mean $\bar{x}$	Remark
Land preparing/Tillage	583	3.2	High participation
Planting	669	3.7	High participation
Weeding	635	3.5	High participation
Fertilizer Application	464	2.5	Low participation
Chemical Application	398	2.2	Non participation
Irrigation	356	2.0	Non participation
Harvesting	644	3.5	High participation
Transportation	534	2.9	High participation
Marketing	624	3.4	High participation

Source: Field survey, 2016

**Table 14. Distribution of respondents according to the major problems affecting women participation in vegetable production (n=182)**

Problems	Frequency	Percentage (%)
Inadequate Funds	166	91.21
High Cost of Farm Inputs	139	76.37
Land Tenure Problems	73	40.11
High Cost of Irrigation Facilities	88	48.35
Non-availability of Storage Facilities	89	48.90
Poor Pricing of Vegetables	125	68.68
Lack of Extension Services	69	37.91
Problems of Erosion	126	69.23
Poor Government Policy	104	57.14
Poor Marketing System	93	51.07
Communal conflict	54	29.67
Invasion by Animals	108	59.34
Theft	85	46.70

Source: Field survey, 2016

Table 15 shows that most of the respondents are affected by the identified problems in their participation in vegetable production activities. The study shows that majority (91.21%) of the respondents had the problem of inadequate funds, 76.37% of the respondents are confronted with the problems of high cost of farm inputs, 40.11% complained of land tenure problem, 48.35% and 48.90% of the respondents had problems of high cost of irrigation facilities and inadequate storage facilities respectively.

Similarly, 68.68% of the respondents had the problem of poor pricing of vegetables, 37.91% of the respondents were confronted with the problem of lack of visitation by extension service agents and 69.23% of the respondents had the problem of erosion. Similarly, 57.14% of the respondents complained of poor government policy, 51.09% of the respondents had the problem of poor marketing system while 29.67% of the respondents faced the problem of communal conflicts and 59.34% of the

respondents were confronted with problem of invasion by animal and 46.70% of the respondents had problem of theft.

This findings implies that women vegetable farmers had so many problems affecting their production of vegetable but the most critical problem is inadequate funds which if provided could help to solve many other problems in the study area. The inadequacy of fund is a major problem as perceived by the respondents. Credits makes it possible for farmers to take advantage of new machines, good seeds, fertilizers, labour which enable women vegetables farmers to organizes and operate large and more profitable agricultural business. Agricultural credit and capital, or funds is an important instrument for improving efficiency and expanding production. The high cost of inputs is another problem facing the respondents in their participation in vegetable production activities. Inputs such as improved seeds, chemicals fertilizers, are not affordable because of the high

cost. Lack of women's access to one of the factors of production which is land, is a problem facing the respondents in their participation in vegetable production activities. This agrees with Ani, (2004), that women's right over land might not survive the death of a spouse. Laws defining women's status and those governing marriage, property and inheritance may all be incompatible with the principle of equal right for women. Women's limited legal and customary rights to land through land ownership clearly affects the ability of rural women heads of households to provide for themselves and their dependents by means of agricultural production.

Even when the respondents are interested in irrigation, the high cost of irrigation facilities is an impediment because they don't have enough funds or capital to buy things like pump, pumping machines and other irrigation facilities that will improve and increase their participation in vegetable production activities. There are no storage facilities and because vegetable products are very sensitive due to their perishability the respondents' usually incur loss if the products harvested are not all sold.

For those who sell their product to the buyers directly, the prices which buyers offer for vegetable products sometimes are usually poor. Lack of extension services is one of the problems faced by the respondents'. Even though very few (4.90%) have had access to extension services, here, only 37.91 perceive lack of extension services as a problem. This implies that the respondents are faced with lack of knowledge in new technology which will help them to improve and increase their participation in vegetable production activities in the study area. Some of the respondents pointed out that erosion have constituted a problem in their participation in vegetable production activities and have reduced the productivity of their lands thereby affecting their income.

Sometimes policy makers and administration assumes that men are the farmers, so some policies are not favourable towards women and this affects their participation in vegetable production activities. For those respondents who sell their product wholesale, showed their concern over exploitation by marketing middle men. After they might have spent a lot of money to transport these products to the market, these

market middlemen always want to buy the vegetable products at the cheapest possible price and sell it to the final consumers at the highest possible price thereby exploiting the farmers.

Sometimes when there is a communal conflict, the respondents' are displaced and this constitutes a problem to them because they will not be able to participate in vegetable production activities and therefore their means of livelihood is affected. Activities of animals constitute a problem because of the nature of rearing animal prevalent in the study area. Sometimes vegetable farms are being invaded and destroyed by animals. Some of the respondents' complained that thieves sometimes invades their farm and cart away their vegetable products, thereby causing havoc to them. These result agreed with the findings of [28,25,18] and [29].

### 3.6 Logic Regression Result on the Relationship between the Socio-Economic Characteristics of Women Vegetable Farmers and their Level of Participation

The multiple (logic) regression analysis result on the relationship between the socio-economic characteristics of women vegetable farmers and their level of participation is presented in Table 15.

The empirical estimation of the logic analysis result as presented in Table 15 reveals a log livelihood of -122.9448,  $R^2$  of 0.024068 and LR statistics of 0.0641, all significant at 5% probability level, this shows that the model has a good fit. Considering the coefficients for all the variables included in the model as shown in Table 15. Only educational level ( $x_2$ ), household size ( $x_3$ ), farming experience ( $x_5$ ) and access to extension ( $x_7$ ) are significant at 5% level and positively related to women participation in vegetable production activities. The implication of this from the finding is that increase in the level of any of the explanatory variable with positive sign i.e.  $x_2$ ,  $x_3$ ,  $x_5$ , and  $x_6$  in this case will have a positive effect on the woman participation in vegetable production activities in the study area. That means if the respondents'  $x_2$  (Educational level),  $x_3$  (Household size),  $x_5$  (farming experience) and  $x_6$  (Source of finance for vegetable production activities).

**Table 15. Logic regression result on the relationship between the socio-economic characteristics of women vegetable farmers and their level of participation**

Variable	Regression coefficient	Standard error	E-Statistic	Probability
C	-3.833398	3.396819	-1.128626	0.0391
Age ( $x_1$ )	-0.005034	0.021678	-0.232234	0.1164
Educational Level ( $x_2$ )	0.169968	0.151508	1.121846	0.0019 **
Household Size ( $x_3$ )	0.063773	0.065142	0.978983	0.0276 **
Farm Size ( $x_4$ )	-0.111096	0.191452	-0.580283	0.0317 **
Farming Experience ( $x_5$ )	0.001459	0.027367	0.053321	0.0275 **
Income ( $x_6$ )	0.316366	0.206219	1.534125	0.1250
Access to Extension ( $x_7$ )	-0.031596	0.041569	-0.760087	0.0172**
R-squared	0.024068			
S.E of regression	0.502724			
Log Livelihood	-122.9448			
LR Statistic	0.064120			

\*\* Significant at 5% level, Source: Field survey, 2016

If their educational level ( $x_2$ ) is increased, it will play an important role in increasing and enhancing participation in vegetable production activities because the women will be able to comprehend and adopt innovations that will help them to participate profitably for quality livelihood. It also implies that if household size ( $x_3$ ) increases, it will mean more and better participation of the women in vegetable production activities because it will mean more labour provision and more people to feed. The result also implies that the more experienced the women are in farming ( $x_5$ ), the better their participation in vegetable production activities.

The findings of this research reveals that, if the source of finance for vegetable production activities improves, women's participation in vegetable production activities will increase and it will mean more investment, higher yield, increase income and better livelihood. Whereas those explanatory variables with negative sign,  $x_1$  (Age),  $x_4$  (Farm size) and  $x_7$  (Access to extension service delivery) will exert a negative relationship on woman participation in vegetable production activities. An increase in age is likely to decrease the probability of women participation hence older women might have less energy to be fully engage in the stressful activities unlike younger women all things being equal. Also, farm size should measure the probability of woman participation in vegetable production activities, this probably means that most of the women do not need large farm size to produce vegetable or

are constrained by the problem of land tenure system. Also, access to inefficient extension services ( $x_7$ ) has negative coefficient that might be attributed to the ineffectiveness of extension agents in carrying out their function of training and visiting of the women vegetable farmers in the area. This result agrees with the observation of [26] and [30] which found out that women receive less than (10%) of agricultural extension services, women lack or have less access to the productive resources and services such as extension services and new technologies that would save time and eliminate drudgery. As is seen in cultivation of vegetable whenever it comes to the use of machines such as sprayers, tractors, it is the men who perform the task. The reason cited is that men have more physical strength than women.

However, the positive and significant of the variables; education level ( $x_2$ ), household of size ( $x_3$ ), farming experience ( $x_5$ ) and sources of income ( $x_6$ ) indicate that they are the major factors considered for women participation in vegetable production activities. Also age ( $x_1$ ) farm size ( $x_4$ ) and access to extension services ( $x_7$ ) had negative regression coefficient though  $x_4$  and  $x_7$  are statistically significant at 5% level, this means that they are both important factors toward women participation in vegetable production activities, but their negative coefficients is at variance with apriority expectations.

#### 4. CONCLUSION

The women farmers in the study area see vegetable farming as the major means of their livelihood and therefore highly engaged in its production with high expectation on the returns, all things being equal. Majority of the women farmers are in their active and productive years capable of carrying out farming activities such as land preparation/tillage, planting, weeding as well as harvesting. The major determinants of women farmers' participation in vegetable production in the study area are educational level, household size, farming experience and income. Women farmers are confronted with the problem of inadequate funds and high cost of farm inputs which if tackled could enhance women farmers' participation in vegetable production activities in the study area.

#### 5. RECOMMENDATIONS

Based on the major findings of this study, the following recommendations are made:

- i. Consider Women farmers are encouraged to forming or joining cooperative society in order to get financial support from government, NGOs and formal financial institutions to boost vegetable production in the study area, and increase return on investment.
- ii. Government should subsidize the price of farm inputs in order to make them accessible and affordable to women farmers in the study area.
- iii. Better access of women to agricultural extension services should be emphasized. By this information on best practices will get to them so as to enhance greater yield from their farms.
- iv. Well organized and integrated awareness creation strategy should also be designed and facilitated by stakeholders to minimize the social, cultural and economic factors that are affecting rural women's decision-making in agricultural production.
- v. Government should provide adequate marketing structures in order to make the prices of agricultural produce stable.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

#### REFERENCES

1. Prince NS, Bushra T (Mrs), Abdul HB, QAZI BA. Role of rural women in agriculture Kanak valley Bolochistan. AERU, Quetta Staff Paper No. 91-1 Agriculture Economics Research Unit PA RC Agriculture Research Institute Seriab – Quetta; 2010.
2. Faraja M. Vegetable production and Household poverty reduction in Ludewa District: A dissertation Submitted in partial fulfillment of the requirement for the degree of Master of Science in Development Policy (Msc. DP) of Mzumbe. University Mzumbe; 2013.
3. Song Y, Jiggins J. The feminization of agriculture and the implication for maize development in China | women managing change magazine on low External input and sustainable Agriculture (LE ISA). 2002;18:4.
4. WOW. (Women of Work) Women's work; An Overview; 2007.
5. Kochlar SL. Tropical Crop (2nd edition) The Interstate Printers and Publishers Inc. U.S.A; 1986.
6. Barley LH. Principle of vegetable Cultivation: Discovery Publishing House, New Delhi – 1100 02, P2; 2010. ISBN: 01- 7141 – 4898.
7. Oyeniran JO. Report of Nationally Coordinated Research Project on fruit and vegetables in Nigeria, Proc. Nat. Workshop on improved packaging and storing system for fruits and vegetable in Nigeria. Ilorin, Nigeria; 1988.
8. Erinle ID. Present status and prospects for increased production of tomatoes and pepper in Northern Nigeria. Proceeding of International Symposium on Integrated Management Practices. AVRDC Taiwan, Taiwan; 1989.
9. Ibeawuchi II, Okolo NA, Alagba RA, Ofor MO, Emma Okafor LC, Peter Onoh CA, Obiefuna JC. Journal of Biology, Agriculture and Healthcare. 2015;5:2. ISSN: 2224-3208 (Paper) FSSN: 2225-093x (Online)
10. Iheke OR. Economics of homestead production in Abia State, Nigeria. Agricultural Society of Nigeria. Proceeding of the 43<sup>rd</sup> Annual Conference held in Abuja, October, 20<sup>th</sup>-23<sup>rd</sup> 2009;305.

11. AVRDC, (2004), Asian vegetable Research Development centre for Africa, 11th Regional Training course on vegetable crop production and research. Tanzania, July 4th – November 4th, 2009.
12. Adeyemi SAO, Ogazi PO. Fruits and vegetable processing. A Seminar Presented on Agro-based Industrialization Held at Ascon, Badagry, Nigeria, 14th Nov.-3rd Dec. 1983;7.
13. Abdulrahman A, Yahaya A. Resource use efficiency of vegetable production-n in Kaduna State, Nigeria. Agricultural Society of Nigeria. Proceeding of the 43rd Annual conference held in Abuja. October 20th-23rd 2009;270.
14. Taraba State Government (TRS). Taraba State Official Diary, Government Printing Press, Jalingo Nigeria. 2016;30-33.
15. Busari O, Idris AKM, Oyekale JO. Economic Analysis of vegetable production by rural women in Iwo Zone of Osun State, Nigeria: A Research Article; 2013. DOI:<http://dv.doi.org/10.15580/GJAS.2013/110512231>
16. FAO. The state of food insecurity in the world 2010.Addressing food insecurity in protracted crises; 2010.
17. Oakley P, Garforth C. Guide to Extension Training Economic and Social Development Department, Agricultural Extension and Rural Development Centres, School of Education, University of Reaching U.K. FAO of the United Nations, Rome; 1985.  
ISBN: 92+5-101453-1.
18. Mahmood HU. Characteristics of women farmers and food security M Girei Local Government Area of Adamawa State Nigeria: Journal of Science and Multidisciplinary Research. 2011;3. Cenfesin Publications.
19. USAID. The Role of Women in the fruit and vegetable supply chain in Maharas intra and Tamil Nadu, India. The new and Expanded Social and Economic Opportunities for vulnerable Groups task order under the Women in Development 1QC Contract No GEW-1-00-02-00016-00800; 2006.
20. Ani AO. Women in Agriculture and Rural Development. Priscaquila, Maiduguri, Born State, Nigeria. 2004;7-8.  
ISBN: 978-36090-1-7.
21. IFPRI. Women still hold the Key to Food and nutrition Security. Washington D.C International Food Policy Research Institute; 2005. Iheke OR. Economic of homestead vegetable production in Abia State, Nigeria. Agricultural Society of Nigeria. Proceeding of the 43rd Annual conference held in Abuja, October, 20th-23rd 2009;305.
22. Bradfield DJ. Guide to Extension Training Economics and Social Development Services No. 6 Rome FAO; 1966.
23. International Fund for Agricultural Development (IFAD), (2017), Rural Poverty Portal: Dimension's of Rural Poverty in Faraja, M., (2013) vegetable production and Household poverty reduction in Ludewa District: A dissertation Submitted in partial fulfillment of the requirement for the degree of Master of Science in Development Policy (Msc. DP) of Mzumbe. University Mzumbe; 2013.
24. Rudra BS, Wen-Chi H, Pai-Po L, Yam BT. Determinates of Inefficiency in vegetable farms: Implication for Improving Rural Households income in Nepal: American Journal of Rural Development. 2012; 4(52016):105-113.  
DOI: 10.12691/ajrd-4-5-2/original Article. Copyright @ 2012-2016 Science and Education Publishing Co. Ltd. All Right Reserved.
25. Samantaray SK, Prusty S, Raj RK. Paper on constraints in vegetable production experiences of tribal vegetable growers. Indian Research Journal Extension Education. 2009;9(3).
26. Garrity D. Science Based Agro forestry and the Achievement of the Millennium Development Goals Edited by Dennis Garrity; 2006.
27. Akinfaye TS. Analysis of involvement of rural men and women in vegetable production in Osun State Nigeria. Unpublished B.Sc Thesis Submitted to the Department of Agriculture and Rural Development, University of Ibadan, Ibadan; 2013.
28. Sajida T, Khalid MA, Mohammad S, Zarina Y. Gender dimensions of labour participation in vegetable farming system in district Attock of Punjab, Pakistan. Journal of Agricultural Research. 2009; 47(1).

29. Deji OF, Koledoye GF, Owombo PT. Gender analysis of constraints to vegetable production in Oyo State, Nigeria 21st Annual National Congress of the Nigerian Rural Sociological Association (NRSA) Held at University of Ibadan Between Sunday, 7th and Thursday 11th October 2012 Ibadan.

30. Allendorf K. Do Women Land Rights Promote Empowerment and Child Health in Nepal? *World Development*. 2007; 35(11):1975-1988.

© 2018 Nakwe et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

*Peer-review history:*

*The peer review history for this paper can be accessed here:*

<http://www.sciedomain.org/review-history/26093>