

Assessing the Socio-Economic Determinants of Women Participation in Crop Cultivation in Adamawa State, Nigeria

¹Muhammad R. Ja'afar-Furo*, ²Khalid Bello, ³Agnes Philips Madanga

^{1,2,3} Department of Agricultural Economics and Extension,
Faculty of Agriculture
Adamawa State University,
PMB 25, Mubi,
Nigeria.

Email: jaafar436@adsu.edu.ng

<https://orcid.org/0000-0001-6550-1402>

Abstract

Women's active involvement in crop production plays a crucial role in ensuring food security and sustaining rural livelihoods. This study determined the socio-economic characteristics that influenced women's participation in crop production in Adamawa State, Nigeria. A Multi-stage, random and purposive methods of sampling were used to generate 220 respondents from eight local government areas. Structured questionnaire, group discussion and interview schedules were used for primary data collection. Descriptive statistics, regression analysis, gross margin analysis, and multicollinearity tests provided insights into the intricate relationships between variables. Findings revealed the key roles of education, farming experience, household size, and farm size in significantly ($p < 0.05$) determining women's participation in crop production. A cost-benefit ratio of .079 indicated fairly profitable enterprises in the State. Major identified challenges among women farmers included inaccessibility to credit facility, lack of extension services and expensive farm inputs. Policymakers need to subsidise farm inputs for women and make credit facilities available to them, with the intention of improving productivity and by extension sustainable rural community development.

Keywords: Adamawa, Crop production, food security, Nigeria, socioeconomic determinants,

INTRODUCTION

It has been reported by Fasoyiro *et al.* (2012) that agriculture formed the main backbone of Nigeria's economy, by contributing to the provision of food, employment of slightly more than 75.00% of the teeming population and serving as a source of raw materials to several industries. The nature of their agricultural production has been characterised by peasantry practiced mostly in the rural areas, with farm-size of 1-2 hectares. According to the World Food Programme in 2016, the majority of these agricultural workers are female peasant farmers who are involved in various farming tasks such as planting, thinning, fertilising and harvesting. Nigeria is currently grappling with a substantial food shortage problem, resulting in one-third of children under five years experiencing stunted growth, and almost half (48.5%) of the women in their reproductive years suffering from anaemia. The importance of women's involvement in agriculture, as well as the potentials they hold and the obstacles they face in enhancing food production in Nigeria, cannot be emphasised enough. The dedication of women to ensuring a steady food supply for the rapidly expanding population in Nigeria is

*Author for Correspondence

extensively discussed. Aneke et al. (2018) shed light on the various roles women play in the production, processing, and marketing of agricultural products, and more. The significant population of women and their high number in the agriculture labour market coupled with their important involvement in highly productive activities had made their role in the economic development of their nations a force to reckon with, and a segment which require urgent livelihood advancement and intervention.

The majority of individuals employed in the agricultural sector are women, accounting for 43% of the global agricultural workforce, with figures rising to 70% in specific countries (Agboh and Eteng, 2018). In certain African nations, a substantial 80% of agricultural production is attributed to small-scale farmers, with rural women being the primary contributors (Aneke and Alio, 2018). Although women make up the largest portion of the agricultural labour force, they face limitations in accessing and controlling essential land and productive resources, as noted by Mugege in 2013. Moreover, the percentage of households relying on women's financial contributions for food security has seen an increase, with women now contributing a larger share of income than in the past, as observed by Frankenberger et al. (2020). Women have an important role in Nigerian agriculture, working alongside male counterparts within farm families. However, many rural women confront problems such as illiteracy, a lack of skills, and cultural restraints. Despite these challenges, they actively support agricultural and rural development. According to Nakwe et al. (2018), women engage in a variety of agricultural activities such as weeding, fodder cutting, livestock management, and pre- and post-harvest food processing

Despite unquestionable contributions to agricultural and economic growth by women, empirical evidence shows that they have limited access to resources and opportunities such as land, loans, and extension services (Kemi et al., 2019). In spite of this, rural women face a number of barriers to agricultural output, including a lack of financial support and limited access to extension services. Numerous studies show that developing countries, in particular, frequently neglect and undervalue their contributions (Bhat et al., 2012). Even with this magnitude of contribution, there is a paucity of studies specifically addressing rural women's participation in agricultural production activities, particularly in Nigeria's north-eastern region. Most women in this region are considered largely as housewives who rely on their husbands' income (Hendrickson et al., 2012).

Women confront significant hurdles in achieving their agricultural demands, despite their passion for farming. These difficulties include a lack of access to financing, microcredit, necessary farming gear, and accurate knowledge about planting, harvesting, and marketing. These circumstances have prompted the formation of women's agricultural cooperatives in a number of local communities, mainly in rural areas, with the goal of increasing agricultural growth closer to their homes. Furthermore, women are underserved in terms of training, visits from extension agents, and access to new technology and seeds. They also face land ownership concerns stemming from traditional standards that hinder women from inheriting land appropriate for large-scale farming because of their gender. This study is being undertaken in this context. Specifically, it described the socio-economic characteristics of women crop producers in the area; identified the types of crops grown by women in the State; determined the socio-economic factors influencing women participation in crop production; examined the major sources of information for the women crop producers; determined the profitability of women crop production in the area; and identified the challenges associated with women participation in crop production in the study.

METHODOLOGY

Area of the Study

Adamawa State which is the study area is located in the Northeastern part of Nigeria. Adebayo (2020) reported that the State is found on latitude 7 and 11° N and between longitude 11° and 14° E. The State is bordered in the South and West by Taraba State, in the Northwest by Gombe State and Borno State in the Northern aspect. Internationally, the Republic of Cameroon lies on the State's Eastern side (Figure 1). The area of study has a total landmass of about 38,741 square kilometers, and composed of 21 Local Government Areas (LGAs). The population of the State is 4,633,160 which was taken from the NPC (2006)'s figure of 3,178,959 and projected at a growth rate of 2.94% as reported by Gabdo *et al.* (2020).

The climate of the State is made up of two distinct tropical dry and wet seasons. The dry season of the area extends to the months of November to March. However, the wet season commences in April and lasts up to October. There has been a wide variation of mean annual rainfall in the region (Adebayo, 2020) which ranges between 160mm and 700mm in the far South and Northwestern parts of the State, respectively.

The major occupation of the larger chunk of the people of the State, especially the women, is farming. The majority of the farming population mainly cultivates cereal crops which include maize, rice, millet, sorghum and wheat as the staple. Cash crops grown majorly are cotton, groundnut and cowpea. In addition, root crops namely cassava, cocoyam, yams and sweet and Irish potatoes are seen grown in some parts of the State. Aside from these mentioned crops, the rural farmers also raise livestock like small ruminants (sheep and goats) and large ruminants (cattle). Mainly seen alongside these animals, are poultry (chicken, ducks and turkey). Going by the human development index ranking indicated by USAID (2022), the State ranked the eleventh lowest in terms of sustainable development indices.

There are several languages spoken by the population of the people in the State. Of these, are Hausa, Fulfulde, Bwatiye, Higgi, Margi, Kanakuru, Lunguda, Chamba and Gude. Others are Verre, Yandang, Yungur, Njanyi and Kilba. The major sideline economic activities of the people are based on their culture and tribe; including fishing, beekeeping, pottery, petty trading, weaving and dying. Since the State has connections with about three countries by borders, namely the Chad Republic, the Republic of Cameroon and the Niger Republic, there is huge influx of traders that transverse the major markets for trading in mainly agricultural crops.

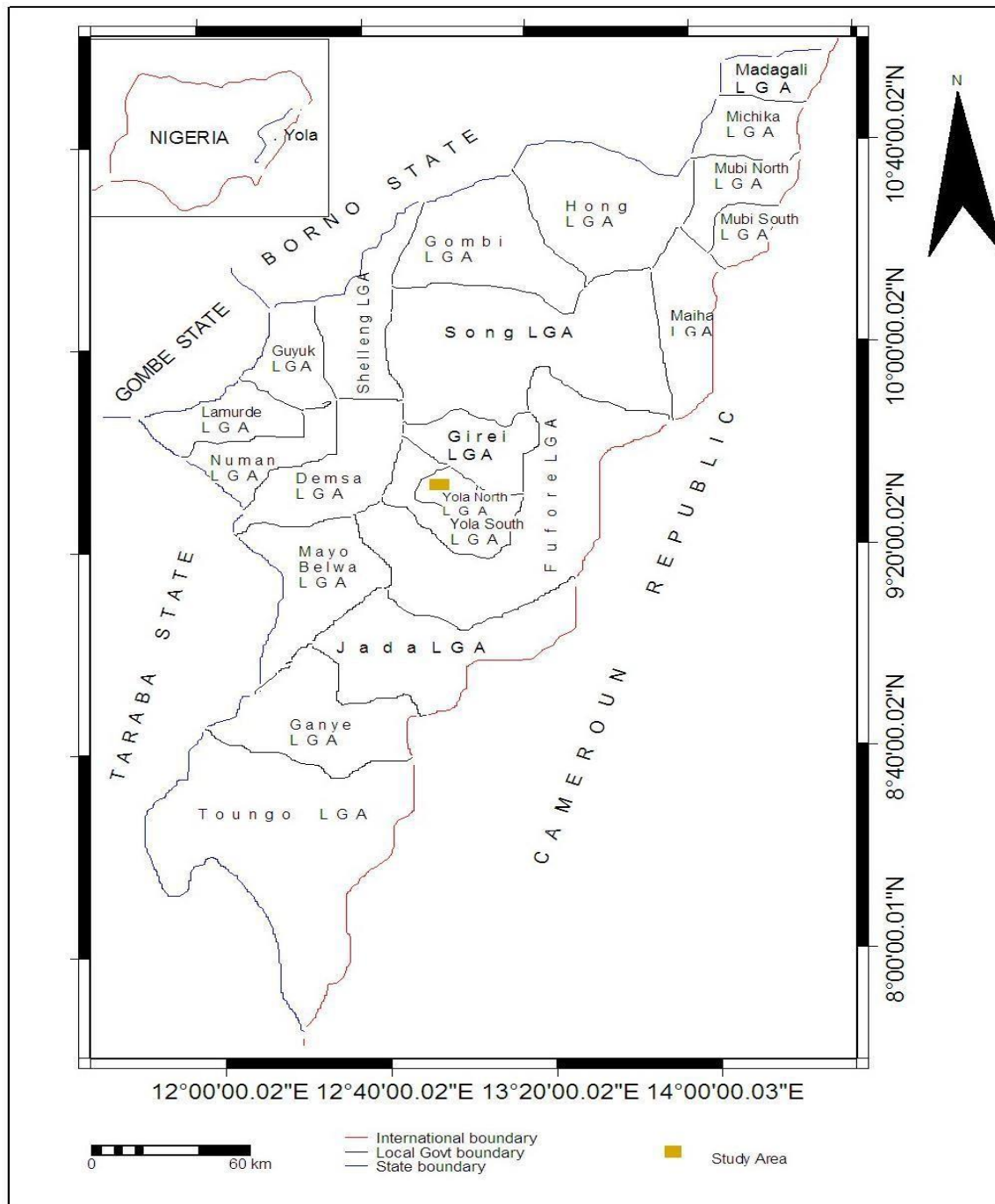


Figure 1: Map of the Study Area Indicating the 21 LGAs.
Source: Adebayo (2020).

The Sampling Procedure and Sample Size

The sampling procedure adopted for the research includes the Multistage, Purposive and Random methods. The first stage was the grouping of the State into agricultural zones in order to obtain a good spread of the sample. Adamawa State is divided into four main agricultural zones, namely Zone I, Zone II, Zone III and Zone IV. The Zone I is composed of five LGAs which are Madagali, Maiha, Michika, Mubi-North and Mubi-South. Zone II is made-up of four LGAs which are Girei, Gombi, Hong and Song. While the third Zone has Fufore, Ganaye, Jada, Mayobelwa and Toungo; the fourth Zone consists of the Demsa, Guyuk, Lamurde, Numan and Shelleng LGAs, respectively (table 1).

The second stage involved the selection of two LGAs from each Zone purposely thereby making a total of eight earmarked for the survey. These LGAs are shown in Table 1 and as well reflected in Figure 1 as Maiha and Mubi-North from Zone I, Hong and Gombi from Zone II, Ganye and Jada from Zone III, and Demsa and Numan from Zone IV, respectively. These localities were particularly chosen due to the height of participation of women in agricultural production in the areas.

In the third stage, the selection of one ward from each LGA where women crop farmers were more populated was made. This gave a total number of eight wards in the entire study area. Further, a village from each of the eight wards where there's high participation of women was selected to form eight villages. These villages were highly known for the huge involvement of women's crop production. The rurality of these areas further made it more appropriate for conduct of this research.

The fourth stage dealt with the selection of the women crop farmers randomly from a sampling frame of 2,200 residents across the State using a 10% value proportionate to size. This eventually yielded a sample size of 220 rural community women crop farmers in Adamawa State as reflected in Table 1. As women are the main drivers of rural agriculture production, documenting their appropriate socio-economic variables for this important survey would pave the avenue for absolutely understanding rural farming from the perspective of gender.

The Method of Data Collection

The data for the research were mainly generated from the primary source. A well-structured questionnaire served majorly as the instrument for the collection of data from the slightly enlightened women crop farmers. However, other complementary methods which included the group discussion, cost route and farm visits were applied to gather more comprehensive data. The research focused on the socio-economic profile of the women crop farmers, the variety of crop cultivated, the determinants of variables influencing their participation in crop production, their access to credit facilities and inputs, and extension services. Additionally, data were sourced on the profitability of the productive processes of the entire farming activities, and lastly, the challenges associated with the engagement of women in crop production.

Table 1: Sampling Procedure and Sample Size of the Rural Women Crop Farmers in the Study Area.

S/no.	Agric. Zone	No. of LGAs in a Zone	Selected LGAs	Selected Wards	Sample frame	Sample Size (10%)
1.	Zone 1	5	Maiha & Mubi-north	Pakka & Dazala	500	50
2.	Zone II	4	Hong & Gombi	Hong & Gabon	600	60
3.	Zone III	7	Ganye & Jada	Tsugu & Danaba	600	60
4.	Zone IV	5	Demsa & Numan	Dong & Bare Bolki	500	50
Total		21	8		2,220	220

Source: Generated from field survey data (2023).

The Analytical Tools Applied

Descriptive Statistics namely frequency distribution, means and percentages were applied to achieve the aspect of description of socio-economic variables of the women crop farmers,

types or variety of crops grown and challenges experienced by the farmers. In order to realise the socio-economic factors determining the participation of the women crop farmers in the area surveyed, the Ordinary Least Squares (OLS) method of regression analysis was adopted. However, the gross margin approach was used to estimate the profitability of the crop enterprises of the women farmers. The regression model is specified as follows:

$$Y_i = a + b_1X_{i1} + b_2X_{i2} + b_3X_{i3} + b_4X_{i4} + b_5X_{i5} + b_6X_{i6} + U_i \dots \dots \dots (1)$$

Where:

Y = Quantum of the yield of crop measured in scale of kg;

a = regression constant/intercept;

b₁, b₂, b₃, b₄, b₅, and b₆ = regression coefficients of the independent variables;

X₁ = age of the women crop farmers in years;

X₂ = level of education of the women crop farmers in years; X₃

= household size of the women crop farmers in number; X₄ =

farm size of the women crop farmers in hectares;

X₅ = farming experience of the women crop farmers in years;

X₆ = source of information measured by dummy; 1 for having access, otherwise = 0;

U_i = error term.

The aspect of the profitability of the entire enterprises of the women crop farmers was realised by the application of Gross Margin analysis (GM). The formula is given as:

$$GM = GFR - FVC \dots \dots \dots (2)$$

Where:

GM = Gross Margin

GFR = Gross Farm Receipt

FVC = Farm Variable Cost

$$NFI = GM - TFC \dots \dots \dots (3)$$

Where:

NFI = Net Farm Income

GM = Gross Margin

TFC = Total Fixed Cost

RESULTS AND DISCUSSION

Socio-Economic Variables of the Rural Women Crop Farmers

The importance of understanding the socio-economic variables of rural community dwellers in formulating appropriate policies that bring about rapid transformation in terms of development cannot be over-emphasised. As rural community development is all-encompassing in concepts, the inclusion of these variables seems apt for utilisation in policymaking. In this research, these variables namely the age of the women crop farmers,

marital status, household size, their experience put into the cultivation of crops, their level of educational attainment, primary occupation and farm size were properly captured and evaluated. This opinion on the application of the socio-economic variables of the rural farmers was similarly advanced by Anderson *et al.* (2020) who summarised their findings as enacting policies that allow for heavy investment in women to ensure the empowerment of households and communities; and Ogunniyi *et al.* (2021) who worked on the measures for ensuring food security among rural farmers in Nigeria. In this research, some of these socio-economic variables of the women crop farmers are shown in Tables 2 and 3.

The findings in Table 2 reflect the age, marital status, household size and farming experience of the rural women crop farmers in the State. Starting with the age of the crop cultivators, it could be observed that the majority (54.09%) of the respondents were middle-aged women ranging from 30-49 years. Usually farmers within this range in terms of age are considered physically strong, productive and, most of all, matured in making appropriate farming decisions (Dwomah *et al.*, 2023). A similar opinion was advanced by Sumo *et al.* (2022) in their assessment of the socio-economic variables of the farmers influencing the demand for extension service delivery after the end of the conflict in Liberia. Also, Alokpai and Mahunon (2023) stressed the relevance of this factor when assessing the importance of cultural and socio-economic variables in limiting the rate of rural women’s access to landownership in Zakpota community of the Benin Republic. Further, the marital status of the women respondents indicated a whooping majority (67.27%) of them as married, while an insignificant percentage of them were either divorcees, singles or widows. This finding might not be unconnected with the fact that a larger chunk of the rural women crop farmers were concerned with fending for the larger household size they had, and their males counterparts were mostly deceased due to either insurgency attacks or had been kidnapped for ransom. Moses *et al.* (2024) earlier reported similar result in their study in Northeastern Nigeria. Furthermore, the findings showed that most (52.27%) of the respondents’ family households had between 6 and 10 members, with a family size of 1-5 members trailing as the second position in the area surveyed. The discovery clearly indicates that the farm families had many persons to take care of, taking into cognisance of the present economic realities in the country where the inflation rate hits well over 37.00%. Kuma and Godama (2023) had earlier reported a much higher figure of 80.00% of the rural women farmers in a region of Ethiopia as married. This factor had relevance in giving the women right of ownership of land and other empowerment elements not only in Ethiopia alone but other sub-Saharan African nations, claimed the authors.

Table 2: Distribution of the Women Crop Farmers According to Age, Marital Status, Household, Size and Farming Experience in Adamawa State, Nigeria.

S/no.	Variable	Frequency	Total
1.	Age (yrs.)		
	20 - 29	40	18.18
	30 - 39	50	22.73
	40 - 49	69	31.36
	50 & above	61	27.73
	Total	220	100.00
2.	Marital Status		
	Divorcees	20	9.09
	Married	148	67.27
	Single	27	12.28
	Widows	25	11.36
	Total	220	100.00

3.	Household Size		
	1 – 5 persons	75	34.09
	6 – 10 persons	115	52.27
	11 – 15 persons	16	7.27
	16 – 20 persons	09	4.09
	21 & above persons	05	2.28
	Total	220	100.00
4.	Farming Experience		
	1 – 5 years	21	9.55
	6 – 10 years	94	42.73
	11 – 15 years	36	16.36
	16 – 20 years	29	13.18
	21 & above years	40	18.18
	Total	220	100.00

Source: Computed from field data (2023).

Lastly in this segment, Table 2 also shows findings on the farming experience of the rural women crop producers. A total of 42.73% of the crop producers had farming experience of 6-10 years as the largest proportion, with the women respondents having 1-5 years in cultivation of crops as the least. Inferring from the findings on this variable, it could be conveniently said that most of the rural women crop producers in the area had put in six years and above in cultivation of crops in Adamawa State, Nigeria. While it's strongly noted by several scholars (Oladejo *et al.*, 2011; Lowder *et al.*, 2019; Mukaila *et al.*, 2021) that experience is the period spent on agricultural enterprise which further goes to explain how knowledgeable these farmers are in understanding their businesses, majority of the rural women are mostly experienced in crop cultivation. As these women farmers dominate rural crop production, this factor remains relevant in increasing their productivity and by extension income.

Table 3: Distribution of the Rural Women Crop Farmers Based on the Primary Occupation, Level of Education and Farm Size in the Study Area.

S/no.	Variable	Frequency	Total
1.	Primary Occupation		
	Farming	175	79.55
	Civil service	26	11.82
	Petty trading	19	8.64
	Total	220	100.00
2.	Level of Education		
	Illiterate	48	21.82
	Primary school	53	24.09
	Secondary	76	34.55
	Diploma	29	13.18
	Degree	14	6.36
	Total	220	100.00
3.	Farm Size		
	Less than 1.0 hectare	38	17.27
	1.0 – 2.0 hectare	131	59.55
	2.1 – 4.0 hectare	22	10.00
	4.1 – 6.0 hectare	28	12.73
	5.1 & above	01	0.45
	Total	220	100.00

Source: Computed from field data (2023).

Table 3 shows three important socio-economic variables of the rural women farmers in the area namely primary occupation, level of education and farm size, respectively. The findings revealed that the majority of the respondents had farming as their main occupations, with civil servants occupying the second position in terms of the percentage of rural women that were engaged in cultivating crops in the study area. Those women farmers who were involved in petty trading as their major occupation accounted for the least in terms of percentage. The high rate of unemployment experienced in the country might have contributed immensely to the present condition. And since agriculture requires no specific qualification or license to practice, many of the rural women farmers had no other option than to get involved. Also, reflected in Table 3 is the level of educational attainment of the rural women farmers. Pooling from these findings, it could be said that the majority (78.18%) of the entire rural women have had Western educational experience ranging from primary school to tertiary schooling. This has been particularly evidenced by the result that only 21.82% of the respondents could not attend either formal or informal school. Omotesho *et al.* (2019), Lowder *et al.* (2019) and Bjomlund *et al.* (2020) who conducted studies in North-central Nigeria, took stock of the global distribution of farmland and reported an historical perspective of why agricultural production in sub-Sahara Africa has been low, respectively, documented similar result. Further, the findings on the farm size of the women farmers revealed that almost 60.00% of the respondents surveyed had cultivated farmland between 1.0 hectare and 2.0 hectares, with 17.27% and 12.73% owning less than 1.0 hectare and 4.1 – 6.0 hectares, respectively. These results aligned with that of Haile (2016) who reported 61.67% of the rural women farmers in a district in Ethiopia cultivating between 1-3 hectares of farmland. Kuma and Godana (2023) documented similar finding in Wolaita, Ethiopia among rural women farmers.

*Table 4: Types of Crops Cultivated by Rural Women Farmers in the Area (n: 220).

S/no.	Type of Crop	Frequency	Percentage	Ranking
1.	Yam	01	0.45	6 th
2.	Guinea corn	41	18.64	5 th
3.	Rice	80	36.36	4 th
4.	Beans	96	43.64	3 rd
5.	Groundnut	133	60.45	2 nd
6.	Maize	147	66.82	1 st

*Note: Multiple responses were observed.

Source: Computed from field data (2023).

The results in Table 4 indicate the types of crops cultivated by the rural women farmers in Adamawa State, Nigeria. This has been a facet of research that is minimally reported especially for women farmers in the country. In this study, maize was the highest-grown crop by rural women farmers. This might be due to the fact that this crop is regarded as one of the staples in the area. Groundnut was the second crop that was mostly cultivated by the rural women. And this could be probably because it's a cash crop and it fetches more money for women to handle other family needs like payment of children's school fees, settling of medical bills of members of the family and clothing. The third most grown crop by the women farmers was the beans. The latter's being a cash crop in nature could also be why the farmers put more effort into its cultivation in the area. Rice, guinea corn and yam trailed in descending order. Olawepo and Fatulu (2012), Asadu *et al.* (2013) and Adamu (2018) were among the few findings reporting similar results as it relates to the rural women farmers in Ekiti, Kwara State, Imo State and Ogun State all in Nigeria, respectively. The implication of this main finding is that, the two major cereal crops as staples in the area were maize and rice; and the cash crops were groundnut and beans. And any decisive policymaking should be hinged on these crops for improving the status of income of rural women.

Table 5 highlights the socio-economic determinants of the rural women crop farmers that influence the respondents' participation in crop production in the State. The importance of these variables in making meaningful decisions concerning the women farmers' participation made it necessary for consideration in this research. The results indicate that the income of the rural women farmers was the most significant ($p < 0.001$) variable that influenced the participation of the respondents with a coefficient of 1.2011 which is positive. In other words, a 1.00% increase in the income of the women farmers in the area would lead to an increase of 1.2011 in their participation in the cultivation of crops in the State. Similarly, the household size of the families of the rural women crop farmers had a significant ($p < 0.001$) influence on the level of participation of the respondents in crop production in Adamawa State. The coefficient of 2.1023 was the unit of increase in the involvement of the rural women farmers as the result of a 1.00% unit increase in their household size. Also, the farming experience and farm size of the rural women crop farmers played a significant ($p < 0.05$) role in influencing their participation in the cultivation of crops in the State. The coefficients of 1.0391 and 2.1012 were recorded for the number of years the women farmers spent in farming and their farm size, respectively. In these two instances, the coefficients represent the values of a unit increase in the level of participation of the rural women in the cultivation of crops due to 1.00% increase in their farming experience and farm size, respectively. However, the negativity recorded in the coefficients of a source of information and marital status of the rural women crop farmers showed that, as these explanatory variables increase in values, holding others variables constant, there would be a unit decrease in the participation of the rural women in the cultivation of crops in the area. The reverse is always the case. These findings are all shown in Table 5.

Table 5: Results of Regression Showing Factors that Determining Rural Women Participation in Cultivation of Crops in Adamawa State, Nigeria (n: 220).

S/no.	Variable	Coefficient	Stand. Error	t-Values	Level of Sig.
1.	Constant	3.1520	1.4231	2.2100	0.3451**
2.	Age (yrs)	0.1023	0.0123	0.0251	0.0011**
3.	Edu. Level	0.0280	2.0012	1.1101	0.0021
4.	HH size	2.1023	3.2131	0.1603	0.0001***
5.	Experience	1.0391	0.0281	1.3801	0.0030**
6.	Info. Source	-0.4331	0.1072	-4.0410	1.0202*
8.	Farm size	2.1012	0.0032	2.1201	0.0001**
9.	M/status	-2.1310	1.2940	-1.6601	2.0011
10.	Income	1.2011	0.1032	2.1002	0.0000***
11.	Adj. R ²	0.6210			
12.	F-value	3.1022**			

Note: HH = Household; * = $p < 0.01$; ** = $p < 0.05$; *** = $p < 0.001$

Source: Extracted from computer printout of SPSS version 26 & STATA (2023).

The essence of the involvement of rural women farmers in the cultivation of crops is to increase their income and by extension their wellbeing. In an attempt to evaluate the profitability of their enterprises in the study area, the net farm income (NFI) and gross margin analysis (GM) of the women crop farmers' farms were reported in Table 6. The findings indicate the gross receipts, fixed cost, variable cost and NFI of the entire enterprises for the women farmers in Adamawa State. The entire total gross receipts of their enterprises was N33,653,600, with sales of groundnuts and that of rice accounting for 49.01% and 39.49%, respectively. The fixed costs of the whole farms recorded total of N644,597 computed from the straight line depreciation of the equipment used by the rural women crop producers. Of the latter value, 60.60% was from depreciation on the use of cutlasses and 27.10% from depreciation on the use of sprayers. The total variable costs amounted to N42,496,855 which

was realised from the 11 items used during the production processes of all the enterprises. Out of this value, the cost of fertiliser, cost of ploughing and cost of harvesting formed proportions of 18.61%, 13.99% and 13.25%, respectively, as the most used items in descending order. Going by the formulae earlier stated, both the GM and NFI were negative in values, which indicated that the rural women's crop farming in the State at that point in time was not profitable. I supposed that the incidence was not due to the underutilisation of resources among the women farmers, but to the fact that at the period they purchased their farm inputs, there was sharp inflation which led to high-rocketed cost of these items. However, at the time of harvest, the Federal Government of Nigeria (FGN) observed that the prices of these staples and other produce were soaring and therefore, decided to allow for the import of rice for a short period of time. Additionally, the FGN also released some grains into the market from its reserve. These government actions lowered the prices of food stuff which invariably drastically reduced the prices of grains in Nigeria's markets. And by extension the income of the rural women farmers was negatively affected.

This policy of the FGN was a huge minus on the part of the farmers generally in the country. The ideal action to would have been undertaken by the government was to purchase the grains directly from the entire farmers and store same in the reserve as a stabilising factor, and then later offer such produce at lower prices for the citizenry at the period of scarcity. This is what is obtainable in most developed economies. The essence of this particular economic measure is to bring about stability of prices of agricultural commodities in the country, while equally keeping the farmers safer into the following production season. By doing so, the farmers will be maximally secured in the next cropping period. Similar opinions were expressed by Fasanya and Odudu (2020) and Adeyonu *et al.* (2021) in the country. Moreover, an appropriate reversal of this trend for the betterment of the nation would be the involvement of massive genuine investment in the agricultural sector with negligible tariffs on both exported and imported goods and services. The FGN's diversification of the economy from the mono-economy that is mainly dependent on the exploration of oil to the modernisation of agriculture is absolutely apt.

Table 6: Profitability Analysis of Enterprises of Rural Women Crop Farmers in Adamawa State, Nigeria (n: 220).

S/no.	Variable	Amount (N)	Percentage (%)
1.	Gross Receipts (GR)		
	Sales of maize	1,129,000	3.35
	Sales of groundnuts	16,494,000	49.01
	Sales of rice	13,289,300	39.49
	Sales of guinea corn	1,980,000	5.88
	Sales of beans	491,300	1.46
	Sales of yams	270,000	0.81
	Total (GR)	33,653,600	100.00
2.	Fixed Cost (FC)		
	Cost of hoes	79,275	12.30
	Cost of cutlasses	390,650	60.60
	Cost of sprayers	174,672	27.10
	Total FC	644,597	100.00
3.	Variable Cost (VC)		
	Cost of rent	3,543,500	8.34
	Cost of l/preparation	1,357,700	3.19
	Cost of fertiliser	7,907,800	18.61
	Cost of harvesting	5,628,850	13.25
	Cost of pesticides	1,678,505	3.95

Assessing the Socio-Economic Determinants of Women Participation in Crop Cultivation in Adamawa State, Nigeria

	Cost of herbicides	3,911,900	9.21
	Cost of seeds	1,871,350	4.40
	Cost of transport	3,799,100	8.94
	Cost of labour	4,446,850	10.46
	Cost of ploughing	5,948,000	13.99
	Contingencies	2,403,300	5.66
	Total VC	42,496,855	100.00
4.	Gross Margin	-8,843,255	
5.	Net Farm Income	-9,487,852	

Source: Computed from field data (2023).

The results of the study in Table 6 show that a total sum of N33,653, 600 was the gross receipts of the entire enterprises of the rural women crop farmers in the State. Of this amount, the larger proportion was accounted for by groundnuts. The second leading component of gross receipts of the entire enterprises was the sales from rice. Sales from guinea corn and maize formed the third and fourth components, respectively. While proceeds from the sales of yams accounted for the least component of gross receipt, sales from the beans trailed this root crop as the next most negligible component of the entire proceeds from all the enterprises in the area surveyed. Further, the fixed costs component was derived from calculating the cost of items using a straight-line depreciation on the entire equipment. The total amount recorded for the whole items was a sum of N644, 597. Out of this amount, depreciation on the value of cutlasses formed the major chunk in this research. This was followed by the cost of depreciation on the use of sprayers. The cost obtained from the depreciation on hoes accounted for the least of this component.

Furthermore, the variable costs for the entire enterprises of the rural women crop farmers in Adamawa State are shown in Table 6. A total cost of N42, 496,855 was the value obtained for the whole enterprises of the respondents. Eleven items of costs were documented in this study. Of this cost, the farm power (cost of land preparation + cost of ploughing + cost of harvesting + cost of other labour) put into the production processes accounted for the larger proportion (40.89%) of the entire variable costs of the enterprises in this research. This is followed by the cost of fertiliser and herbicides with 18.61% and 9.21%, respectively. Other costs which include transportation of goods, rent, seeds, pesticides and contingencies formed part of the variable costs but remained less significant in the production process. This major finding aligned with those of Panwal (2017), Bjornlund *et al.* (2020), Imanudin *et al.* (2022), and Gollin (2023) which primarily emphasised farm power as the most limiting input in small-scale agriculture in most developing countries. Therefore, minimising the constraints of the rural women crop farmers in the area, among other things, would call for making policies that will be subsidising this important input in the State.

Table 7: Major Sources of Information for Rural Women Crop Farmers in Adamawa State, Nigeria (n: 220).

S/no.	Source of Information	Frequency	Percentage	Ranking
1.	Research institutes	01	0.45	6 th
2.	Television	16	7.27	4 th
3.	Radio	45	20.45	2 nd
4.	Government agencies	03	1.36	5 th
5.	Extension officers	31	14.00	3 rd
6.	Knowledgeable farmers	193	87.73	1 st

Source: Computed from field data (2023).

In an attempt to find out how far information the rural women have on improving their crop production generally, the findings in the Table 7 were reported. The majority of the respondents acquired their information on crop production processes from fellow farmers who are more knowledgeable in farming. The second-ranking was that group of rural women farmers who got their knowledge on farming from radio sources. Those women farmers who obtained their information from the extension agents or officers accounted for 14.00% which ranked third among the sources in the area surveyed. The sources of information from the television, government agencies and research institutes ranked in ascending order of 4th, 5th and 6th positions, respectively. The studies of Issoufou *et al.* (2020) in Niger Republic, FAO (2023) which targeted the global perspective of women in inequality and Khan *et al.* (2024)'s submission on underdeveloped and developing countries, all highlighted the issues of illiteracy and inadequate access to information and agricultural productive resources as the bane for the rural women in advancing agriculture development. Although there would have been several sources of information for rural women farmers, Mittal and Mehar (2015) were of the opinion that rural women farmers have had limited access to these ideas thereby posing hindrance to the expected pace of agricultural development especially in developing countries.

Pooling from the immediate above findings, it could be stated that policymakers who intend to reach out fast to rural women farmers in terms of information dissemination should mainly involve the use of radio and on-farm visits in order to achieve massive success.

***Table 8: Major Challenges Experienced by Rural Women Crop Farmers in Adamawa State, Nigeria (n: 220).**

S/no.	Challenge	Frequency	Percentage	Ranking
1.	Inaccessibility to land	189	85.91	1 st
2.	Inadequacy of extension services	183	83.18	3 rd
3.	Inadequacy of farm inputs	179	81.36	4 th
4.	Inadequacy of credit facilities	168	75.00	5 th
5.	Cultural and religious issues	185	84.09	2 nd

Note: * Multiple responses were observed.

Source: Computed from field data (2023).

Table 8 shows the major challenges the rural women crop farmers experienced in Adamawa State, Nigeria. There were five main constraints to agricultural production faced by these respondents in this particular study area. The foremost of these challenges was the inaccessibility to the land for cultivation of crops with 85.91% of the rural women farmers reporting this challenge. While the cultural and religious factors accounted for the second-ranking in this category, the inadequacy of extension services by the changed agents ranked third. Inability to access the required farm inputs like hybrid seeds, herbicides, insecticides, and farm power, etc.; and inadequacy of credit facilities from both public and private sectors, recorded the 4th and 5th places, respectively. The findings of this survey aligned with that of Effiong (2013) who reported that in spite of the fact that women accounted for 60.00% - 90.00% of the total tasks performed in rural crop production in Nigeria, they still faced challenges of poor extension service, inadequacy of land and religious/cultural restrictions. Also, Agboh and Eteng (2018) reported that the main challenges experienced by rural women farmers in Akwa Ibom State, Nigeria, include restriction on land ownership, minimal access to credit facilities, gender inequality and inadequacy of storage facilities. Similarly, Dwomoh *et al.* (2023) stated that the rural women farmers remained the most affected persons in terms of inaccessibility to agricultural productive resources in Nigeria.

All these research findings are pointers to the fact that rural women remained the most vulnerable sets of crop producers both in terms of weakness in socio-economic variables that play significant roles in influencing the modernisation of agriculture and accessibility to appropriate productive agricultural resources. This implies that policymakers who intend to improve rural community agriculture would focus more attention on easing access to land for them, providing more agricultural extension contacts with them, massively subsidising the cost of inputs, and most of all, making available and affordable the major source of information to the rural women farmers (radio). Solving these raised issues would invariably mean modernising rural agriculture and by extension increasing the income of the larger chunk of the population that is engaged in agricultural production, and by far improving their wellbeing.

CONCLUSION

Pooling from the results of this survey, it could be stated that middle-aged rural women farmers formed the majority of the respondents in the area studied, with most of them as married. While a larger proportion of these sets of farmers were fairly experienced in the production of crops in the State, the women crop producers had medium-sized families and cultivated less than two hectares of land. The majority of the women crop farmers had stint with the Western education ranging from primary school to tertiary school. Also, the leading crop grown by the women farmers were maize, groundnuts, beans and rice. Knowledgeable farmers, radio and extension officers were the major sources of dissemination of information among the women groups of crop cultivators in the area. Further, the results showed that the cultivation of crops among these sets of farmers was not profitable mainly due to the flawed policy of the FGn. And the major challenges experienced by the women farmers were difficulty in ownership of land, some religious and cultural barriers, limited extension services, minimal farm inputs and inability to access adequate credit facilities. All these research findings are pointers to the fact that rural women remained the most vulnerable sets of crop producers both in terms of weakness in socio-economic variables that play significant roles in influencing the modernisation of agriculture amongst them and accessibility to appropriate productive agricultural resources. This implies that policymakers who ought to have focused their attention on solving the challenges that affect the largest population that produce the food requirement for the nation are still being neglected.

Based on the above findings, both public and private institutions that intend to improve upon the rural women crop cultivation in the study area should work towards the improvement of the supply of radio services at affordable rates to the respondents, provide more experienced extension officers to the rural communities to assist in the modernisation of crop cultivation, and encourage more lending financial institutions to offer adequate soft loans to the rural women farmers. Other measures that could be of immense significance to the women farmers' advancement in their agricultural activity are ease of access to landholdings and ownership and more enlightenment with regard to religious and cultural limitations. Above all, both the public and private sectors should work assiduously to ensure that farming inputs are made available to rural women farmers at affordable prices.

ACKNOWLEDGEMENTS

The authors wish to immensely thank the Adamawa State University, Mubi, Management for approving the conduct of this research, and the Tertiary Education Trust Fund (TETFund), Abuja, Nigeria, for providing the required funds to undertake the study, vide Reference number: TEFT/DR&D/UNI/MUBI/RG/2023/VOL.1 dated 27th November, 2023. Similarly, the trained enumerators that collected the data for this research deserve commendation for

their efforts and the rural women crop producers for their patience and cooperation throughout the study period.

REFERENCES

- Adamu, C. O. (2018). Analysis of Access to Formal Credit Facilities among Rural Women Farmers in Ogun State, Nigeria. *Nigerian Agricultural Journal*. 49(1): 109-116
<http://www.ajol.info/index.php/naj>
- Adebayo, A. A. (2020). *Climate "I and II" Adamawa State in Maps*. In: Adebayo, A. A. and Tukur, A. L. (eds.), *Adamawa State in Maps*. First Edition, Paraclete Publisher, Yola, Nigeria. Pp. 20 – 26
- Adeyonu, A. G., Shittu, A. M., Kehinde, M. O. and Adekunle, C. P. (2021). Farm Households' Demand Response to Escalating Food Prices in Nigeria. *Journal of Applied Economics*. 24(1): 555-576 <https://doi.org/10.1080/15140326.2021.1980351>
- Agboh, U. I. and Eteng, F. O. (2018). Challenges of Rural Women in Agricultural Production and Food Sufficiency in Cross River State, Nigeria. *Advances in Social Sciences Research Journal*, 5(12) 385-400 <https://doi.org/10.14738/assrj.512.5803>
- Alokpai, N. and Mahunon, B. S. (2023). Socio-Economic and Cultural Realities Limiting Agricultural Women's Access to Land in the Commune of *Zakpota* in the Republic of Benin. *International Journal of Agricultural Policy and Research*. 11(3): 79-90
<https://doi.org/10.15739/IJAPR.23.008>
- Aneke, C. U. and Alio, A. N. (2018). Women Participation in Agriculture: Prospects and Challenges for Increased Food Production in Enugu State, Nigeria. *British Journal of Education*, 6 (11): 29-35 www.eajournals.org
- Anderson, C. L., Reynolds, T. W., Biscaye, P., Patwardhan, V. and Schmid, C. (2020). Empowering Women in Agriculture: Assumptions and Evidence. *The Journal of Development Studies*. 57(2): 193-208 <https://doi.org/10.1080/00220388.2020.1769071>
- Asadu, A.N., Egbujor, C.L., Chah, J. M. and Ifejika, P. I. (2013). Gender Roles in Urban Crop Production in Imo State, Nigeria. *Journal of Agricultural Extension*. 17(2): 1-6
<http://dx.doi.org/10.4314/jae.v17i2.1>
- Bhat, A. H., Bhat, G. M., Khan, B. A. and Bhat, A. S. (2012). Analysis of Women Participation in Farm Activities in Rural Kashmiri – Some Major Findings. *Journal of Arts, Science and Technology*, 3(4): 42-47
- Bjomlund, V., Bjomlund, H. and Van Rooyen, A. V. (2020). Why agricultural production in sub-Saharan Africa remains low compared to the rest of the world – a historical perspective. *International Journal of Water Resources Development*. 36(51): 520-553
<https://doi.org/10.1080/07900627.2020.1739512>
- Dwomah, D., Agyabeng, K., Tuffoun, H. O., Tetteh, A., Godi, A. and Aryeetey R. (2023). Modeling Inequality in Access to Agricultural Productive Resources and Socioeconomic Determinants of Household Food Security in Ghana: A Cross-Sectional Study. *Agricultural and Food Economics*. 11(24): 1-21
<https://doi.org/10.1186/s40100-023-00267-6>
- Effiong, J. B. (2013). Challenges and Prospects of Rural Women in Agricultural Production in Nigeria. *Journal of Contemporary Research*. 10(2): 183-190
- Fasanya, I. O. and Odudu, T. F. (2020). Modeling Return and Volatility Spillovers among Food Prices in Nigeria. *Journal of Agriculture and Food Research*. 2: 100029
<https://doi.org/10.1016/j.jafr.2020.100029>
- Fasoyiro, S. B. and Taiwo, K. A. (2012). Strategies for Increasing Food Production and Food Security in Nigeria. *Journal of Agricultural and Food Information*, 13(4): 338 – 355
<https://doi.org/10.1080/10496505.2012.715063>

- Frankenberger, T., Garrett, J. L. and Downen, J. (2020). Programming for Urban Food and Nutrition Security in Achieving Urban Food and Nutrition Security in Developing World – A 2020 Vision for Food, Agriculture and the Environment Focus 3, Washington DC: IFPRI, 22pp
- Gabdo, B. H., Ja'afar-Furo, M. R., Hamid, M. Y. and Thlaffa, Y. A. (2020). Estimation of Technical Efficiency of Cattle Feedlot System in Adamawa State, Nigeria: Comparison among Estimators. *Agricultural Science and Technology*. 12(1): 24-30 <https://doi.org/10.15547/ast.2020.01.005>
- Gollin, D. (2023). Agricultural Productivity and Structural Transformation: Evidence and Questions for African Development. *Oxford Development Studies*. 51(4): 375-396 <https://doi.org/13600818.2023.2280638>
- Haile, F. (2016). Factors Affecting Women Farmers' Participation in Agricultural Extension Services for Improving the Production in Rural District of Dendi West Shoa Zone, Ethiopia. *Journal of Culture, Society and Development*. 21: 30-41 www.iiste.org
- Hendrickson, M. K. and Porth, M. (2012). Urban Agriculture-Best Practices and Possibilities. Report Developed for the Urban Sustainability Directors in the Cities of Columbia, Kansas City and St. Louis, Missouri, through the Financial Assistance of the Urban Sustainability Directors Network. Division of Applied Social Sciences June 2012, University of Missouri. 52pp
- Issoufou, M., Amadou, O., Lawali, D., Saidou, O. M., Habibou, I. and Boubacar, Y. (2020). Constraints and Strategies for Women's Access to Land in the Regions of Maradi and Zinder(Niger). *Congent Social Sciences*. 6(1):1712156 <https://doi.org/10.1080/2331886.2020.1712156>
- Imanudin, M. S., Bakri, Armanto, M. E. and Saputra, A. (2022). Analysis of Limiting Factors for Food Agriculture Development in Peatland Areas. *Earth and Environmental Science*.1025012029 <https://doi.org/10.1088/1755-1315/1025/1/012029>
- Khan, F. U., Nouman, M., Negrut, L., Abban, J., Cismas, L. M. and Siddiqi, M. F. (2024). Constraints to Agricultural Finance in Underdeveloped and Developing Countries: A Systematic Literature Review. *International Journal of Agricultural Sustainability*. 22(1): 2329388 <https://doi.org/10.1080/14735903.2024.2329388>
- Mittal, S. and Mehar, M. (2015). Socio-economic Factors Affecting Adoption of Modern Information and Communication Technology by Farmers in India: Analysis Using Multivariate Probit Model. *Journal of Agricultural Education and Extension*. 1-14pages <http://dx.doi.org/10.1080/1389224X.2014.997255>
- Omotesho, K. F., Akinrinde, A. F., Komolafe, S. E. and Aluko, O. E. (2019). Analysis of Women Participation in Farmer Group Activities in Kwara State, Nigeria. *Agricultura Tropica Et Subtropica*. 52(3-4): 121–128 <https://doi.org/10.2478/Ats-2019-0014>
- Panwal, E. F. (2017). Farm Labour Problems of Small Scale Farmers: A Case Study of Some Farming Communities in Plateau State Nigeria. *Journal of Agriculture and Sustainability*. 10(2): 187-197
- Kuma, B. and Godana, A. (2023). Factors Affecting Rural Women Economic Empowerment in Wolaita Ethiopia. *Congent Economics and Finance*. (2023), 11: 2235823 <https://doi.org/10.1080/23322039.2023.2235823>
- Lowder, S. K., Sanchez, M. V. and Bertini, R. (2019). Farms, Family Farms, Farmland Distribution and Farm Labour: What Do We Know Today? F. A. O. Agricultural Development Economics Working Paper 19-08. Rome, FAO. 72pp
- Moses, J. D., Ja'afar-Furo, M. R. and Ntasimda, S. (2024). Impact of Insecurity on Crop Productivity of Rural Women in Northeastern Nigeria. *Dutse Journal of Pure and Applied Sciences*. 10(2c): 242-260 <https://dx.doi.org/10.4314/dujopas.v10i2c.23>

- Mukaila, R., Falola, A. and Akanbi, S. U. O. (2021). Socioeconomic Determinants of Income among Rural Women in Enugu State, Nigeria: Implication for Achieving First Sustainable Development Goal. *Journal of Agribusiness and Rural Development*. 4(62): 363-370 <https://orcid.org/0000-0001-8584-0858>
- Mugede, S. M. (2013). The Role of Rural Women in Agriculture. <https://www.inforoma.org/women-in-agriculture/articles/the-role-of-agriculture.html>. Retrieved 7th March, 2013
- Nakwe, S. H. G., Mahmood, H. U., Ndaghu, A. A. and Bashir, M. B. (2018). Assessment of Women Participation in Vegetable Production Activities in ADP, Zone III, Taraba State, Nigeria. *Asian Journal of Agricultural Extension, Economics and Sociology*, 27 (2): 1 - 16 <https://doi.org/10.9734/AJAEES/2018/44126>
- Ogunniyi, A. I., Omotoso, S. O., Salman, K. K., Omotayo, A. O., Olagunju, K. O. K. O. and Aremu, A. O. (2021). Socio-economic Drivers of Food Security among Rural Households in Nigeria: Evidence from Smallholder Maize Farmers. *Social Indicators Research*. 155: 583-599 <https://doi.org/10.1007/s11205-020-02590-7>
- Olawepo, R. A. and Fatulu, B. (2012). Rural Women Farmers and Food Productivity in Nigeria: An Example from Ekiti Kwara, Nigeria. *Asian Social Science*. 8(10): 108-117 <http://dx.doi.org/10.5539/ass.v8n10p108>
- Oladejo, J. A., Olawuyi, S. O. and Anjorin, T. D. (2011). Analysis of Women Participation in Agricultural Production in Egbedore Local Government Area of Osun State, Nigeria. *International Journal of Agricultural Economics and Rural Development*. 4(1): 1-11
- Sumo, T. V., Ritho, C. and Irungu, P. (2022). Effect of Farmer Socio-Economic Characteristics on Extension Services Demand and its Intensity of Use in Post-Conflict Liberia. *Heliyon*. 8(2022) e12268 <https://doi.org/10.1016/j.heliyon.2022.e12268>
- United State Agency for International Development, USAID (2022). Celebrating the Return of Peace in Nigerian's Adamawa State. Retrieved on 15/12/2022 from www.usaid.gov/w