



GENDERED PATH TO MARKET PARTICIPATION OF SMALL-HOLDER COWPEA (*VIGNA. UNGUICULATA* (L.) WALP.) FARMERS IN NIGERIA

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ABSTRACT

The study analysed gender-based market participation of cowpea farmers in Borno state, Nigeria. Multi stage sampling procedure was employed in the selection of 593 cowpea farmers, comprising of 150 females and 443 males and primary data were collected using structured questionnaire. Descriptive and inferential statistics such as Chi-square and Tobit regression were used to analyse the data. The result showed that the average ages of both females and males were 48.83 (13.89) and 44.29 (13.83) years respectively, the average years of formal education for females and males were 5.08 (5.08) and 8.97 (5.91) years respectively. Less than half (41%) of females and the majority (58%) of males were members of a group. Equally, less than half (40% and 37.9%) of females and males respectively had access to market information. The result further revealed that the majority (62.7% and 68.62%) of females and males respectively sold their cowpea outside their village. The level of cowpea market participation was high for females and males (53.58% and 55.39 respectively) with no significant difference ($\text{Chi}^2=0.591$, $P \geq 0.1$). Tobit estimates showed that Household size was positively significant ($P \leq 0.1$), Age, Years of formal education, and group membership were found to be negative but significant ($P \leq 0.01$, $P \leq 0.01$ and $P \leq 0.05$ respectively). It is concluded that there is no gender inequality regarding to cowpea market participation in Borno State Nigeria. The use of conventional market channels that are gender-friendly is recommended to improve cowpea market participation.

Keywords: Inequality, Household commercialization index, Tobit model, Sex, Skewness, Borno

INTRODUCTION

Nigeria is the highest producer of cowpea which accounts for 48% of production in Africa and 46% worldwide with negligible exports and imports quantities which plays a substantial role in the country's agricultural sector (IITA, 2023). Cowpea is a staple crop in Nigeria, the northern region in particular, where it is grown usually by small-holder farmers (IITA, 2023). The distribution of cowpea marketers also sheds light on gender inequality within the cowpea market (Kyari *et al.*, 2023).

In agricultural activities, we often observe gender-based disparities in market participation (FAO, 2023). These disparities can be influenced by various factors, including socio-economic, division of labour, access to resources, and institutional support (FAO, 2023). Gendered market participation refers to the differential engagement of males and females in agricultural markets, where certain crops or activities are predominantly carried out by one gender over the other (Comblon *et al.*, 2017). Studies in other African countries have tinted the role of household dynamics in shaping gender patterns of market participation. According to



ILO (2016) inequality between females and males continues across a wide scale of the global market participation, in addition, informal occupation like farming in Sub-Saharan Africa (Nigeria inclusive) is a major source of occupation for females than their counterpart but the gender gap in informal work still exists and reaches up to 13% points. Market participation is continuous being seen as a strategy to mitigate food insecurity, poverty, unemployment growth and mal-nutrition (Falola *et al.* (2022); Ogutu *et al.*, 2019; and Simtowe *et al.*, 2017). Also, Akouegnonhou and Demirbaş (2023) assert that improving market participation increases farmers' earnings and welfare.

Arrangement for the economic and social changes connected with the gendered cowpea market participation is crucial to safeguard development towards the realization of the Sustainable Development Goals (SDGs) of the 2030 Agenda for Sustainable Development. These are relevant for Goals on: “eradicating poverty (SDG 1); promoting gender equality (SDG 5); full productive employment and decent work for all (SDG 8); reducing inequalities between and within countries (SDG 10); and making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11)”.

The study was guided by Random Utility Theory (RUT) as a framework for understanding and modelling individual female's and male's decision-making in the presence of choice alternatives in the context of extent of market participation.

Cowpea is a crop with high commercial value due to its protein content and atmospheric Nitrogen fixation ability into soil. It can be processed into different food items. The land area under its cultivation is increasing due to its importance and high demand by industries also as a strategy to improve productivity, descent employment, making human settlement inclusive and gender equality (FAO, 2020). This has shown that there is a great market potential for the crop ‘both locally and for export. Conversely, no conclusive evidence exists to show the gendered path to market participation in Borno.

A study by Ingabire *et al.* (2017) inferred that Female-headed households were more likely to partake in bean markets, selling higher volumes than male-headed households which put forward that bean production can be paramount source of income for females' smallholder farmers.

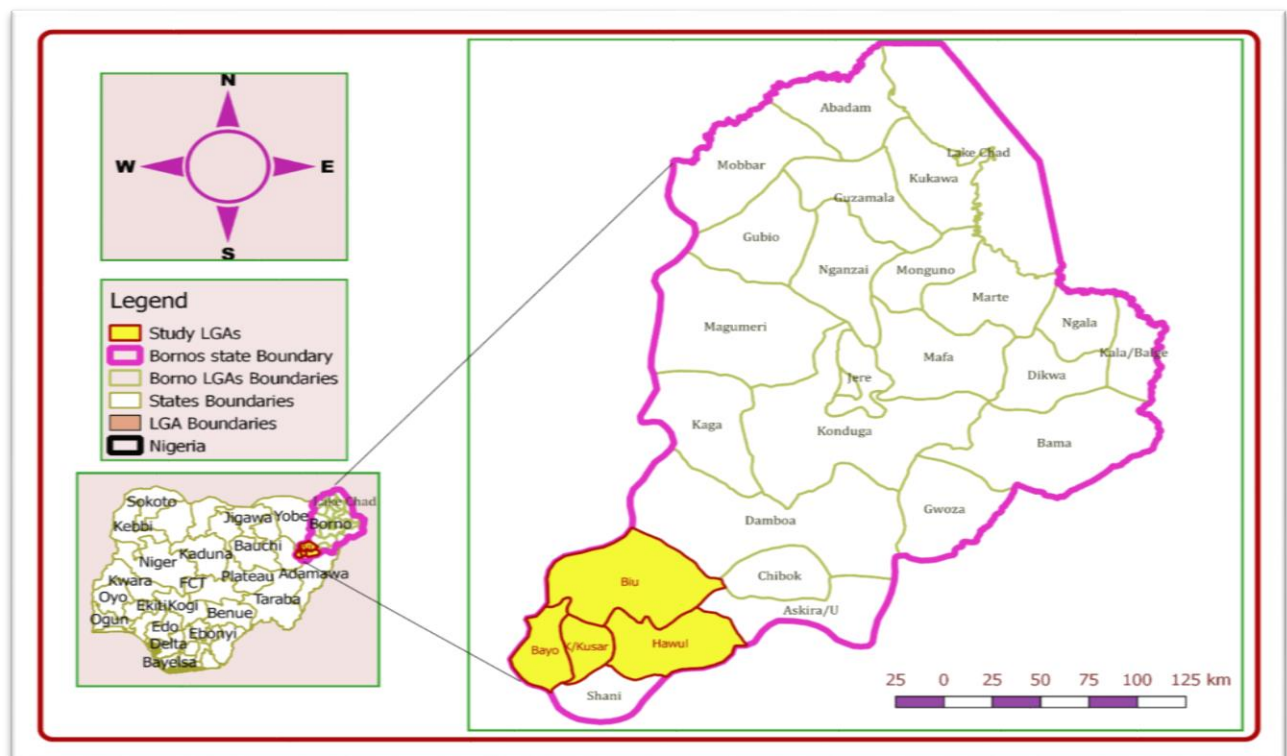
The studies of Sylla *et al.* (2023) on the importance of the social structures in Cowpea varietal demands for females and males farmers in Segou Region, Mali have revealed that females are less involved in cowpea value chain activities, except in sorting and grading cowpea grains and seeds which is drive by the norms and values of change of social hierarchy and the social structures that control and guide interpersonal relations and social network within and between of households and communities. Studies by Kyari *et al.* (2023) and Gaya *et al.* (2020) in Borno State, Nigeria, have shown cowpea as an important staple crop for smallholder farmers, contributing significantly to food security and income generation. However, females' participation in cowpea markets is paramount. To understand the factors that influence and potentially affect females' and males' participation in cowpea markets in Borno State, a gender-based analysis is needed. Some studies have been conducted in African countries, such as Mali and Niger, to understand the gender dynamics and social structures within communities and their influence on farmer participation in the cowpea market. Gender-inclusive research is crucial to improving cowpea production and ensuring equal participation in cowpea markets for both sexes in Borno State, Nigeria. It was against this background that this study was conducted in Borno state among cowpea farmers. The study was carried out to describe the socio-economic characteristics of cowpea farmers in Borno state, describe the cowpea farmers access to market information in Borno state, describe the cowpea farmers market channels in

Borno state, examine the gendered market participation among Cowpea farmers in Borno State, determine the gendered level of market participation among the cowpea farmers in Borno state and determine the factors influencing the extent of market participation among cowpea farmers in Borno state.

METHODOLOGY

The Study Area

The study was conducted in the Borno State where Improved Cowpea Technologies (ICTs) were disseminated to farmers through projects such as PROSAB, TL II, TL III and N2Africa among others in collaboration with Borno State Agricultural Development Program (BOSADP). The study was conducted in four selected local government areas, namely; Biu, Kwaya Kusar, Hawul and Bayo Local Government Areas due to the security situation of the State. The study area (*Fig. 1*) is situated between latitudes $10^{\circ} 30'N$ and $10^{\circ} 45'N$ and longitude $12^{\circ} 23'E$ and $13^{\circ} 13'E$. The study area has a population of about 352,886 (NPC, 2006) with a



2020 projected population estimate of about 704,468 based on a 3.2% population growth rate. The study area covers an area of $6,874.2 \text{ km}^2$ (BOSADP, 2020).

The dominant crops grown for home consumption and local markets are cowpea, maize, sorghum, groundnuts, rice and recently cowpea. Livestock species (that is small and large ruminants as well as poultry) are an integral part of the farming system and provide income and food to households.

Figure 1: map of Borno state showing the study area

Sampling Procedure

The multi-stage sampling technique was used in selecting communities and respondents in the four LGAs. The technique reduces the time and cost of surveying samples from vast population to a convenient size but passes through several stages to ensure equitable representation (Xie



and Lu, 2015). In the first stage, four local government areas were purposively selected, these includes: Bayo, Biu, Hawul and Kwaya-Kusar as a result of civil unrest and concentration of cowpea production. In the second stage, thirty communities where cowpea is being produced in higher concentration were randomly selected from the four LGAs. The basis for this selection is informed by the presence of registered Households in the communities. The third stage was involved selecting proportionate random number of respondents from each of the thirty communities. The list of groundnut farmers in the various communities was obtained from the service department of BOSADP. A total of 593 respondents were selected for the study.

Method of Data Collection

Primary data from descriptive survey was used for the study; data were collected from the respondents using interview schedule. Trained enumerators under the supervision of the researcher were used to collect data electronically on annual cowpea production, improved cowpea varieties used, socio-economic characteristics of the farmers, among others.

Method of Data Analysis

Descriptive statistics (such as percentages, mean, standard deviation.....) and inferential statistics such as Pearson chi square and Tobit regression were used to achieve the objectives of the study.

The level of cowpea market participation was calculated using the household commercialization index (HCI) as proposed by Govereh *et al.* (1999) and Straasberg *et al.* (1999) to achieve objective (iv) of the study. It was calculated as follows;

$$HCI_{is} = \text{Gross value of Cowpea sale}_{ij} / \text{Gross value of Cowpea production}_{ij} \times 100 \quad \dots 3$$

Where;

HCI_{is} = the *i*th farmer commercialization index for cowpea. It is a proxy measure for level of participation among farmers
 Numerator = Total value of cowpea sold by the *i*th farmer in the *j*th year
 Denominator = Total value of cowpea harvest by the *i*th farmer in the *j*th year, *j* = 2022/2022 farming season.

Pearson Chi square

$$\text{Pearson chi-square} = \sum \frac{(O-E)^2}{E} \quad \dots 4$$

Where:

O= observed frequency

E= expected frequency

Tobit regression

The drivers of the extent of market participation were achieved using Tobit regression. The model is explicitly expressed as:

$$Z_i^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_{10} X_{10} + \epsilon_i \quad \dots 5$$

Z_i^* =sales volume in percentage

β_0 = intercept

β = regression coefficients

ϵ_i = error term

X_1 = Age of the farmer (years)

X_2 = Sex (male=1, otherwise=0)

X_3 = Marital status (married=1, otherwise=0)

X_4 = Education (years)

X_5 = Legume farming experience (years)



- X₆ = Household size (Number of persons in the household)
X₇ = Farm size (hectare)
X₈ = Group membership (member=1, otherwise=0)
X₉ = Market information (accessed=1, otherwise=0)
X₁₀ = Farm Income (Naira)

RESULT AND DISCUSSION

Socio-economic Characteristics of Cowpea Farmers by Sex in Borno State Nigeria

Table 1 revealed that the Age of the respondents was averagely 48.83 and 44.29 years with standard deviations of 13.89 and 13.83 for both the females and the males respectively. This showed that both the females and males were at their active age to be able to engage in cowpea marketing, the standard deviation depicts little dispersion of the ages of both sexes. The result further showed a skewness of 0.46 and 0.38 for females and males respectively. These inferred that the ages of both sexes were normally distributed as they were within the range of 1 and -1 as suggested by Mishra *et al.* (2019).

The average Years of formal education of both the females and males were found to be 5.08 and 8.97 with standard deviations of 5.08 and 5.91 respectively. These implied that most female cowpea farmers do not attain the universal basic education of 9 years in Nigeria while most males attain the universal basic education mission of 9 years.

This confirms the cowpea female farmers' exclusion and bias of access to education in Borno State, Nigeria. The standard deviations showed the exorbitant dispersion of education within both sexes. The skewness of 0.46 and 0.72 of both the females and males affirmed the normal distribution of years of formal education of cowpea farmers' sexes in Borno state. This means the normal distribution for poor education of females' cowpea farmers in Borno state Nigeria which as a result might affect their ability to engage in modern-day methods of marketing cowpea that involve the use of modern technologies. This coincides with Comblon, *et al.* (2017) who found a significant disparity between the Cameroun and Mali in terms of females' market participation which is determined by the disparity in their education levels.

The average farming experiences of both females and males were found to be 22.68 and 21.49 years with a standard deviation of 12.56 and 11.18 respectively. These revealed that most of the females and males cowpea farmers were experienced in farming, which will enable them to use their rich experience to engage in cowpea marketing. The standard deviations depict immoderate dispersion within female and male cowpea farmers in Borno state. This means that there were a lot of farmers with rich farming experience and also a lot with poor farming experience within the state. The skewness of 0.44 and 0.86 for female and male cowpea farmers respectively revealed that the farming experiences were normally distributed for both female and male cowpea farmers. This implies that both sexes of average cowpea farmers were on the experience side in farming to be able to know the nooks and crannies of cowpea marketing.

The average legume farming experiences of both females and males were found to be 14.60 and 15.77 years with standard deviations of 9.47 and 9.68 respectively. These revealed that most of the female and male cowpea farmers were experienced in farming, which will enable them to use their rich experience to engage in cowpea marketing. The standard deviations depict immoderate dispersion within female and male cowpea farmers in Borno state. This means that there were lot farmers with rich legume farming experience and also a lot with poor farming experience within the state. The skewness of 0.91 and 1.30 for female and male cowpea farmers respectively revealed that the farming experience was positively



skewed for male farmers. This showed that farming experience of male cowpea farmers were tilted towards higher experience as opposed to their females' counterpart that were normally distributed. This implies that male cowpea farmers were more experienced in farming. This enables them to know the nooks and crannies of the cowpea marketing.

The average Household sizes of both female and male cowpea farmers were 7 and 9 with standard deviation of 3.06 and 4.33 respectively. These showed that household sizes were relatively large with little dispersion within both sexes. These might cause market intensification of cowpea by the cowpea farmers. The skewness values of 0.91 and 0.80 for both females and males respectively depict the normal distribution of the household sizes of females and males.

The group membership of both the females and males cowpea farmers was normally distributed as inferred by the skewness value of 0.38 and -0.32 for both the females and males respectively. These showed that there is no inequality in regards to participation in groups. This will probably enable them to utilize their social capital in order to improve their market participation. The result further revealed that less than half (41%) and majority (58%) of females and males cowpea farmers were members of a group.

Table 1: Socio-economic Characteristic of Cowpea Farmers based on Sex n=593

Variable	Age (years)	Education (years)	Farming experience (years)	Legume farming experience (years)	Household size (person)	Group membership (member=1, non-member=0)
Female	N	150	150	150	150	150
	Mean	48.83	5.08	22.68	14.60	7.04
	Std. Deviation	13.89	5.08	12.56	9.47	3.06
	Skewness	0.46	0.59	0.44	0.91	0.91
	Minimum	18	0	2	1	1
	Maximum	80	20	50	50	17
Male	N	443	443	443	443	443
	Mean	44.29	8.97	21.49	15.77	8.75
	Std. Deviation	13.83	5.91	11.18	9.68	4.33
	Skewness	0.72	-0.22	0.86	1.30	0.80
	Minimum	20	0	3	1	1
	Maximum	86	30	56	56	24

Field Survey (2023)

Distribution of Cowpea Farmers' Access to Market Information by Sex in Borno State Nigeria

The result in Table 2 showed that among female cowpea farmers in Borno state, less than half (40%) accessed market information. This revealed that the market information was poorly accessed by females for them to make better decision of their marketing participation and strategy. This in turn might affect their level of market participation and profit. Also, their males counterpart, only 37.9% accessed market intelligence. This implies a terrible access to



market information which might negatively affects their marketing participation and profit of the cowpea marketing. This coincides with Sitko and Jayne (2014) who revealed that farmers were facing poor market information in eastern and southern Africa which compels them to sell it to exploitative grain buyers that take advantage of their poor market information.

Table 2: Access to Market Information of Cowpea Farmers by Sex n=593

	Variable	Frequency	%
Female	Not accessed	90	60.0
	Accessed	60	40.0
	Total	150	100.0
Male	Not accessed	275	62.1
	Accessed	168	37.9
	Total	443	100

Field Survey (2023)

Distribution of Cowpea Farmers by Sex based on Marketing Channel in Borno State Nigeria

Table 3 revealed that less than half (44%) of the female cowpea farmers sold their cowpea at a local market and also less than half (37.25%) of their male counterpart sold at the local market. This showed the cowpea had market even at the local market in some locations in Borno state.

The Table further inferred that majority (62.67% and 68.62) of females and males respectively had sold their cowpea in a market outside their villages. This was probably as a result of majority of rural villages had no market for their grains and sold with premium at the markets outside their village in Borno state Nigeria. This is in line with Adams *et al.* (2022) who found in their review that farmers’ choice of output market was influenced by prices. Only 0.67% and 2.93% of females and males cowpea farmers respectively sold their cowpea for Agro-dealers. This might be due to less distribution of agro-dealers in rural-Borno State, Nigeria.

The result further discovered that only 2.67% and 4.06% of females and males cowpea farmers respectively sold their cowpea for traders in Borno state Nigeria. This implies that traders were not usually use for selling cowpea. This is probably due to cowpea farmers sold it with premium at market place that patronising the traders.

The Table 3 also exposed informal market as patronised by only 0.67% and 0.68% of males and females respectively in Borno state. This implies that cowpea farmers prefer formal settings to sell their produce in Borno state Nigeria.

Table 3: Market Channel of Cowpea Farmers by Sex

Variable		Frequency*	%
Local market	Female	66	44
	Male	165	37.25
Market outside village	Female	94	62.67
	Male	304	68.62
Agro-dealer	Female	1	0.67
	Male	13	2.93
Traders	Female	4	2.67
	Male	18	4.06
Informal market	Female	1	0.67
	Male	3	0.68
Total	Female	166	110.67
	Male	503	113.54
Grand total		669	224.21

Field Survey (2023)

*= multiple responses

Gendered Level of Market Participation among Cowpea Farmers in Borno State, Nigeria

Table 4 inferred that the average females and males' market participations were 53.58% and 55.39% with standard deviation of 16.14 and 19.74. This showed that there were higher market participation for both the females and the males as suggested by Abera (2009), who said that the HCI of more than 50% is considered high. This implies the active participation of both the females and the males in Borno state Nigeria. The standard deviation revealed the little variation of market participation in Borno state Nigeria. The skewness of -0.51 and -0.35 means there were no inequality within both the females and within the males in Borno state Nigeria. This was contrary to the findings of Zakari *et al.* (2023) and Comblon *et al.* (2017) who found that gender was positively affecting smallholder farmers' market participation in sahelian region of Niger, Cameroun and Mali.

Table 4: Gendered Level of Market Participation among Cowpea Farmers n=593

Variable	N	Mean	Std. Dev.	Minimum	Maximum	Skewness	
Female	Total value of Cowpea produced (₦)	150	135933.33	154269.77	10000	1250000	4.58
	Total value of Cowpea sold (₦)	150	76462.60	110180.66	1500	1125000	6.56
	Market Participation (%)	150	53.58	16.14	10	90	-0.51
Male	Total value of Cowpea produced (₦)	443	342820.47	539671.03	7000	6500000	6.74
	Total value of Cowpea sold (₦)	443	202852.73	355461.69	2250	4050000	7.07
	Market Participation (%)	443	55.39	19.74	10	90	-0.35

Field Survey (2023)

Distribution of Cowpea Farmers based on Gender Disparity to Market Participation in Borno State, Nigeria

Table 5 revealed the categorization of HCI into ordered levels of High (>50%), Medium (26-50%) and Low ($\leq 25\%$) as suggested by Abera (2009). No significant difference was found between the females and males as shown by the Pearson chi square of 0.591 ($P \geq 0.1$). This showed the equal market participation opportunity for both males and females as opposed to Baba (2018) who showed the biased in cowpea marketing in BIU LGA, Borno state. This was probably due to the fact that he based his study on some selected markets, but this study was based on cowpea producers and their associated marketing activities.

Table 5: Gender Disparity of Cowpea Farmers based on Market Participation

Variable	HCI	Frequency	Female	Male	Joint	Pearson Chi square	Sig.
Low		Observed	14	50	64	0.591	0.744
		Expected	16.3	47.7	64		
		% within Sex	9.70%	11.80%	11.30%		
Medium		Observed	39	106	145		
		Expected	36.8	108.2	145		
		% within Sex	27.10%	25.10%	25.60%		
High		Observed	91	267	358		
		Expected	90.9	267.1	358		
		% within Sex	63.20%	63.10%	63.10%		
Total		Observed	144	423	567		
		Expected	144	423	567		
		% within Sex	100.00%	100.00%	100.00%		
Kendals tau-b			-0.007				0.859

Field Survey (2023)

Determinants of Extent of Market Participation among Cowpea Farmers

Table 6 revealed that LR $\chi^2(10) = 25.73$ and significant ($P \leq 0.01$), this shown the reliability of the model as affirmed by the Log likelihood -2522.52. Out of ten explanatory variables included in the model only three were found to be negative but significant and household size was positively significant. Household size was found to be positively significant ($P \leq 0.1$). Age, Years of formal education and Group membership were found to be negative but significant ($P \leq 0.01$, $P \leq 0.01$ and $P \leq 0.05$ respectively).

Household size was found to be positively significant ($P \leq 0.1$). This showed that as Household size increases by one person the extent of cowpea farmers’ market participation increases by 0.375%. This might be due to increase in dependents that the cowpea farmer will strive to cater for their needs and the possible increase in the labour forces in the household that provide more available family labour. This is in line with Cheng *et al.* (2019) who found household composition to be affecting market participation in china.

Age ($P \leq 0.01$) was found to be negative but significant ($P \leq 0.01$). This implies that as age decreases by one year, the intensity of cowpea market participation will increases by 0.235%. This showed that younger cowpea farmers were actively engaged in cowpea marketing more than their older counterparts. This was likely due to labour participation is declining with ageing of farmers as it is a phenomenon in most nations. This corroborates Moussa (2019) and Formosa (2019) who inferred that aged people were less in participating into labour market. The result is contrary to that of Oyata *et al.* (2020) who found age to be positively influencing market participation of yellow pepper in south-east Nigeria; the author reported inconsistencies in regards to effect of age on market participation as age denotes experience while younger farmers are more energetic.

Years of formal education was found to be negative but significant ($P \leq 0.01$). This revealed that as years of formal education decreases by one year, the extent of cowpea farmers’



market participation increases by 0.151%. This might be due to less educated farmers engage more into farming business venture as opposed to educated people that usually have their primary occupation besides farming enterprise. This is contrary to report of Ingabire *et al.* (2017) who found education to have direct relationship with bean market participation in Rwanda.

Group membership was found to be negative but significant ($P \leq 0.05$). This showed that if cowpea farmer was non-group members the tendency of him to participate in intensity of cowpea marketing increases by 3.278%. This was likely due to the farmers' group were not meant for marketing information but usually to derived agricultural assistance from government and other donor agencies. This is in line with the findings of Emaziye (2020) who found majority of agricultural cooperatives were geared to attract credit in Delta state, Nigeria. This contradicts the report of Oyata, *et al.* (2020) who found group membership to be positively affecting market participation of yellow pepper in south-east Nigeria.

Table 6: Factors affecting extent of market participation n=593

Variable	Coef.	Std. Err.	T-value	P> t
Age	-0.235	0.076	-3.07	0.002
Sex	3.309	2.308	1.43	0.152
Marital status	-1.526	2.868	-0.53	0.595
Years of formal education	-0.453	0.146	-3.11	0.002
Legume farming experience	0.151	0.104	1.45	0.148
Household size	0.375	0.204	1.84	0.067
Farm size	-0.172	1.234	-0.14	0.889
Group membership	-3.278	1.630	-2.01	0.045
Market information	-1.065	1.651	-0.64	0.519
Farm income	1.24e-07	1.44e-06	0.09	0.932
Constant	64.626	4.204	15.37	0
Sigma	18.820	0.559		
Log likelihood	-2522.52			
LR $\chi^2(10)$	25.73***			
Pseudo R ²	0.005			

Field Survey (2023)

CONCLUSSION AND RECOMMENDATION

The study concludes that there is no any gender bias about market participation in Borno state Nigeria. It is therefore recommended that since there was a bias in attaining females' universal basic education in Borno state, there is need to adopt a conventional market channels that are not above the understanding of the female farmers by government and other NGOs in an attempt to improve cowpea market participation which coincide with Goals on: "eradicating poverty (SDG 1); promoting gender equality (SDG 5); full productive employment and decent work for all (SDG 8); reducing inequalities between and within countries (SDG 10); and making cities and human settlements inclusive, safe, resilient and sustainable (SDG 11)". Alternatively, encouraging creation of groups that are market oriented in addition to existing groups that helps cowpea farmers procure agricultural support. This will enable less educated ones to enjoy use of marketing information system from their peers and sell their cowpea with premium. Also, digital and business literacy of female farmers should



be encouraged by policy makers on practical skills for market participation like accessing market information, using mobile apps for communication and transactions.

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