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Land tenure and agricultural intensification by women farmers in Nigeria

Effects on crop commercialization

[1]Alawode Olubunmi Olanike, [2]Oladokun Yetunde Olasimbo Mary, [3]Awotunde Mololuwa Mayowa

[1] Olubunmi Olanike Alawode. olubunmio.alawode@gmail.com .

University of Ibadan, Nigeria

[2] Yetunde Olasimbo Mary Oladokun. yetunde.oladokun@gmail.com

Cocoa Research Institute of Nigeria

[3] Mololuwa Mayowa Awotunde.

mololuwaawotunde@gmail.com .

University of Ibadan, Nigeria

ABSTRACT

Women make essential contributions to agriculture by playing a large role in food crop production. They require land as source of rural livelihood and monetary strengthening through land right security. Women's ownership of land and property can be potentially transformative, not only as a store of value, but also as a means of acquiring other assets and engaging in a range of markets. However, women have lower access to productive resources (land and capital) compared to their male counterparts.

Goal and Objectives

This paper broadly examines land tenure and agricultural intensification by women farmers in Nigeria, and their effects on crop commercialization. Specifically, this paper examines land tenure systems, analyzes agricultural intensification and evaluates crop commercialization among women farmers in Nigeria.

Methodology

The Nigeria General Household Survey (GHS) 2018 were used. Data for 1,962 women farmers were extracted from the dataset. These include socioeconomic characteristics of women farmers as well as information on land tenure systems, agricultural intensification and crop commercialization. Data were analysed using descriptive statistics to examine land tenure systems; Ruthenberg Index, Labour Use Intensity, and Fertilizer Use Intensity to analyze agricultural intensification; Crop Commercialization Index (*CCI*) to evaluate crop commercialization and Tobit Regression Model to measure the effects of land tenure systems and agricultural intensification on crop commercialization among women farmers in Nigeria.

Results

Results show that the total number of plots held by women was 2,378 and the average farm size cultivated was 0.43hectare. Women practiced land tenure mainly by inheritance (42.9% of the plots). Though there are restrictions on land inheritance by women in some cultures, they have been able to have access to farm plots by land market; through outright purchase (39.9%) and rent (8.4%). Results on agricultural intensification show that the mean land use intensity was 0.26(±0.26). Also, on the average, labour use was approximately 55mandays/hectare and fertilizer use was 728kg/hectare. Crop commercialization results show that almost three-quarters (71.10%) of the women farmers were market oriented at different levels (0%<CCI<100%), 28.9% were fully subsistent (CCI=0%) and 2.30% fully commercialized their farm produce (*CCI*=100%). The mean *CCI* was 29.5(±31.3), meaning that only 29.5% of the quantity of the crops produced was commercialized. Tobit regression results show that land tenure systems and agricultural intensification have positive significant effects on crop commercialization among women farmers in Nigeria. Crop commercialization is low among women farmers. Land access and intensification improve crop commercialization by women farmers in Nigeria. There should be upgrading of informal land rights to legally enforceable rights for women farmers to provide greater protection (tenure security) for the women.

Keywords:

Land Rights, Land inheritance, Crop commercialization, Labour use intensity, Land use intensity, Fertilizer use intensity.

1.0 INTRODUCTION

Women make up 43percent of agricultural labour force worldwide (World Bank, 2012) although many work without pay. Food and Agriculture Organization (FAO, 2011) asserted that women constitute a large and important segment of smallholder farmers in sub-Saharan Africa. Women are the backbone of African agriculture and the guardians of the continent's food security. It is estimated that they produce 80percent of food resources (FAO, 2017). However, women have lower access to productive resources (land and capital) compared to their male counterparts.

Land is an important asset as a factor of production and of immense importance in agricultural production. Land is a critical factor of production in sub-Saharan Africa, and this is because the economy is largely based on agriculture, which requires access to land, but far too many people lack such access (United Nations, 2011). The success of using land as the core of the challenge of getting agriculture moving for food security and poverty reduction in Africa is based on land tenure.

Bruce, Wendland & Naughton-Treves (2010) consider land tenure as a set of institutions and policies that determine locally how land and its resources are accessed; who can hold and use these resources, and for how long and under what conditions they may be used. Greenwell (2008) explained land tenure as the manner in which land is held or transferred, and land tenure security refers to whether the landholders perceive that their land could be expropriated or not. Consequently, land tenure plays an important role in food production and in overall livelihoods of rural population of developing nations (Holden and Yohannes, 2002).

Smallholder farmers engage in agriculture mainly for household food self-sufficiency (subsistence farming) and some monetary income from their marketable surplus (semi-subsistence). The movement away from subsistence to greater market orientation is termed "commercialization". Commercialization can be referred to as the production of agricultural crops for sale in the market, rather than for family consumption; the transformation from production for subsistence to production for the market (Sokoni, 2008). This implies an increase in proportion of agricultural production that is sold by farmers. Agricultural commercialization is key in achieving economic development.

The process of commercialization can be broadly seen from output or input side. On the output side, there is an increase in the proportion of marketed output, and on the input side, an increase in the proportion of purchased inputs per unit of output. These commercialization effects can also occur simultaneously. On the input side, agricultural commercialization is related to agricultural intensification. Carswell (2011) defined agricultural intensification broadly as the process of humans changing the style of agriculture to move along the gradient from the lowest impact (shifting cultivation) all the way up to the industrial, high impact forms of agriculture. Intensification means a greater concentration of inputs and/or outputs per unit area.

Roger *et al. (*2013) stated that increased agricultural production for commercialization can only be achieved through sustainable agricultural intensification. This means fostering access to inputs, including the use of "smart" subsidy policies, encouraging the adoption of innovations and securing access to resources for women and young people in particular, possibly by law. Archambault (2016) stated that land tenure systems in the rural areas discriminate against women. In traditional

customary law, the wife is considered the property of the husband and so, whatever she owns devolves to the husband.

In addition, a woman's continued interest in a property owned by her husband is dependent on whether she bears children with the husband, or whether on the death of her husband, she chooses to remarry a male relation of her deceased husband. In Nigeria, the land challenges women face are sometimes as a result of "actions and inactions" of women (Chigbu, 2019). Women are often in a disadvantaged position in terms of access to land, inheritance practices, and norms and procedures for formalizing land rights. Strengthening women's rights to land ownership contributes to gender equality and poverty reduction since women are responsible for most food production (Amanda, 2007).

Fischer and Qaim (2012) stated that farmer groups have the potential to promote smallholder commercialization in a gender equitable way. According to Johnson *et al.* (2016), African women are more likely than African men to be self-employed in the agricultural sector; women's ownership of land and property can be potentially transformative, not only as a store of value, but also as a means of acquiring other assets and engaging in a range of markets. Land tenure security is crucial for women's empowerment and a prerequisite for building secure and resilient communities. Though their access to productive resources such as land and capital is often constrained, women play a large role in food crop production (Ibnouf, 2011). Hence, this study seeks to examine the relationship between land tenure system, agricultural intensification and crop commercialization among women farmers in Nigeria.

The broad objective of this paper is to examine the relationship between land tenure systems, agricultural intensification and crop commercialization among women farmers in Nigeria. The specific objectives are to:

i. Examine land tenure systems among women farmers in Nigeria.

ii. Analyze agricultural intensification among women farmers.

iii. Evaluate crop commercialization among women farmers.

iv. Measure the effects of land tenure systems and agricultural intensification on crop commercialization among women farmers in Nigeria.

2. RESEARCH METHODOLOGY

2.1 The Study Area

The study area is Nigeria. The land area is approximately 923,768km^2 with a population of 204 million as at 2017 (World Bank, 2017). As a tropical country, there are two seasons in Nigeria; the dry season which usually lasts from November to March with a temperature as high as 110°F and rainy season which usually lasts from March till October with average temperature between 73°F and 88°F, an average annual rainfall of 1693mm and an average annual temperature of 26.5°C. The country has 774 local government areas, grouped under its 36 states and the Federal capital territory in six geopolitical zones. The major food crops grown include yam, cassava, maize, vegetable, pepper, cashew (nuts), oil palm, millets, melon, rice, kolanut, soybean, rubber, and sorghum.

2.2 Types and Source of Data

Secondary data were used for the purpose of this study. The Nigeria General Household Survey (GHS) 2018, which is the fourth wave of the GHS, was used. The GHS-Panel was carried out by the World Bank in collaboration with the Nigerian Bureau of Statistics (NBS). The GHS-Panel survey is a nationally representative survey administered every 2-3 years, it covers a range of topics including demography, education, welfare, health, food security and agriculture. Data for 1,962 women farmers were extracted from the dataset.

For the purpose of this paper, information used from the GHS data include socioeconomic characteristics of women farmers; age, level of education, marital status, household size, farm size, and access to credit. Information on land tenure systems; types of land tenure practiced, proof of ownership, security of tenure on each plot and size of each plot (hectares). Information on agricultural intensification include labour use (mandays), fertilizer use (kilogram), land use (across geopolitical zones), and farm size (hectares). Information on crop commercialization among women farmers include, gross quantities of crops produced and gross quantities of crops sold.

2.3 Methods of Data Analysis

Descriptive statistics were used to describe the socio-economic characteristics of respondents and examine land tenure system among women farmers (objective 1). Results are presented in frequency distribution tables.

Land Use Intensity

Land use intensity model by Ruthenberg (1980) was used to determine the extent of land use by farmers (objective 2). It states thus:

$$R = \frac{C}{L}$$ Where: R = Ruthenberg index (land use intensity index), C = Cropping years

L = length of cycle of land cultivation (cropping years plus fallow period)

R is unitless and ranges from 0 to 1. The closer R is to 1, the higher the land use intensity.

Labour Use Intensity

Labour use intensity index for each woman farmer was computed to examine the extent of labour use for crop production. The labour index is reported in mandays per hectare. Higher values of labour use index represent more intensive labour use.

Labour use intensity of a farmer is specified as follows:

$$\text{Labour } \textit{use intensity index} = \frac{\textit{Total labour used (mandays)}}{\textit{Area of land cultivated (hectares)}}$$

Fertilizer Use Intensity

Fertilizer use index shows the extent of fertilizer use for crop production. The fertilizer index is reported in kilogram per hectare (kg/ha). A higher value of fertilizer index denotes more intensive use of fertilizer.

Fertilizer use intensity index = $\frac{\text{Total quantity of fertilizer used (kilogram)}}{\text{Area of land cultivated (hectares)}}$

Crop Commercialization Index (*CCI*)

Crop Commercialization Index (*CCI*) was used to evaluate crop commercialization among women farmers (objective 3). The *CCI* is conceptualized in this paper as a ratio of the gross quantity of all crop sales per household per year to the gross quantity of all crop production in the same year.

CCI is given as:

$$CCI = \frac{\text{Gross quantity of crop sales in year j}}{\text{Gross quantity of crop production in year j}} * 100\%$$

Where; *CCI*= Crop commercialization index of women farmers, *CCI* ranges between 0 and 100 ($0 \leq CCI \leq 1$). *CCI* = 100 if farmer sells all her output (fully commercialized)

CCI = 0 if farmer consumes all her output (subsistence)

$0 < CCI < 1$ = different levels of commercialization

Tobit Regression Model

The Tobit model was used to measure the effects of land tenure systems and agricultural intensification on crop commercialization among women farmers in Nigeria. The regression equation is stated as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + E_i$$

Where: *Y* = Crop commercialization index ($0 \leq Y \leq 100$)

X_1 = Land tenure types (Outright purchase, Distributed by community, Family inheritance)

Intensification Indices: X_2 = Fertilizer use intensity (Kg/ha), X_3 = Labour use intensity (Mandays/ha), X_4 = Land use intensity ($0 \leq R \leq 1$)

Socio-economic variables: X_5 = Household size (Number of persons), X_6 = Age (years), X_7 = Access to credit (No), X_8 = Access to extension service (No), X_9 = Marital status (married, single, separated, widowed), X_{10} = Level of education (No formal education, primary, secondary, tertiary), X_{11} = Membership of cooperative society (No), X_{12} = Engagement in non-agricultural business (Yes), X_{13} = Engagement in trading (Yes), *E* = Error term

3 RESULTS AND DISCUSSIONS

3.1 Socio-economic Characteristics of Respondents

The socio-economic characteristics of the women farmers in Nigeria are presented in Table 1. The mean age of the respondents was 33.4years (±16.3) with minimum of 12 years and maximum of 86 years. More than half (56.83%) of the respondents were married, having mean household size of 8.4(±5.15) persons, and most (39.14%) of the women farmers had secondary education. Low proportion (2.14%) of the farmers had access to extension agents, 10.45% belonged to cooperative societies, and 20.64% had access to credit facilities to finance their farm and cater for their basic

needs. Also, the average farm size cultivated by the women was 0.43hectare with a minimum of 0.0001hectare and maximum of 1.99hectares and 0.41% received monetary assistance from abroad.

Table 1: Socio-Economic Characteristics of Women Farmers in Nigeria

Variable	Frequency(n=1,962)	Percentage
Age (years)		
≤ 30	1.043	53.16
30-60	775	39.50
>60	144	7.34
Min. 12 years, Max. 86 years		
Mean 33.4(±16.4)		
Marital Status		
Single	657	33.49
Married	1,115	56.83
Divorced	6	0.31
Separated	27	1.38
Widowed	157	8.00
Level of Education		
Primary School	676	34.45
Secondary School	768	39.14
Tertiary	135	6.88
No formal Education	383	19.52
Household Size		
1-5	570	29.05
6-10	892	45.46
>10	500	25.48
Min. 1, Max. 33		
Mean 8.35(±5.15)		
Access to Extension Services (yes)	42	2.14
Membership of Cooperative Society (yes)	205	10.45
Access to Credit (yes)	405	20.64
Monetary assistance from abroad (yes)	8	0.41
Farm size (ha)		
≤0.5	1,351	68.86
0.5001 – 1.0	499	25.43
1.0001 - 1.99	112	5.71
Min. 0.0001, Max. 1.99		
Mean 0.43(±0.40)		

Source: Computed from GHS, 2021

Min-Minimum value, Max- Maximum value

3.2 Land Tenure Systems among Women Farmers in Nigeria

The various land tenure systems practiced by women farmers in Nigeria on their plots are presented in Table 2. The total number of plots held by women was 2,378. Land tenure system by inheritance was practiced on most (42.9%) of the plots. This points to the fact that women inherit land in Nigeria based on the culture and tradition of each zone. Though there are restrictions on land inheritance by women in some cultures, they have been able to have access to farm plots by

land market; through outright purchase (39.9%) and rent (8.4%). Alawode, Abegunde, & Abdullahi (2018) pointed to land market activities in Nigeria. Outright purchase confers ownership rights while rent gives use right to the tenant farmer by payment of rent to the landowner, and the land reverts back to the owner at the expiration of the contract. This underscores the participation of women in land market. Other types of tenure include land being used for free (6.35% of plots), through community distribution (1.6% of plots), through temporary land exchange (0.5% of plots), and sharecropping (0.2% of plots), where a tenant farmer pays for use of land with a share (part) of the crop produce. Secure tenure improves investment on land, crop outputs and commercialization.

Table 2: Land Tenure Systems among Women Farmer in Nigeria

Land Tenure System	Frequency	Percentage
Outright purchase	950	39.94
Rented	200	8.41
Used for free	151	6.35
Distributed by community	38	1.60
Family inheritance	1021	42.94
Sharecropped	5	0.21
Temporary Land exchange	13	0.55
Total number of plots held	2,378	100.00

Source: Computed from GHS, 2021

3.3 Agricultural Intensification among women farmers in Nigeria

The results of agricultural intensification among women farmers in Nigeria are presented in Table 3. The measures of intensification in this paper include land use intensity, labour use intensity and fertilizer use intensity.

Land Use Intensity

From the results in Table 3, most (65.90%) of the women farmers had land use intensity of less than 0.25 and the mean land use intensity of 0.26 (±0.26), implying low intensive use of land. The closer the index is to 1, the higher the land use intensity of the farmers; 1.53% of the women farmers had high land use intensity (LUI=0.751-0.99) meaning they practiced little fallow, and 5.96% used their lands for continuous cropping (LUI=1; no fallow at all). The results show that on the average, women farmers in Nigeria moderately practice fallow to improve land productivity and crop commercialization.

Labour Use intensity

Results on the extent of labour use by women farmers are presented in Table 3. Higher values of labour indices show more intensive labour use. On the average, labour use by women farmers per hectare was approximately 55mandays. Most (39.30%) of the women farmers used 25 mandays or less per hectare, while 4.89% used between 75.1 and 100 mandays per hectare. However, more than one-quarter (28.19%) of the women farmers used more than 100 mandays per hectare with maximum of 120mandays per hectare. There is need to develop labour saving technologies to achieve increased food crop outputs, improved commercialization and increased farm income.

Fertilizer Use Intensity

Table 3 shows the extent of fertilizer use for crop production among women farmers. Fertilizer use was measured in kilogram per hectare. Largest proportion (50.71%) of the women farmers used less than 500kg of fertilizer per hectare, which means they could increase their production with efficient use of fertilizer, while 11.37% of the women farmers used between 500kg and 1,000kg (1 tonne) per hectare, 31.60% used above 1 tonne of fertilizer to 1.5 tonnes per hectare, and 6.32% used about 2tonnes of fertilizer per hectare. The average quantity of fertilizer use among the women farmers was 728kg per hectare. The level of fertilizer usage could be attributed to the continuous use of land (high land use intensity) by some of the women with reduced time allocated for fallow. Optimum use of fertilizer increases crop output and crop commercialization.

Table 3: Agricultural intensification among women farmers in Nigeria

Intensification index	Frequency (n=1,962)	Percentage
Land use intensity (0≤R≤1)		
≤ 0.25	1,293	65.90
0.251 – 0.50	481	24.52
0.51 – 0.75	41	2.09
0.751 – 0.99	30	1.53
1.0	117	5.96
Min. 0.00, Max. 1.00		
Mean 0.26 (±0.26)		
Labour use intensity (Mandays/ha)		
≤25	771	39.30
25.1 – 50	379	19.32
50.1 – 75	163	8.31
75.1 – 100	96	4.89
>100.0	553	28.19
Min. 1, Max. 120		
Mean 54.76 (±45.00)		
Fertilizer use intensity(kg/ha)		
≤500.0	995	50.71
500.1 – 1000	223	11.37
1000.1 – 1500	620	31.60
1500.1 – 2000	124	6.32
Min. 4.61, Max. 2000.00		
Mean 728.24 (±592.04)		

Source: Computed from GHS, 2021

3.4 Crop Commercialization among Women Farmers in Nigeria

The results of crop commercialization among women farmers in Nigeria are presented in Table 4. The closer the index is to 100, the higher the degree of commercialization. Results show that more than one-quarter (28.90%) of the women farmers were subsistence farmers, they only produced for the consumption of their households, which implies no commercialization at all. The index of 0 means they did not sell any part of their farm produce. However, 71.10% of the women farmers were market oriented at different levels (0<CCI<100).

It is noted that 2.30% of the women fully commercialized their farm produce (100%), that is, all the farm produce is sold, which means the women farmers in this category had full market orientation. The mean household commercialization index was 29.5(±31.3). This implies that on the average, only 29.5% of the quantity of the crops produced was commercialized. Crop commercialization by women farmers in Nigeria is low. Participation in crop market offers opportunities for increasing their farm income.

Table 4: Crop commercialization among Women Farmers

Commercialization Index (%)	Frequency	Percentage
0	565	28.90
0.01– 25.0	509	26.04
25.01– 50.0	381	19.49
50.01 – 75.0	294	15.04
75.01 - 99.99	161	8.24
100	45	2.30
Total	1955	100.00
Mean 29.5 (±31.3)		
Min. 0, Max. 100		

Source: Computed from GHS, 2021

3.5 Effects of Land Tenure Systems and Agricultural intensification on Crop Commercialization among Women in Nigeria

Table 5 shows the results of the Tobit regression analysis on the effects of land tenure systems and agricultural intensification on crop commercialization among women farmers in Nigeria. The model was significant at 1%. Results show that land tenure systems (distribution by community and family inheritance), intensification indices (labour use intensity and land use intensity), and socioeconomic characteristics; age, access to credit, marital status (single and widowed), level of education (primary and secondary), membership of cooperative society, engagement in non-agricultural business and engagement in trading were the significant factors that determine crop commercialization among women farmers in Nigeria.

Land tenure systems

Land distribution by community and family inheritance were found to be positive and significant at 1% and 5% levels, respectively. Land tenure through distribution by community will lead to 1.6636 increase in the likelihood of commercialization when compared to women farmers that practiced land tenure by purchase. Also, land tenure by family inheritance will lead to 0.2434 increase in the likelihood of commercialization when compared to women farmers who practice land tenure by purchase. This may imply that women were more secured on land obtained through the community and family inheritance than purchase. For women farmers who acquired land through distribution by community, the likelihood of selling crops is higher than farmers that acquired land through family inheritance. Land tenure systems have significant positive effects on the level of commercialization by women farmers in Nigeria.

Intensification indices

Significant at 10%, a unit increase in labour use intensity will lead to 0.2679 increase in the likelihood of commercialization among women farmers. This implies that as labour use increases in terms of harvesting, sorting, processing and transporting produce to markets, commercialization also increases among the women farmers. More use of labour translates to higher level of crop production and consequently, higher level of commercialization.

Also, significant at 1%, a unit increase in land use intensity will lead to 3.2379 increase in the likelihood of commercialization among the women farmers. This implies that as land use increases, commercialization increases among the women farmers. This may be because land use intensity is low with mean of 0.26 (±0.26) as shown in Table 3. Increased land use or using land more intensively will increase the level of crop production and hence, commercialization, if necessary farm practices are adopted to keep the soil in optimum condition for crop growth.

Socioeconomic variables

Age of the women farmers was found to be significant at 5% level with a negative sign. This indicates that a year increase in age will lead to decrease in the likelihood of commercialization by 0.0080. Therefore, as the women farmers grow older, the extent of crop commercialization decreases. Access to credit was significant ($p<0.01$) and positively related to the level of crop commercialization. Having access to credit increases the likelihood of crop commercialization by 0.2713 when compared with women farmers that have no access to credit.

For marital status, being single was found to be significant at 1% level, having a negative relationship with crop commercialization. This indicates that, being single will lead to a decrease in the likelihood of commercialization by 0.5988 when compared to the women farmers that are married. Also, being widowed was found to be significant at 1% level with a positive sign. This explains that being widowed will lead to 0.6017 increase in the likelihood of commercialization when compared to women farmers that are married.

Level of education had positive signs for both primary and secondary, confirming that education has a significant effect on commercialization. Having primary education will lead to 0.2250 increase in the likelihood of commercialization ($p<0.05$) and having secondary education will lead to 0.3539 increase in the likelihood of commercialization ($p<0.01$) when compared to women farmers that do not have any formal education.

Membership of cooperative society was significant ($p<0.10$) and negatively related to the level of commercialization. Hence, not belonging to any cooperative society will lead to decrease in commercialization by 0.2406 when compared with women farmers that belong to a cooperative society.

Engaging in non-agricultural business was significant at 5% with a negative sign, showing that having other occupations other than crop production will lead to decrease in the likelihood of crop commercialization among the women farmers by 0.2697. Also, engaging in trading was significant at 1% with a negative sign, showing that engaging in trading will lead to decrease in the likelihood of crop commercialization among the women farmers by 0.4479.

Table 5: Effect of Land Systems and Agricultural Intensification on Crop Commercialization among Women in Nigeria

Commercialization index	Coefficient	Standard Error	t	P|t|	dy/dx
Land Tenure Systems					
Distributed by community	1.6636	0.2729	6.10	0.0000	1.6636***
Family inheritance	0.2434	0.1113	2.19	0.0290	0.2434**
Intensification indices					
Fertilizer use intensity	-0.2360	0.1725	-1.37	0.1710	-0.2359
Labour use intensity	0.2679	0.1372	1.95	0.0510	0.2679*
Land use intensity	3.2379	0.1555	20.82	0.0000	3.2379***
Socio-economic variables					
Household size	0.0109	0.0081	1.34	0.1800	0.0109
Age	-0.0080	0.0034	-2.40	0.0170	-0.0080**
Credit access (No)	0.2713	0.0934	2.90	0.0040	0.2713***
Extension access (No)	0.1934	0.2672	0.72	0.4690	0.1934
Single	-0.5988	0.1079	-5.55	0.0000	-0.5988***
Separated	-0.6861	0.4257	-1.61	0.1070	-0.6861
Widowed	0.6017	0.1402	4.29	0.0000	0.6017***
Primary education	0.2250	0.1131	1.99	0.0470	0.2250**
Secondary education	0.3539	0.1133	3.12	0.0020	0.3539***
Tertiary education	0.2704	0.1820	1.49	0.1370	0.2704
Membership of cooperative society (No)	-0.2406	0.1364	-1.76	0.0780	-0.2406*
Engagement in Non-Agric. Business (Yes)	-0.2697	0.1078	-2.50	0.0120	-0.2697**
Engagement in Trading (Yes)	-0.4479	0.1025	-4.37	0.0000	-0.4479***
_cons	-1.6261	0.3565	-4.56	0.0000	-2.3252
Sigma	1.2959	0.0383			1.2208

Source: Computed from GHS, 2021

4. CONCLUSIONS

Women farmers in Nigeria practice land tenure mainly by family inheritance and purchase and use land less intensively. The women farmers also practice intensification by the use of labour and fertilizer. Crop commercialization is low among women farmers as they sell approximately 30percent of their total crop produce. Land tenure system (land distribution by community and family inheritance) improves crop commercialization, and intensification (labour and land use intensities) also improves commercialization. Land tenure system and intensification improve commercialization by women farmers in Nigeria.

There should be upgrading of informal land rights to legally enforceable rights for women farmers. Such reform should provide greater protection (tenure security) for the women.

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7. AUTHOR CONTRIBUTIONS

Alawode Olubunmi Olanike – Data extraction, analysis and review

Oladokun Yetunde Olasimbo Mary – Data analysis and writing

Awotunde Mololuwa Mayowa – literature review and writing

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9. KEY TERMS AND DEFINITIONS

Crop commercialization: It is an increase in the proportion of marketed output; moving away from subsistence to commercial crop production.

Agricultural intensification: Greater concentration of inputs per unit area. It is measured in this paper by land use intensity, labour use intensity and fertilizer use intensity.

Land Tenure: The manner in which land is held. In this paper, land is held by women farmers through inheritance, outright purchase, rent, and others.